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<th>Strategy Process in Technology Transfer Offices</th>
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Strategy Process in Technology Transfer Offices

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This dissertation is submitted in fulfilment of the requirements for the Degree of Doctor of Philosophy (PhD), National University of Ireland, Galway.

December 2011
I hereby certify that this material, which I now submit for assessment on the programme of study leading to the award of Doctor of Philosophy is entirely my own work, that I have exercised reasonable care to ensure that the work is original, and does not to the best of my knowledge breach any law of copyright, and has not been taken from the work of others save and to the extent that such work has been cited and acknowledged within the text of my work.

Signed: ____________________________ Date: ____________________________
In loving memory of

Noreen McGill

“Hello Dearie, I am good”
ACKNOWLEDGEMENTS

First and foremost, I want to thank my supervisor Dr. James Cunningham. To look back over the process and see the manner in which he expertly assisted and directed my efforts is testament to his ability as both a teacher and an expert in his field. I have gained a great deal of knowledge and experience under James’s supervision. He has taught me, both consciously and unconsciously, how good research is done. I appreciate all his contributions of time, ideas, and feedback to make my Ph.D. experience productive and inspiring. I would also like to thank Dr Rachel Hilliard for her support and advice in guiding my research.

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Also, special thanks to Suz, Marie, Fran, and Hatch, for all the phone calls, emails, nights out and nights in with celebrations and cups of tea, to make sure
the bd’s were kept somewhat under control. Also, to Orls, Reg, Criodhna and Denise for checking in with me with much appreciated words of encouragement.

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My final word of thanks goes to MOB, for being with me every step of the way. For his understanding and patience when listening to my endless ramblings, and for his constant ability to show me what is really important, by making me laugh every single day and who is the highlight of my every day.
This study focuses on actors and activities of the technology transfer process from the perspective of the Technology Transfer Office (TTO) where the TTO acts as a boundary spanner in the triple helix of academy, industry and government entities. The purpose of this study, using strategy process theory, is to explore the extent to which TTOs are the key actors and influencers in the commercialisation of research from universities by exploring the extent to which the TTOs engage in strategy process. Motivating the decision to undertake such a study was the belief that, in more explicitly investigating the processes of the TTO, one could contribute to the understanding of 'how' the TTO engages in strategic choice. The study used an in-depth multi case study approach using a full population of Irish university TTOs, incorporating interviews and secondary data. Overall, the findings compare two approaches of TTOs to strategic choice; strategy takers and strategy makers and uses this finding to explain the differences in their process within the context of the National Innovation Framework. Moreover, a cross case analysis of different actors influence in the seven cases improves our understanding of the factors influencing the strategy process at a meso-level.
TABLE OF CONTENTS

DECLARATION........................................................................................................ III

ACKNOWLEDGEMENTS .................................................................................... IV

ABSTRACT.......................................................................................................... VI

TABLE OF CONTENTS ..................................................................................... VII

LIST OF TABLES ............................................................................................... XIII

LIST OF FIGURES ............................................................................................. XV

CHAPTER ONE: INTRODUCTION ........................................................................ 1

1.1 INTRODUCTION ............................................................................................ 1
1.2 SIGNIFICANCE OF RESEARCH TOPIC ......................................................... 1
1.3 SIGNIFICANCE OF TTOS ............................................................................. 3
1.4 SIGNIFICANCE OF STRATEGY PROCESS .............................................. 4
1.5 METHODOLOGY .......................................................................................... 5
1.6 RESEARCH LIMITATIONS ........................................................................ 6
1.7 IMPORTANCE AND CONTRIBUTION OF THE RESEARCH .................... 6
1.8 RESEARCHER MOTIVATION ..................................................................... 8
1.9 STRUCTURE OF THESIS .......................................................................... 9

CHAPTER TWO: LITERATURE REVIEW- NATIONAL INNOVATION SYSTEM, TRIPLE HELIX MODEL AND THE TTO ................................................................. 11

2.1 INTRODUCTION ........................................................................................... 11
2.2 INNOVATION CONTEXT .............................................................................. 12
2.2.1 NATIONAL INNOVATION SYSTEMS .................................................... 12
2.2.2 ROLE OF ACTORS IN NATIONAL INNOVATION SYSTEMS ........... 14
2.2.3 TRIPLE HELIX ....................................................................................... 14
2.2.4 CHANGING ROLE OF UNIVERSITY .................................................. 16
2.2.5 NEOLIBERAL MANAGERIALISM DRIVING STRATEGY .................. 16
2.2.6 ENTREPRENEURIAL UNIVERSITY ...................................................... 17
2.3 ROLE OF THE TTOS ................................................................................. 19
2.3.1 WHAT IS A TTO? .................................................................................. 19
2.3.2 PURPOSE OF TTOS ............................................................................. 20
2.3.3 PREVIOUS EMPIRICAL STUDIES OF TTOS .................................... 22
2.3.4 RATIONALE FOR TTO ........................................................................ 26
2.3.5 CRITICISM OF TTO ............................................................................ 28
4.6 OUT IN THE FIELD ............................................................................................................ 76
4.6.1 COLLECTING INTERVIEW DATA .................................................................................. 77
4.6.2 TAPE RECORDINGS AND NOTE TAKING ................................................................. 78
4.6.3 TAKING NOTES ........................................................................................................... 78
4.7 DATA ANALYSIS ............................................................................................................. 79
4.7.1. ESTABLISHING RIGOUR IN WRITING UP CASE STUDY RESEARCH .................. 79
4.7.2 CODING ....................................................................................................................... 82
4.7.2.1 CODING FIRST STEPS .......................................................................................... 83
4.7.2.2 ANALYSIS .............................................................................................................. 83
4.7.2.3 DEFINITION OF EACH CASE .............................................................................. 83
4.7.2.4 DATA IMPORTATION ............................................................................................ 84
4.7.2.5 FIELD NOTES AND OBSERVATIONS ................................................................. 84
4.7.2.6 CODING FRAMEWORK ....................................................................................... 85
4.8 BIAS ............................................................................................................................... 87
4.9 LIMITATIONS OF METHODOLOGY ............................................................................... 87
4.10 CONCLUDING COMMENTS .......................................................................................... 88

CHAPTER FIVE: THE STRATEGIC CONTEXT FOR TTOS IN IRELAND ................................. 89

5.1 INTRODUCTION ................................................................................................................ 89
5.2 STRATEGIC POSITIONING OF TTO ............................................................................. 89
5.2.1 THE EXTERNAL ENVIRONMENT .............................................................................. 90
5.2.1.1 POLITICAL AGENDA ......................................................................................... 90
5.2.1.2 POLICY INITIATIVES ....................................................................................... 94
5.2.1.3 TECHNOLOGY TRANSFER STRENGTHENING INITIATIVE ................................. 99
5.2.1.4 POLITICAL ACTORS ....................................................................................... 102
5.2.1.5 ECONOMIC ENVIRONMENT ............................................................................ 105
5.2.1.6 FUNDING CHALLENGES ............................................................................... 106
5.2.1.7 OUTCOMES ....................................................................................................... 108
5.2.2 STRATEGIC CAPABILITY ......................................................................................... 109
5.2.2.1 STRENGTHS OF THE IRISH TECHNOLOGY TRANSFER SYSTEM .................. 109
5.2.2.2 CHALLENGES OF THE IRISH TECHNOLOGY TRANSFER SYSTEM .............. 110
5.2.2.3 INFLUENCING ACTORS .................................................................................... 111
5.2.3 PURPOSE .................................................................................................................. 112
5.2.3.1 GROWTH OF TTO ........................................................................................... 113
5.2.3.2 STRATEGIC ROLE OF TTO ............................................................................. 113
5.2.4 CULTURE ................................................................................................................... 115
5.2.4.2 ORGANISATIONAL CULTURE ......................................................................... 116
5.2.5 STRATEGIC POSITIONING SUMMARY .................................................................. 117
5.3 INTRODUCING THE CASES ......................................................................................... 117
5.3.1 OVERVIEW OF CASES ............................................................................................ 118
5.3.2 REPORTING STRUCTURE ......................................................................................... 118
5.3.3 ACTIVITIES .............................................................................................................. 119
5.4 CONCLUDING COMMENTS ............................................................................................ 121
7.2.3 ANTECEDENTS ........................................................................................................ 172
7.2.4 AGENDA SETTING ................................................................................................. 174
7.2.4.1 APPROPRIATING AND ALLOCATING RESOURCES ...................................... 174
7.2.4.2 ALIGNMENT TO UNIVERSITY ....................................................................... 175
7.2.5 STRATEGIC ARTEFACTS ...................................................................................... 176
7.2.6 CONCLUDING COMMENTS: RESEARCH QUESTION ONE .................................. 178
7.3 HOW DO KEY ACTORS INFLUENCE TTO STRATEGY PROCESS? ......................... 182
7.3.1 INFLUENCE OF KEY ACTORS ............................................................................ 182
7.3.2 HOW THE KEY ACTORS INFLUENCE STRATEGY PROCESS OF THE TTO ...... 184
7.3.3 KEY ACTORS IN THE NATIONAL INNOVATION SYSTEM ..................................... 185
7.3.4 HOW NIS ACTORS INFLUENCED TTO STRATEGIC CHOICE .............................. 186
7.3.5 CONCLUDING COMMENTS: RESEARCH QUESTION TWO ............................... 188
7.4 STRATEGIC OUTCOMES ......................................................................................... 191
7.4.1 DRIVERS OF CHANGE ....................................................................................... 192
7.4.2 STRATEGY PROCESS DRIVEN .......................................................................... 192
7.4.2.1 STRATEGY PROCESS DRIVEN ................................................................... 192
7.4.2.2 CONTEXT DRIVEN ....................................................................................... 193
7.4.3 CONCLUDING COMMENTS: RESEARCH QUESTION THREE ............................ 194
7.5 CONCLUDING COMMENTS ...................................................................................... 195

CHAPTER EIGHT: CONCLUSION ..................................................................................... 197

8.1 INTRODUCTION ........................................................................................................ 197
8.2 STUDY OVERVIEW – STRUCTURE AND CONTENT OF THE RESEARCH AGENDA .... 197
8.3 RESEARCH GAPS AND OBJECTIVES .................................................................. 198
8.3.1 TTO LITERATURE GAPS .................................................................................. 199
8.3.2 STRATEGY PROCESS LITERATURE GAPS ......................................................... 200
8.4 KEY CONCLUSIONS OF RESEARCH .................................................................... 203
8.4.1 KEY CONCLUSIONS OF THE OVERARCHING RESEARCH QUESTION ............... 203
8.4.2 KEY CONCLUSIONS OF RESEARCH QUESTION ONE ....................................... 204
8.4.3 KEY CONCLUSIONS OF RESEARCH QUESTION TWO ...................................... 206
8.4.4 KEY CONCLUSIONS OF RESEARCH QUESTION THREE ................................. 208
8.5 CONTRIBUTION OF RESEARCH .......................................................................... 208
8.5.1 CONTRIBUTION OF RESEARCH TO TTO THEORY ......................................... 209
8.5.2 CONTRIBUTION OF RESEARCH TO TTO PRACTICE ....................................... 210
8.5.3 CONTRIBUTION OF RESEARCH TO STRATEGY PROCESS THEORY ............. 211
8.6 IMPLICATIONS FOR RESEARCH METHODOLOGIES AND FUTURE RESEARCH AGENDA ............................................................................................................... 214
8.6.1 IMPLICATIONS FOR RESEARCH METHODOLOGY ......................................... 214
8.6.2 FUTURE RESEARCH AGENDA .......................................................................... 216
8.7 RÉSUMÉ .................................................................................................................. 218

BIBLIOGRAPHY .............................................................................................................. 220

APPENDIX A: ACADEMY OF MANAGEMENT 2011 REVIEWER
COMMENTS .................................................................................................................... 238
APPENDIX B: CALL FOR PROPOSALS TO STRENGTHEN TECHNOLOGY TRANSFER OFFICES IN HIGHER EDUCATION INSTITUTIONS ................................................................. 240

APPENDIX C: CURRENT TRENDS FROM INTERNATIONAL TTOS........ 254

APPENDIX D: DIRECTOR OF TECHNOLOGY TRANSFER AND INNOVATION JOB SPECIFICATION................................................................. 255

APPENDIX E: SUMMARY OF SEMINAL AUTHORS IN STRATEGY PROCESS DEBATE .............................................................................................. 256

APPENDIX F: INTERVIEW QUESTIONS ......................................................... 258

APPENDIX G: ENTERPRISE IRELAND REVIEW .............................................. 259

APPENDIX H: CORRESPONDENCE TO INTERVIEWEE REQUESTING PARTICIPATION .............................................................................................. 261
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Overview of Gaps and Proposed Contribution of Study</td>
</tr>
<tr>
<td>1.2</td>
<td>Structure of Thesis</td>
</tr>
<tr>
<td>2.1</td>
<td>Definitions of National Innovation Systems</td>
</tr>
<tr>
<td>2.2</td>
<td>New Public Management Principles</td>
</tr>
<tr>
<td>2.3</td>
<td>Entrepreneurial University Characteristics</td>
</tr>
<tr>
<td>2.4</td>
<td>Common Definitions of TTO</td>
</tr>
<tr>
<td>2.5</td>
<td>Technology Transfer Process Definitions</td>
</tr>
<tr>
<td>2.6</td>
<td>Characteristics of TTO</td>
</tr>
<tr>
<td>2.7</td>
<td>Challenges of Working with Different Actors in University Technology Transfer System</td>
</tr>
<tr>
<td>3.1</td>
<td>Strategy Process Research Context</td>
</tr>
<tr>
<td>3.2</td>
<td>Guiding principles for strategy process study</td>
</tr>
<tr>
<td>3.3</td>
<td>Strategy Process Topics from Various Disciplines</td>
</tr>
<tr>
<td>3.4</td>
<td>Dimensions of Strategy Process Research</td>
</tr>
<tr>
<td>4.1</td>
<td>Research Questions</td>
</tr>
<tr>
<td>4.2</td>
<td>Yin (2003) Conditions for Case Study Research</td>
</tr>
<tr>
<td>4.3</td>
<td>Case Selection</td>
</tr>
<tr>
<td>4.4</td>
<td>Sources of Evidence</td>
</tr>
<tr>
<td>4.5</td>
<td>Mechanisms to engage with case participants</td>
</tr>
<tr>
<td>4.6</td>
<td>Researchers role in Case Study</td>
</tr>
<tr>
<td>4.7</td>
<td>Overview of Interviews by Role</td>
</tr>
<tr>
<td>4.8</td>
<td>Elements of Credibility in Case Study Research</td>
</tr>
<tr>
<td>4.9</td>
<td>Summary of Main Steps in Data Collection and Analysis Process</td>
</tr>
</tbody>
</table>

xiii
Table 5.1: Policy Initiatives
Table 5.2: Main aims of the Strategy for Science, Technology and Innovation 2006-2013
Table 5.3: PRTLI Funding Cycles
Table 5.4: Enterprise Ireland Initiatives supporting university-industry collaboration
Table 5.5: TTO Metrics
Table 5.6: Reintroduction to Cases
Table 5.7: Hard and Soft Activities of TTOs

Table 6.1: Recap of Research Questions
Table 6.2: Overview of planning approaches to TTSI
Table 6.3: Recap of Benchmarking Activities
Table 6.4: Recap of Professional Development Activities
Table 6.5: Appropriating and Allocating Resources
Table 6.6: Excerpts from a sample of university strategic plans from the cases
Table 6.7: University Mission Statements including TTO role
Table 6.8: Overview of Alignment to University
Table 6.9: TTO Mission Statement Analysis
Table 6.10: Deliberate and Emergent Strategy Formulation in TTOs
Table 6.11: Actors in university industry technology transfer process
Table 6.12: Role of TTO as influencer of strategy process
Table 6.13: Role of Enterprise Ireland as influencer of strategy process
Table 6.14: Role of University Management, in particular the VP of Research as influencer of strategy process
Table 6.15: TTO Activities to engage Academics
Table 6.16: Role of Industry as influencer in strategy process of TTO
Table 6.17: Overview of key influencers in TTO strategy process
Table 6.18: Increase in university commercialisation activity since TTSI
Table 6.19: Enterprise Ireland Definition of High Potential Start up
Table 6.20: Key findings on how strategic outcomes are shaped in TTOs
Table 7.1: Antecedents as part of strategy process in TTOs
Table 7.2: Appropriating and Allocating Resources in TTOs
Table 7.3: Agenda Setting Activities as part of Strategy Process in TTOs
Table 7.4: Mission Statement analysis of TTOs
Table 7.5: Reflection of Mission Analysis
Table 7.6: Contribution of Research Question One
Table 7.7: Contribution of Research Question Two
Table 7.8: Contribution of Research Question Three

Table 8.1: Overview of Research Gaps identified
Table 8.2: Overview of Key Research Questions
Table 8.3: Contribution of Research to TTO Literature, TTO practice and Strategy Process theory

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**LIST OF FIGURES**

Figure 2.1: HEI Technology Transfer Process
Figure 2.2: Modes of Metrics
Figure 4.1: Coding Diagram
Figure 5.1: Total R & D Expenditure as a % GDP
Figure 5.2: Patenting Filing
Figure 5.3: EIS 2008 Innovation Performance
Figure 5.4: Ireland’s Innovation Performance
Figure 5.5: Map of Ireland’s Technology Transfer System
CHAPTER ONE: INTRODUCTION

Whatever you can do, or dream you can, begin it.
Boldness has genius, power and magic in it.
Goethe

1.1 INTRODUCTION

This chapter introduces the motive and significance of this research. The research examines Technology Transfer Offices (TTOs) and the ways in which TTOs engage with strategy process. The theme of strategy process deals with the antecedents, processes and outcomes of strategy (Pettigrew, 1992). The research is anchored in the National Innovation Systems literature with the focus being on the strategy process of the TTO. There are seven university TTOs in Ireland and all seven were selected as cases. The significance of the research is outlined, followed by the methodology of the research and research limitations are presented and this is discussed further in the methodology and concluding chapters. The importance and contribution of the research is presented and also the motivation of the researcher is outlined. Finally, the structure of the remaining chapters of the thesis is previewed.

1.2 SIGNIFICANCE OF RESEARCH TOPIC

The central aim of this thesis is to investigate how TTOs engage in strategy process and to consider the contextual conditions underpinning the formulation of strategy in TTOs. The focus of this research effort is strategy formulation of TTO in the context of a triple helix of stakeholders. Having outlined the overarching research aim, the objective is to explain the contribution this thesis can make to existing knowledge in the field of technology transfer and strategy process. In undertaking a comprehensive review of the literature in the technology transfer
field, an important agenda emerged. There are appeals for the TTO to be considered a strategic subject, both empirically and in practice as outlined by Phan and Siegel (2006: 26) “for technology transfer to succeed, it is critical for university administrators to think strategically about the process”.

With any research there is a choice to be made in terms of sample, context or site. This research chooses TTOs as suitable site for a study of strategy process. This selection is the result of two considerations. Firstly, the changes in universities have led them to being identified as increasingly important areas of study for business and management scholars (Ferlie et al, 1998, Pettigrew et al, 1992). The impact of competitive forces may be seen in strategic behaviour such as the rise of entrepreneurialism in universities in order to maximise public funding and gain additional resources from commercial activities (Clark, 1998). As such, there are areas of convergence between private and public sector strategies. While this thesis does not directly engage in such comparisons, it draws upon the changing nature of higher education suggesting that universities may be considered a relevant and ripe climate for a study of strategy process practices. Secondly, how strategy is undertaken by TTOs is not understood and needs significant research (Siegel et al, 2008, Markman et al, 2009, Sanders and Miller, 2010). The area of strategy covers an assorted array of topics and research perspectives. This diversity is the advantage of the discipline, but it also poses a challenge to conduct high quality research for the strategy researcher. This requires that strategy researchers develop a body of theoretical claims that can make a contribution to an established field by applying existing strategy frameworks and concepts and enhance and contribute original research to grow the strategy field. As argued by Ander et al. in the following quote: “Researchers who do manage to appreciate and build on prior work improve the quality of their research in several ways. They avoid dead ends that others explored. They benefit from the logic, language and the findings that others generated. They uncover threads that can be fruitfully taken up again as methodologically advances make them more tractable. They discover the deep ideas that made the classics classic. Perhaps more important, they allow the field to progress in a cumulative and steady fashion, not
in fits and starts” (Ander et al, 2009: 202 ). The significance of TTO and strategy process will be outlined.

1.3 SIGNIFICANCE OF TTOS

TTOs are making the headlines both globally and nationally. The TTO is a significant intermediary in successfully commercialising university intellectual property. Academics, governments and state agencies worldwide place huge effort in understanding the nature of university–industry engagement and in finding means to encourage closer university industry linkages. Successive policy reports from Irish governments since 1984 have set in place policy imperatives to stimulate closer links between industry and academia. Furthermore, in a national context there is an increased focus on universities to deliver economic returns having received a large investment from the Irish government in recent years. TTOs worldwide are looking to emanate the blockbuster technology success of American universities such as Stanford with Google and the University of Florida with its Vitamin D complex (Greenberg, 2007). The Association of University Technology Managers (AUTM) recently presented the highlights of the AUTM Licensing Activity Survey Summary for FY2010 where the academic technology transfer organisation noted that "despite continuing difficult economic conditions, university and research institute licensing and start-up activity remained very strong" in 2010 (AUTM, 2011: 16). In particular, the AUTM survey found that 651 university start-ups were created in 2010, up 9.2% from the 596 university start-ups created in 2009. The survey also found that licensing revenue rose 3.0% from 2009 to 2010, reversing a sharp decline that saw revenue drop 32.5% between 2008 and 2009. The number of licenses also increased in 2010, albeit only by 0.6%. The survey was generated from 183 responses to a survey sent to 307 U.S. institutions (AUTM, 2011). However, in spite of the increased emphasis placed on the TTO to deliver, little is known about the ‘black box’ of the TTO, specifically relating to strategy processes (Sanders and Miller, 2010). Against this backdrop it is relevant to ask to what extent the TTO engages in strategy process.
1.4 Significance of Strategy Process

This research examines TTOs within the context of seven Irish universities. It examines the ways in which TTOs engage in strategy process. The theme of strategy process centres on the antecedents, processes and outcomes of strategy (Pettigrew, 1992). The term ‘process’ has three main implications for an investigation of strategy. First, it suggests that strategy is an activity over time. Thus the study has a particular focus on the way TTOs engage in activities over time. Secondly, the verb process implies context is important. Finally, process suggests that strategy arises out of interaction with multiple actors (Langley, 1999). From these three perspectives, strategy is formulated. Hence at the outset, the research is concerned with TTO activities, actors and outcomes. As such the topic is located in the domain of strategy process research, focusing as it does upon strategic actors, activities and outcomes occurring within context over time (Chakravarthy and Doz, 1992, Pettigrew, 1992, 1990, Van de Ven, 1992). Therefore, in the tradition of strategy process research, which assumes a holistic approach capturing ‘reality in flight’ (Pettigrew, 1990:270), this research draws upon a broad set of literatures in order to inform both the theory and the analysis of strategy process in TTOs (Chakravarthy and Doz, 1992).

The theme of strategy process deals with the antecedents, processes and outcomes of strategy (Pettigrew, 1992). The originality of the research is developed and explained as “the theoretical contribution involve findings that change, challenge, or fundamentally advance our understandings of a phenomena…In other words the findings cause us to think about a phenomenon, in a way that past research would not normally suggest…It’s not just about “filling a gap” in the literature, it is also about changing the ways scholars think and talk about the phenomenon” (Bansal and Corley, 2011 : 235). The objective of the research is to reconceptualise the way TTOs are regarded and to start the discussion of strategy process in boundary spanning organisations. The next section outlines the method to capture the study.
1.5 Methodology

In investigating a nascent field of research, there are specific considerations to be borne in mind. This thesis adopts a form of hybrid deductive/inductive approach on the premise that it will enhance reader comprehension since: “a purist rendering of interpretive reporting unfortunately requires the reader to work through lengthy data presentation before learning what the major contributions of the research are likely to be” (Gioia and Chittiped, 1991:434).

From a data collection perspective, much of the current research in the area of Technology Transfer is dominated by large-scale quantitative surveys and economic datasets typically using AUTM datasets. The research design uses in-depth multi-case studies as they are more appropriate than surveys for examining the intricate dynamics of TTO processes and in particular their relationships with their stakeholders. While surveys are helpful in measuring the effectiveness of TTOs in terms of measuring outputs, they cannot effectively explore the nature, process and dynamics of TTO processes. In pursuing gaps in the TTO literature, the researcher devised an overarching research question and sub research questions to design the research agenda and frame the reporting of the subsequent research findings and discussion. The outputs of the research are expected to be significant given the fact that TTOs are increasingly on the strategic agenda of both universities and policy-makers, both nationally and internationally (OECD, 2006). In light of the research questions, and the nature of the phenomena being investigated, case study method was the chosen as the most suitable research strategy. The use of qualitative research techniques will ensure richness of outcomes and adds weight to the robustness and validity of findings (Yin, 2003). The context to the study was acknowledged in chapter four, as the strategic positioning of TTOs in an Irish context, in order to express the strategic considerations for the cases.
1.6 RESEARCH LIMITATIONS

The most obvious drawback of proposed methodology is its inherent ambiguity of strategy process research. Words have multiple meanings, and these meanings can change over time as language evolved. This ambiguity has led at times to persistent confusion over key ideas in strategy (Hamilton et al, 2003). The design of the study intends to overcome such limitation by applying triangulation of data methods within each case study. Furthermore, all of the cases are Irish based which may limit the generalisability of the findings. However, given the few empirical studies addressing strategy process in a boundary spanning organisation like the TTO, the findings of the study will be of interest and contribute to the field, and inspire other studies to be conducted in other contexts and on a larger scale.

1.7 IMPORTANCE AND CONTRIBUTION OF THE RESEARCH

An examination of the strategy processes of TTOs and its consequences for stakeholders is a crucial area for analytical and empirical examination, particularly because there are considerable weaknesses, ambiguities and unresolved issues in the existing literature, and, indeed, within the wider public debate. This research offers several contributions. This research study addresses a gap in the study of TTOs that is how do they engage with strategy by examining their strategy process. Specifically the research addresses the role of the TTO, examining the antecedents, process and outcomes of strategy process within TTO and addresses the calls for research to address the ‘black box’ of TTO activities (Sanders and Miller, 2010). The research merges ideas from multiple disciplines, strategy process and technology transfer, in ways that produce something greater than the simple sum of the discipline based ideas, as recommended by Hutzschenreuter and Kleindienst (2006) in their recommendations for high quality research in strategy. In addressing the process of strategy formulation, the research will shed light on the TTOs strategic role within the triple helix of
university, industry, government. This will be achieved by looking at the antecedents, processes and outcomes of strategy formulation. Using seven cases of Irish TTOs provides a unique context to extend and develop theory in this important field of study. Pettigrew’s (1992) strategy process ideas will provide the theoretical lens through which the processes are explored. This is further supported by Hutzschenreuter and Kleindienst’s (2006) framework. The practical application of the research to the TTO profession reflects the field’s origin in the practice of strategic management and its status as an applied social science field (Ander et al, 2009). Table 1.1 presents contribution of study.

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<thead>
<tr>
<th>Technology Transfer – Key Gaps</th>
<th>Strategy Process- Key Gaps</th>
</tr>
</thead>
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<tr>
<td>The TTO literature is predominantly economic focused (Siegel et al, 2008)</td>
<td>Strategy Process theories are vague and complex (Hutzschenreuter and Kleindienst, 2006)</td>
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<tr>
<td>There is an absence of meaningfully frameworks to guide strategy in TTOs (Phan and Siegel, 2006)</td>
<td>University setting has been neglected from a strategy process perspective. There is a need to understand in more detail the application of strategy process to a university/industry hybrid organisation (Buckland, 2009)</td>
</tr>
</tbody>
</table>

Contributions

| Enhance our understanding of the strategic role of the TTO in a boundary spanning capacity (Sanders and Miller, 2010) | Enhance our understanding of how TTOs engage in strategy process by looking at antecedents, processes and outcomes of strategy (Pettigrew, 1992) |
| Contribute to our understanding of the influence of actors in the technology transfer process (Sanders and Miller, 2010) | Contribute to the literature on strategy process by exploring strategy in a new hybrid boundary spanning organisation (Langley, 1999) |
1.8 Researcher Motivation

The researcher was inspired to pursue doctoral research for a number of reasons, not least the reason as articulated by Einstein when he wrote “the state of mind which enables a man to do work of this kind is akin to that of the religious worshiper or the lover; the daily effort comes from no deliberate intention or program, but straight from the heart” (Einstein, 1918). Furthermore the researcher sought to engage with real life issues as advised by Van de Ven (2006) in his book ‘Engaged Scholarship’. In order to address such real life issues the researcher over the period of three years engaged in Linked In discussions on the subject of technology transfer and took opportunities to engage with many people who have an interest in the area to keep up to date with the research issues. Perhaps the most significant opportunity to address real issues within the Technology Transfer practitioner community presented itself when the researcher had the opportunity to present her winning literature review paper, ‘Legitimacy, Mission and Management: Key Strategic Challenges for TTOs’ at the Association of University Technology Managers (AUTM) annual conference. AUTM are a global network of more than 3500 technology transfer professionals who work in academic, research, government, legal and commercial settings. Their mission is to promote and support technology transfer through education, advocacy, networking and communication. The literature review competition was based on communicating research in a manner explicable to the technology transfer practitioners, thus accentuating the saliency and significance of this research topic to the practitioner community. Furthermore, the researcher met with strategy process experts when she presented her paper at the Academy of Management Conference (See Appendix A for reviewer comments).
1.9 Structure of Thesis

The thesis is structured as follows. A review of the literature is undertaken in chapters two and three, setting out the theoretical background and issues relevant to the current research. Gaps in theoretical understanding of strategy process are highlighted which form the basis of the research questions developed to help frame the research agenda. The research methodology follows in chapter four, setting out the design, research methods employed and methodology pursued to undertake the research. Context is addressed in chapter five in terms of presenting a strategic positioning of TTO in an Irish Context. Key results are reported in chapters six, followed by an analysis of the findings in light of the literature and research objectives in chapter seven. Finally the concluding chapter illustrates how the research makes a number of important contributions to understanding TTO strategy process. The main contribution to theorising and interpreting TTOs strategy process is summarised and associated with relevant bodies of literature. Limitations of the current study are also acknowledged. Finally, potential avenues of interest arising from the study are outlined as a future research agenda. Table 1.2 presents structure of thesis.

Table 1.2: Chapter Outline

<table>
<thead>
<tr>
<th>CHAPTER ONE</th>
<th>INTRODUCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHAPTER TWO</td>
<td>LITERATURE REVIEW- NATIONAL INNOVATION SYSTEMS, TRIPLE HELIX MODEL AND THE TTO</td>
</tr>
<tr>
<td>CHAPTER THREE</td>
<td>LITERATURE REVIEW – STRATEGY PROCESS</td>
</tr>
<tr>
<td>CHAPTER FOUR</td>
<td>METHODOLOGY</td>
</tr>
<tr>
<td>CHAPTER FIVE</td>
<td>THE STRATEGIC CONTEXT FOR TTOS IN IRELAND</td>
</tr>
<tr>
<td>CHAPTER SIX</td>
<td>FINDINGS</td>
</tr>
<tr>
<td>CHAPTER SEVEN</td>
<td>DISCUSSION</td>
</tr>
<tr>
<td>CHAPTER EIGHT</td>
<td>CONCLUSION</td>
</tr>
</tbody>
</table>
CHAPTER TWO: LITERATURE REVIEW- NATIONAL INNOVATION SYSTEM, TRIPLE HELIX MODEL AND THE TTO

"The place where you made your stand never mattered. Only that you were there...and still on your feet."
Stephen King

2.1 INTRODUCTION

This chapter provides a review of literature in the area of innovation and technology transfer, and outlines the theoretical underpinnings of the study. It focuses on defining and clarifying various concepts associated with technology transfer and is intended to provide a synthesis of the key debates in the literature on technology transfer to date. It is divided into four sections. Section one considers the context of university industry technology transfer and positions the study in the literature of National Innovation Systems, the Triple Helix, and the changing role of the university. Section two examines the role of the TTO in particular, outlining the studies to date, with particular attention to delineating the contrasting accounts from the ‘fairytales from the enthusiasts’ and the ‘jeremiads from the critics’ of TTOs (Greenberg, 2007). This section provides a rigorous definition of the concept of technology transfer that is found in much of the existing literature and considers the competing perspectives on the differing views on the broad role of the TTO and the competing stakeholder perspectives. In section three, strategic issues for the TTO are analysed from the literature. Finally, in section four, arguments are raised as to why the extant TTO literature has not offered any deep understanding of the strategy underpinning TTO activities and why strategy process theory can provide more insight into the strategic complexities of the TTO and presents the overarching analytical lens of strategy process.
2.2 INNOVATION CONTEXT

The creation and sustaining of innovation has been of interest at individual and national levels. Universities are now being primed as key to the national innovation agenda. The rationale for looking at the innovation context is to position the context of the university and to review the debates on the changing role of the university. This section considers the context of university industry technology transfer and positions the study in the literature of National Innovation Systems, the Triple Helix, and the changing role of the university to become an entrepreneurial university.

2.2.1 National Innovation Systems

This study is situated in the field of innovation as the focus of the study is TTOs in Irish universities. The National Innovation System is the movement of technology and information among people, industries and institutions which is significant to the innovation process on a national level. Lundvall (1992) and Freeman (1985) are both credited for conceptualising the term National Innovation Systems. The concept emerged in a very specific set of sociological circumstances as policy makers and academics attempted to understand the competitiveness of a country. Finland was the first to adopt a National Innovation Systems perspective for its policy making ambitions (Sharff, 2006) and it can be argued are seeing the rewards today as they frequently are awarded the accolade of being one of the most innovative countries in the OECD (2006). The ‘national’ in NSI refers to the idea that the system of institutions will have evolved uniquely in each country and so the type of innovation and the innovation capacity will be unique to that country. Furthermore, there is a debate about what constitutes ‘institutions’ – the OECD take a ‘hard’ view, where institutions are tangible actors (university, government etc) but the Scandinavian tradition, especially Lundvall (1992), appreciate ‘softer’ aspects such as norms, customs and particularly styles of
learning as important institutions that influence innovation. According to innovation system theory, technology development and innovation are outcomes of a complex set of relationships among actors in the system, which includes industry, universities and government research agencies. However, the field is lacking a single definition of a National Innovation System. A few dominating definitions are listed below (quoted by the OECD publication National Innovation Systems, 1997). The common words are highlighted in table 2.1 below. Based on the commonalities of definitions below, networks are important, also relationships and interconnected institutions are the key drivers of a National Innovation System. Thus, the relationships between the interconnected actors are important.

Table 2.1: Definitions of National Innovation Systems

<table>
<thead>
<tr>
<th>Definition</th>
<th>Year</th>
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<tbody>
<tr>
<td>…the <strong>network</strong> of institutions in the public and private sectors whose activities and interactions initiate, import, modify and diffuse new technologies</td>
<td>Freeman, 1985</td>
</tr>
<tr>
<td>The elements and <strong>relationships</strong> which <strong>interact</strong> in the production, diffusion and use of new and economically useful knowledge…and are either located within or rooted inside the borders of a nation state</td>
<td>Lundvall, 1992</td>
</tr>
<tr>
<td>…a set of institutions whose <strong>interactions</strong> determine the innovative performance of national firms</td>
<td>Nelson, 1993</td>
</tr>
<tr>
<td>The <strong>national institutions</strong>, their incentive structures and their <strong>competences</strong> that determine the rate and direction of technological learning (or the volume and composition of change generating activities) in a country</td>
<td>Patel and Pavitt, 1994</td>
</tr>
<tr>
<td>That set of distinct institutions which <strong>jointly and individually</strong> contribute to the development and diffusion of new technologies and which provides the <strong>framework</strong> within which governments form and implement policies to influence the innovation process. As such it is a <strong>system of interconnected institutions</strong> to create, store, and transfer the knowledge, skills and artefacts which define new technologies</td>
<td>Metcalfe, 1995</td>
</tr>
</tbody>
</table>
2.2.2 Role of Actors in National Innovation Systems

There are critics of these theories who argue against the concept of a National Innovation System. Hicks and Katz (1996) argue the difficulties of regularly producing systemic bibliometric indicators for a range of countries and also critique the pre packaged thinking of science and technology in this National Innovation Systems framework which lends to overly systematic thinking and lack of critical analysis. In spite of these critiques the concept is still in use today, both in policy and academic circles and of most significance to this study, places importance on the role of actors. The National Innovation Systems theory complements Etzkowitz (1983) with his Triple Helix metaphor as the Triple Helix denotes the relationship between the key actors of government, industry and the university as overlapping spheres of interaction and interdependence. This will be described in detail.

2.2.3 Triple Helix

Etzkowitz (2003b) proposes a Triple Helix where government, universities and firms are the three elements of a dynamic process of interdependence and interaction. The Triple Helix states that the universities can play an embedded role in increasing knowledge based societies (Ezkowitz and Leydesdoff 2000). This model acknowledges that overall innovation performance of the economy is not dependent on how specific institutions perform but rather, overall performance depends on how they interact with each other as elements of a collective system of knowledge creation and use (OECD, 1994). Critically the Triple Helix model affords central importance to the role of the universities in a context where the focus has previously been exclusively at the firm level of analysis.
Assisted linearity is the basis of a Triple Helix system, in creating economic activity from academic science (Etzkowitz, 2006). The suggestion that the economy can benefit from scientific research, in a linear progression from research to product development has come under severe critics in recent years (Feller et al, 2002). Universities are now being called upon to become prime movers for economic and social development. However, Tornatzky and Gray, (2003) outline some of the dangers of asking the university to take on such a role, “The danger of the university mining its innovation store and failing to replenish it because of dependence on short term gains. The entrepreneurial university is not the industrialised university, a “job shop”, subordinated to local firms” (Tornatzky and Gray, 2003: 354). The authors note that a research university that translates its research findings into use through a variety of mechanism such as TTOs, contracts with firms, patenting, licensing and so on, must adopt some aspects of business, while retaining its previous classical functions. Thus the university internalises some business functions in ways that are compatible with research and training. Making the academy complementary with doing business involves formulating conflict of interest rules to regulate conduct about such issues as time spent on external activities and holding an advisory but not taking an executive position in a firm, while maintaining a full time academic position.

Overall, the Triple Helix model positions HEIs and their activities as critical in facilitating the system of knowledge production in the wider innovation system. As noted by Etzkowitz and Leydesdorff (2000: 110) “the Triple Helix states that the university can play an enhanced role in knowledge based economies”. Innovation therefore cannot be seen as the product of one institutional sphere but rather is the product of a ‘system of innovation’ (Leydesdorff and Etzkowitz, 1998). In this respect, the different helices are seen to be undergoing a common change in direction which will stimulate both competition and cooperation. To better understand these developments it is necessary to consider the changing role of the university.
2.2.4 Changing Role of University

The landscape of universities is changing dramatically and can be examined across two fronts. Firstly, neoliberal managerialism is being embraced by universities and secondly the turn towards the entrepreneurial universities. Each of these trends will be examined in details in order to best capture the changing role of the university.

2.2.5 Neoliberal Managerialism Driving Strategy

Neoliberal managerialism has emerged as a dominant model of performance management in universities. The term ‘new managerialism’ is commonly used to denote the implementation of organisational forms, technologies, management practices and values more commonly found in the private business sector by public sector organisations (Clarke, 1998). This in turn has led to setting performance metrics to capture the third level activities of the universities, which falls under the remit of the TTO. Also, strategic planning techniques have been introduced into the Higher Education Institutes (HEIs) and as such, are relevant to examine in the context of a TTO (Siegel et al, 2008). New Public Management principles are contributing to the changing role of the university by introducing changes set as the use of incentives to enhance performance at both the institutional level and the individual level (Deem, 2001). Table 2.2 below outlines the new public management principles in detail.
Table 2.2: New Public Management Principles: Boston et al (1996: 4-5)

<table>
<thead>
<tr>
<th>Principle</th>
<th>Impact on role of the university</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance Management</td>
<td>Including the use of incentives to enhance performance at both the institutional and the individual level (e.g. short term employment contracts, performance based remunerations promotion systems etc).</td>
</tr>
<tr>
<td>Strategic Planning</td>
<td>The development of an integrated and relatively sophisticated strategic planning and emulation of private sector management styles throughout the public sector</td>
</tr>
<tr>
<td>Separation of Commercial and Non Commercial functions</td>
<td>The institutional separation of commercial and non commercial functions: the separation of advisory, delivery and regulatory functions, and the related separation of the roles of funder, purchaser and provider</td>
</tr>
<tr>
<td>Decision Making De-centralisation</td>
<td>The maximum decentralisation of production and management decision making, especially with respect to the selection and purchase of inputs and the management of human resources</td>
</tr>
</tbody>
</table>

In conjunction with the trend towards neoliberal managerialism in universities, there is also a shift towards embracing the third mission activities of the university which has had a significant impact on the changing role of the university to become an entrepreneurial university.

2.2.6 Entrepreneurial University

It has been proposed that the emergence of entrepreneurial universities was the result of two academic revolutions (Eztkowitz, 1983a). The first academic revolution promoted research as a university function, in addition to the established undertaking of teaching. A second academic revolution changed the university into a teaching, research and economic development enterprise (Jain and George, 2007). As a result of this second academic revolution, the term ‘entrepreneurial university’ was coined. The purpose of the entrepreneurial university is to transform academic knowledge into economic and social utility (Clark, 1998). On the basis of a review of five leading European universities judged as entrepreneurial, Clark (1998) further identified pathways important for academic organisations to be considered as entrepreneurial which are highlighted in table 2.3 below.
Table 2.3: Entrepreneurial University Characteristics as per Clark, 1998

<table>
<thead>
<tr>
<th>Entrepreneurial University Characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td>➢ A strengthening steering core- an entrepreneurial university has a strong body that governs <strong>with vision and sets out a strategy</strong></td>
</tr>
<tr>
<td>➢ Boundary Spanning Structures (e.g. a TTO) and mechanisms to interact with the ‘outside’ world (region and industry)</td>
</tr>
<tr>
<td>➢ A diversified funding base- an entrepreneurial university does not entirely rely on government funding but has a balanced portfolio of first, second, and third income streams</td>
</tr>
<tr>
<td>➢ A strong academic heartland – inter/multi/transdisciplinary research is a necessity to be among the best of universities</td>
</tr>
<tr>
<td>➢ An integrated institutional entrepreneurial culture</td>
</tr>
</tbody>
</table>

Following on from this, the Kantian idea of the university is worth exploring. For Kant (1898) it was the idea of reason which provided an organizing principle for the disciplines, with 'philosophy' as its home. The importance of reason for the Kantian notion of a university is outlined as follows: “It confers universality upon the institution and, thereby, ushers in modernity. It has no content apart from the free exercise of reason and the self-critical and self-legislating exercise of reason, embodied in the philosophy faculty, controls the higher faculties, checking their credentials and credibility, and thereby establishing autonomy for the university as a whole” (Locke, 2007: 870). Therefore, reason would promote autonomy for the university. Other theorists argue that the autonomy of the university as a home of reason has been tainted and terms such as ‘Academic Capitalism’ have been introduced to capture this sentiment. Pioneering this movement were Slaughter and Leslie (1997) who coined the phrase “academic capitalism” to describe the market and market-like behaviour of universities. One of the main issues the authors have with the market like behaviour of universities is the exclusive nature of the activities towards ICT and science based disciplines. In their studies of British, United States, Australian, and Canadian universities, Slaughter and Leslie (1997) recognized that not all disciplines or indeed universities were, or in fact could be, market oriented and so did not benefit equally from this capitalist turn.
In summary, the National Innovation System literature advises that activities and actors are important to successfully generate innovation. Expanding on this, the Triple Helix places a new importance on the role of the university in generating and sustaining innovation. With the changing dynamics of the universities, the introduction of neoliberal managerialism and the trend towards becoming an entrepreneurial university, the role of the TTO within this dynamic is a significant and worthwhile area to study.

2.3 ROLE OF THE TTOs

This chapter examines the role of the TTO in particular, outlining the studies to date, with particular attention to delineating the contrasting accounts from the ‘fairytales from the enthusiasts’ and the ‘jeremiads from the critics’ of TTOs’ which were the classifications made by Daniel Greenberg is his book entitled ‘Science for Sale: Perils, rewards and delusions of campus capitalism’ (Greenberg, 2007). This section considers the competing perspectives on the broad role of the TTO.

2.3.1 What is a TTO?

Following OECD (2003) the study defines a university TTO as a business unit that facilitates the university to identify, manage, protect and market their intellectual property to other parties for further development. A TTO is recognised as typically centring on commercialising applied research, but often providing a wide range of complementary services such as supporting spin-outs, entrepreneurship training and industry outreach programme. In that sense, their role as an intermediary bridging organisation is concerned with the practical transfer and application of knowledge, normally in pursuit of national policy goals and to support industrial capability development (OECD, 2006). In an effort to be called a boundary spanning object, it is important to recognise that a boundary spanning object straddles two or more communities of practice.
(Sanders and Miller, 2010). A comprehensive description of the role is defined by Siegel et al (2007:89): “TTOs serve as an ‘intermediary’ between suppliers of innovation (university scientists) and those that can potentially (help to) commercialise them, i.e. firms, entrepreneurs, and venture capitalists. TTOs facilitate commercial knowledge transfers of IP resulting from university research through licensing to existing firms or start-up companies of inventions or other forms. The activities of the TTO have important economic and policy implications since licensing agreements and university based start-ups can result in additional revenues for the university, employment opportunities for university based researchers (especially post-docs) and graduate students, and local economic and technological spillovers through the stimulation of additional R&D investment and job creation”. Furthermore, the role of the TTO is interpreted as an agent, match-maker, technology seller, middleman and coordinator as highlighted in table 2.4 of the common definitions of a TTO found in the literature.

<table>
<thead>
<tr>
<th>TTO Definition</th>
<th>Author, Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordinator of commercialisation activity</td>
<td>Rammussen, 2008</td>
</tr>
<tr>
<td>Middlemen between the world of pure academic research and the corporate realm</td>
<td>Markman et al, 2005a</td>
</tr>
<tr>
<td>The inventor’s agent</td>
<td>Markman et al, 2005b</td>
</tr>
<tr>
<td>Agent of both the inventor and the university</td>
<td>Jensen and Thursby, 2001, Clarysse et al, 2007</td>
</tr>
<tr>
<td>Technology Seller</td>
<td>Macho-Stadler et al, 2007</td>
</tr>
<tr>
<td>Match Makers that seek to facilitate the transfer of knowledge from those who generate it and those who use it</td>
<td>Bramwell and Wolfe, 2008</td>
</tr>
</tbody>
</table>

2.3.2 Purpose of TTOs

Technology Transfer refers to the “process whereby invention or intellectual property from academic research is licensed or conveyed through use rights to
a for-profit entity and eventually commercialised” (Friedman and Silberman, 2003:18). On analysis of definitions of technology transfer as a process, some key words are significant; transfer; user; process; diffused; human activity. These key words represent the significance of actor and activity to the technology transfer process. Definitions are presented in table 2.5. Recognising that university technology transfer is a process it begs the question, what is the role of the TTO and other actors in relation to this process?

Table 2.5: Technology Transfer Process Definitions

<table>
<thead>
<tr>
<th>Definition</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>The transfer of new technology from the originator to a secondary user</td>
<td>The Consise Oxford English Dictionary, 2011</td>
</tr>
<tr>
<td>The process by which science and technology are diffused throughout human activity. Wherever systematic rational knowledge developed by one group or institution is embodied in a way of doing things by other institutions or groups we have technology transfer. This can be whether transfer from more basic scientific knowledge into technology or adaptation of an existing technology to a new one. Technology transfer differs from ordinary scientific information in the fact that to be really transferred, it must be embodied in an actual operation of some kind</td>
<td>A Dictionary of Business and Management, 2011</td>
</tr>
</tbody>
</table>

**Role of TTO:** Commercialisation of knowledge is facilitated through formal and informal methods of technology transfer. Formal technology transfer mechanisms are those that embody or directly lead to a legal mechanism like a patent, license or royalty agreement. The predominant hard methods of technology transfer are patenting, licensing and company formation – spin out and spin-in. (Cunningham and Harney, 2006). Informal technology transfer embodies informal communication processes where IP is of less importance, for example, joint publications, academic consulting, informal talks, meetings and contacts between academic and industry personnel (Grimpe and Fier, 2010, Perkmann and Walsh, 2007). Most of the literature on technology transfer focuses on formal technology transfer mechanisms (Thursby and Thursby, 2000, Agrawal, 2001). However, Siegel et al. (2003) and Link et al. (2007) highlight that both forms of technology transfer are important. The informal methods can facilitate the development of networks which assist the bi-
directional knowledge exchange to support formal technology transfer activities. Therefore, both are interlinked (Perkmann and Walsh, 2007) and hence, should be encouraged. The typical HEI Industry Technology Transfer process is depicted in figure 2.1 below.

**Figure 2.1: HEI Technology Transfer Process**

![Diagram of HEI Technology Transfer Process](image)

**Source:** Friedman and Silberman (2003)

**Actors:** Actors of the university industry technology transfer process can be distinguished as three categories of stakeholders: scientists, TTOs and firms. There are clear differences in motives, incentives and organisational culture of these groups (Siegel et al, 2003). To some extent it is the role of the TTO to bridge the gap between the stakeholders and to overcome informational and cultural barriers in their capacity as boundary spanners (Guston, 1999, Siegel et al, 2003). The three stakeholders are quite heterogeneous and as such create a complex environment for the TTO with many competing perspectives and so the challenge is for the TTO to facilitate across the different cultures as boundary spanners (Sanders and Miller, 2010).

### 2.3.3 Previous Empirical Studies of TTOs

The TTO literature has developed in recent years, indicating an increase in the number of TTOs and as such an increased academic interest in them (Rothaermel et al, 2007). There is a great variety in what TTOs do and how
they are organised, as seen in varying names like Industrial Liaison Office, Technology Transfer Office and an evolution towards Knowledge Transfer Office as a title to reflect a more holistic representation of the activities of the office. Behind the names are contextual differences in university history, policies, and structure. Research into the characteristics and outcomes of academic entrepreneurship has grown rapidly over the past 25 years, and most significantly in recent years due to the publication of special issues in several journals notably in Management Science, Journal of Technology Transfer, Research Policy and Journal of Business Venturing (Rothaermel et al. 2007). Previous studies have suggested the size; age or experience of TTO; skills and capabilities of TTO and incentives for TTO are all significant to the performance of the TTO. The main studies looking at these areas are highlighted in table 2.6 below.
Table 2.6: Characteristics of TTO

<table>
<thead>
<tr>
<th>TTO Characteristic</th>
<th>Key Argument</th>
<th>Key Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size of TTO</td>
<td>Size of TTO is relevant. In most cases the bigger the TTO, the more productive the outcomes</td>
<td>Chapple et al, 2005, Macho-Stadler et al, 2007, Markman et al, 2005a, Siegel et al, 2003</td>
</tr>
<tr>
<td>Age or Experience of TTO</td>
<td>The age of the TTO typically denotes the experience of the TTO. In the majority of studies thus far, the age of the TTO has a significant impact on the productivity and success of the TTO</td>
<td>Carlsson and Fridh, 2002, Chapple et al, 2005, Friedman and Silberman, 2003, Lockett et al, 2003, Markman et al, 2005b, Powers and McDougall, 2005, Siegel et al, 2003, 2004</td>
</tr>
<tr>
<td>Skills of TTO</td>
<td>In the majority of cases, TTOs lack the business development skills and marketing skills one would expect given their role as boundary spanner responsible for the commercialisation of university IP into industry</td>
<td>Perkman and Walsh, 2007, Lockett et al, 2003, Powers and McDougall, 2005, Siegel et al, 2003, 2004</td>
</tr>
<tr>
<td>Incentives for TTO</td>
<td>The majority of studies in this area argue that by providing incentives for TTO members, productivity will be higher</td>
<td>Link et al, 2007, Jensen et al, 2003, Markman et al, 2005b, Siegel et al, 2003, 2005</td>
</tr>
</tbody>
</table>

The prevailing question is what could have prompted this escalation of TTOs and subsequent TTO research? Powers and McDougall (2005) suggested the remarkable increase in the presence of TTOs and surge in TTO activities in the US led to the inception of the university technology transfer phenomenon. This was considerably accredited by the passage of the 1980 enactment of the Patent and Trademark Law Amendments Act, commonly known as the Bayh–Dole Act (Grimaldi et al, 2011). This action transformed the US's intellectual property policy by improving the incentives for academics to embrace the third
mission activities of their institutions and get involved in commercialising their research. The underlying purpose of this act was to license federal funded research to industry for commercial development in the public interest (Friedman and Silberman. 2003). Debackere and Veugelers (2005) document and analyze the evolution of “effective” university-based technology transfer mechanisms. They describe how decentralized organizational approaches and incentives that stimulate the active involvement of the research groups in the exploitation of their research findings might be combined with specialized central services offering intellectual property management and spin-off support. More particularly, they analyze how implementation of appropriate decision and monitoring processes within the TTO has brought about critical elements in fostering an “effective” commercialization of the academic science base.

While the Bayh–Dole Act had an impact on the TTOs in the US, other countries have also embraced the third mission activity as reflected by growing number of empirical papers on international TTOs, of which this study will also contribute. Table 2.7 outlines such international studies from South Africa, Sweden and Germany, Italy, Belgium, and Austria. In South Africa, Wolson (2007) identified the TTO as the predominant reason behind the poor flow of technologies from research labs to industry. When questioning why this is the case, the findings presented argued that there were unrealistic expectations of the TTO from their governments. Wright et al (2008) engaged in a cross comparison of UK, Belgium, Sweden and the UK, the findings show that only if sufficient critical mass is created can a sound IP strategy by developed for the research development and eventually spin-offs become a possible outcome. Furthermore, in a study of Italien TTOs, Muscio (2009) presented evidence that universities make greater use of TTOs when they are run by non-academic managers and would explain why some TTOs are more effective than others in managing intellectual property. Finally, in a study of Austrian TTOs, Reiner (2010) makes the distinction between active and passive TTOs. While passive TTOs merely facilitate existing contracts of the academic staff, active TTOs generate new university-industry linkages. Such national studies indicate there
is a lot to be learned in engaging in a national study, the findings of which will be interesting to the larger international TTO community.

While the general topic of technology transfer has a distinctive contemporary relevance and importance, there is a need for clearer and deeper consideration of its theoretical antecedents. Therefore, the chapter proceeds by reviewing the literature on the interface between university-industry alliances to deliver an understanding and appreciation of the competing schools of thought: TTO can be rationalized as an ‘ideological and market-driven form of academic capitalism’ but that is only one small understanding, and not one that is actually very helpful for public policy objectives. Technology and knowledge transfer can also be rationalized in other ways: as a broader tangible ‘public good’, among other perspectives. Neither is inherently right or wrong. However, without due regard for such competing intellectual perspectives, the technology transfer scholars run the risk of producing research that is simply of its time and lacks theoretical currency to best inform the Technology Transfer Profession in practice. Rothaermel et al. (2007) in their review of the technology transfer field differentiate between the two schools of thought as, “some argue that a TTOs role includes establishing a link between the university and industry (…), while others suggest that scientists in universities and industry are embedded in the same formal and informal networks thus limiting the TTOs role in facilitating these relationships (…)” (Rothaermel et al., 2007: 58). The chapter will now consider each school of thought in further detail.

2.3.4 Rationale for TTO

Fairytales from the enthusiasts’ is a classification made by Daniel Greenberg in his book entitled ‘Science for Sale: Perils, Rewards and Delusions of Campus Capitalism’ (Greenberg, 2007) to outline the theorists who advocate the rationale for a TTO; these include market knowledge and reputation argument.
As a result, the advocates argue the TTOs as a unit are more effective at transferring commercial knowledge.

**Market Knowledge:** Firstly, the majority of literature supporting the rationale for TTOs centres on an economic argument of the market for knowledge as characterized by a number of features that may lead to severe market failures e.g. high information asymmetries, high or even prohibitive transaction costs (Polt et al, 2001, Debackere and Veugelers, 2005). Furthermore, Macho-Stadler et al (2007) advances the affirmative case for the TTO in commercialisation of university IP. The assumption is that the TTO acting on behalf of the university owning the patent, has superior knowledge on how the invention may be used and by what firm. Markman et al (2005a) continues along the same argument and further develops the concept by introducing time to market as a variable which differentiates the role of the TTO. Markman and his colleague’s results confirm that when inventors collaborate with TTOs, technologies tend to be commercialised faster and earn higher revenues.

**Reputation Argument:** Building up a reputation argument is the critical success factor required to increase the efficiency of the market for knowledge according to some of the literature. Specifically, Macho-Standler et al (2007) argues that TTOs are able to pool inventions across research units and “shelve” some of these, and thereby signalling to the technology buyer a positive selection towards higher quality inventions. The authors argued the key role of the TTO is to propel a reputation argument to reduce asymmetric information when firms have incomplete information in the quality of inventions. TTO is often able to benefit from its capacity to pool inventions across research units and to build a reputation for honesty. According to the authors, if there are a lot of inventions, TTOs will have an incentive to “shelve” some projects, thus raising the buyers beliefs of expected quality which results in fewer more available inventions begins sold at higher prices. However if the stream of inventions is too small, TTOs will not be able to do this and will not be able to maintain a good reputation. This reputation model explains the importance of
critical size for the TTO and also suggests for the TTO to take a more niche approach to pursuing which inventions to commercialise.

**More Effective at Transferring Commercial Knowledge:** Following on from the studies assessing the economic argument of the office, the scholars have taken a micro turn whereby the dynamics of TTO management have been explored. One such study by Friedman and Silberman (2003) argue that the effectiveness of TTO depends on their management as much as on university regulations and scientists incentives. A further study by O’ Gorman et al (2008) confirms these findings by demonstrating that the TTO through an enterprise development programme played an important role in the commercialisation process. The principal benefit of the TTO is in the domain of putting external resource providers in contact with scientists committed to commercialisation (Di Gregorio and Shane, 2003). Murray (2002) argued that the ties between science and technology networks are often rather informal and according to their research, take place through conferences and research students, emphasising the need to incorporate the softer side of tech transfer. When discussing the motivation for the TTO, the most obvious rationale is the possibility of a return for the office. One of the most valuable university patents ever issued, the Cohen-Boyer(C-B) patent, was a process patent issued in the 1980 on a technique for the creation of genetically engineering microorganisms (Mowery and Sampat, 2003). Over its 17 year life, it collected over €225 million revenues for the Stanford University and the University of California. The vast majority of these revenues represented royalties on human therapeutics developed using this technique. Such blockbusters are the ‘holy grail’ of TTOs around the world (Mowery and Sampat, 2004).

**2.3.5 Criticism of TTO**

However, not withstanding the economic and social rationale for TTOs, TTO practitioners also need to be aware of the critics whose studies refute the
legitimacy of TTOs in creating and even facilitating university industry linkages (Kenney and Patton, 2009). These were deemed ‘Jeremiads from the Critics’ by Greenberg (2007). These include:

**TTO as a Monopoly:** A policy paper from the Kauffman Foundation by Litan et al (2007) argue that the centralisation of commercialisation activities at universities due to a TTO leads to all the problems typically associated with monopolies. Hence they suggested either the abolishing of TTOs or the implementation of competition between TTOs.

**Circumventing the TTO:** While the TTO most often has a monopoly on commercialising ideas and technology from its host institution, it has been found that faculty members are able to circumvent the formal TTO process in many cases and choose to not to disclose their ideas (Litan et al, 2007, Markman et al, 2009). This could result in the TTO getting stuck with mediocre ideas, as the best ones are commercialised through direct interaction between researchers and industry representatives (Jensen et al, 2003). Some of the faculty may think that the costs of interacting with the TTO are too high or are otherwise reluctant to disclose their ideas/ inventions (Chapple et al, 2005, Owen–Smith and Powell, 2001). Problematic initial experiences may lead to a bad reputation for the TTO, sending it into a negative spiral of reduced resources, staffing problems and delays as in one of Owen-Smith and Powell’s (2002) cases. Colyvas et al (2002) found that TTOs may have the greatest importance in areas where existing university industry linkages are weak.

**TTOs as Bottlenecks:** Furthermore, Litan et al (2007) found that some university leaders have backed policies that encourage TTOs to become bottlenecks rather than facilitators of innovation dissemination. Kenney and Patton agree and argue that institutional arrangements force TTO officers to act as revenue maximisers for the university instead of “facilitators of technology dissemination for the good of the entire society” (2009:1407). Furthermore, Siegel et al (2007) found evidence that involvement of TTOs may slow down
the commercialisation process due to a keenness to safeguard researchers’ interest and maximize university returns.

**TTO as Redundant Entities:** Colyvas et al (2002) question if the Bayh Dole Act really did intensify the acceleration of research into industry. Their in-depth study of six inventions found that the transfer of technology from universities takes place through informal networks that exist between academics and industrial corporations and not through the formal communication channels of the TTO. They argue that academics and industrial corporations are part of the same scientific networks and knowledge exchange. They therefore argue that that informal relations and mobility of personnel may be much more important in terms of impact of the environment than formal transfer of technology. These results were somewhat confirmed by a further study by Markman et al (2009) who discovered research scientists were indeed bypassing their TTO and working directly with industry. Further evidence of such activity was discovered by Aldridge and Audretsch (2010) when they found that 70% of the scientists chose to commercialise their research by assigning all patents to their university TTOs, but 30% chose a “backdoor route” to commercialisation and did not assign at least some of their patents to the TTO.

**Metrics:** Another critique is that TTO commercialisation policies are measuring the wrong things. The emphasis of TTO and policymakers involved in the technology transfer system is traditionally on hard metrics such as licensing income. However such a quantiative metric does not capture the social benefits of a greater number of innovations. Indeed, some theorists consider that more appropriate metrics could be adopted to induce improved performance as many do not give credence to serendipity in the invention and commercialisation process (Grimaldi et al, 2011). For example, the Kauffman Foundation recommended a transition from the licensing model that seeks to maximize patent-licensing income to a volume model that emphasises the number of university innovations and the speed with which they are moved.
into the marketplace (Kenny and Patton, 2009). Furthermore, Perkmann et al’s (2011) recent study of how universities research quality shapes their engagement with industry utilised industry involvement measures that are broader than commercialization and indicate actual collaboration, i.e. collaborative research, contract research and consulting.

**Criticism of Bayh Dole Act:** Most of the TTOs are fairly young in age as they have spawned since 1980 after the implementation of the Bayh Dole act, although there are examples of offices that date back many decades, showing that the TTO concept is not a new organisation structure. According to Mowery et al (2004: 183): “The contribution of US universities to economic growth and innovation during the 1980s and 1990s were important but no evidence suggests that these contributions were more important than those during the 1930s and 1950s”. The authors argue that the effect of the Bayh Dole has been exaggerated as long prior to passage of the Bayh Dole some universities were already staffed and on alert for opportunities to sell their science to industry and were executing substantial business deals. An example is Wisconsin University, which initiated technology transfer activities in 1925, with the creation of the Wisconsin Alumni Research Foundation (WARF) to license university help patents initially derived from the synthesis of Vitamin D. This was a historic development which resulted in the elimination of rickets, a disease of malnourishment. Over the next 80 years, WARF received over 3,000 disclosures from researchers at the university, 1,000 US patents and returned 800 million dollars to the universities (Mowery et al, 2004: 179).

In light of such criticism, the National Research Council in the US commissioned research into the TTO and their activities. The objectives of the report included investigating how the function of technology transfer fits into the mission of the university, how TTO activities can be broadened and how can accountability to the public be improved? The report found that IP based technology transfer is a small fraction of the ways in which academic knowledge and discovery are moved from the university to broader
community. Other more prevalent mechanisms include publications, conferences, consulting, and informal information exchanges. Also, that the Bayh Dole act has not interfered directly with research and generation for its own sake. The report also examined the alternative of introducing competition among TTOs. However, the report affirmed that it was inconclusive whether the introduction of competition as recommended by the Kauffman foundation would make the TTO more efficient (National Research Council, 2011).

Having defined the role of the TTO, the next question to be addressed is how we can understand the role better. The following section will look present strategic issues for the TTO.

### 2.4 Strategic Issues for the TTO

In this section, structure, management, mission, actors and barriers are discussed as key issues that have emerged in the empirical TTO studies to date.

#### 2.4.1 Structure

Organisation structure shapes the incentives and capabilities of the TTO. Bercovitz et al (2001) defined four different organisational structures of TTOs and found evidence that TTO organisation structure is shaped by university history and related to TTO performance. Furthermore, the study revealed while universities are similar in terms of sharing the same ultimate goals, their histories, traditions and organisational structures are significantly different and have an influence on the structure and performance of the TTO. In particular, these components have an impact on TTOs relationships with key actors in the process of knowledge exchanges and technology transfer. This branch of literature shows that there is high heterogeneity in TTOs, where there is no such thing as a typical university. Therefore there is no distinctive method to become an entrepreneurial university or a ‘one size fits all’ approach for a TTO.
In particular the size of the TTO and age of the TTO emerged as significant in the studies of the structure of the TTO. In recent studies there was convincing evidence that the magnitude of resources invested in TTO personnel increases spin-off activity (O’Shea et al, 2005). Also, Thursby and Kemp (2002) studied the area of faculty quality and the size of the TTO in relation to licensing. Their primary quantitative results found that faculty quality and the number of TTO staff have a positive impact on the technology transfer process of licensing. Chukumba and Jensen (2005) find that the number of licenses and university start-ups is positively related to the age of a TTO, but not the size of a TTO. However, other studies report that older TTOs are less productive than comparable institutions suggesting an absence of learning effects (Chapple et al, 2005).

2.4.2 Actors

Academics have been found to be crucial components of the university industry technology transfer process. For example, changes in faculty attitudes have increased the rate of innovation disclosure to TTOs and therefore determined an increase in patenting by universities (Thursby and Thursby, 2004). For the most part, the literature argues that success or failure in the management and commercialisation of IP often depends on the eagerness of academic entrepreneurs to engage actively with the TTO (O’Shea et al, 2005). In order to ensure faculty collaboration it is important to set up the right bundle of incentives and mitigate moral hazard problems with regard to inventor effort (Jensen and Thursby, 2001). Furthermore, the quality of the relationships between the TTO, academic entrepreneurs and industry was deemed to be critical to the success of the commercialisation process by Thursby and Thursby (2003) and Levin and Cross, (2004). Jensen and Thursby (2001) also outlined a theoretical model, suggesting that faculty involvement in the commercialisation of a licensed technology increased the likelihood that such an effort will be successful. A recent paper by Miller et al (2011) found that prior knowledge, partner knowledge complementarily and reciprocity resulting
in collective learning, were found to motivate stakeholders to engage in external knowledge retention strategies. However, in spite of recognising that relationships with key actors in the process is crucial to the success of commercialisation of IP, there are challenges of working with different actors, as presented in table 2.7. In order to address such challenges, management of a TTO has emerged as a significant area of empirical research.

Table 2.7: Challenges of Working with Different Actors

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Key Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institutional Barriers, operational barriers, and cultural barriers</td>
<td>Cunningham and Harney, 2006</td>
</tr>
<tr>
<td>Culture clashes, bureaucratic inflexibility, poorly designed reward systems and ineffective management of university TTOs</td>
<td>Siegel et al, 2003, 2005, 2008</td>
</tr>
<tr>
<td>Limited Resources</td>
<td>Pandya and Cunningham, 2000, Geoghegan and Pontikas, 2008</td>
</tr>
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2.4.3 Management

There are a few studies that have examined management issues in a TTO, but not many. One fine example is a study by Owen-Smith and Powell (2001) who provide an excellent comparison of TTOs at two universities. The well-managed case at an entrepreneurial private university operated smoothly with considerable success. However, the case at the large public university had far greater management difficulties resulting in the summation that a badly managed TTO can impede technology transfer. Also thought-experts in the field of management research are the Advanced Institute of Management in the UK who bring academics together with business, public sector and policy thinkers in order to develop and deliver research of a world class standard which has an immediate and significant impact on management practice (Sharih and Lui, 2010). AIM conducted extensive research into TTOs across the UK, using a similar methodology to this study whereby they interviewed key stakeholders in the process. The report acknowledged a number of management challenges for TTOs in the UK, specifically; a lack of a clearly defined strategic role; unclear national STI framework or role for the
institution; shifting balance between long-term capability development versus short term economic development; poor focus and prioritisation; more pressure on funding; pressures to reduce public expenditure budgets; increasing competition from other R&D providers; and difficulty in demonstrating value as the key challenges. Similarly, Warren et al (2008) explored key management issues for university TTOs and the impact of location on the selection of appropriate commercialisation models. Their study found that the main challenges for the TTO in meeting their technology transfer objectives lay in internal procedural issues such as number, quality and experience of staff, faculty cooperation, and a highly politicised environment. Their focus on internal procedures without any mention of potential influences from the local external innovation system is highly surprising, according to Warren et al (2008). The authors argue this indicates a significant gap in the understanding of TTOs towards defining their purpose, missions and operations to match the capabilities of their local innovation systems.

**Mission:** Mission statements are of significance to the TTOs as recognised by the Sharih and Lui (2010: 69) in the AIM report: “Less successful TTOs tend to underperform because they generate within a national system in which their precise role and mission is insufficiently defined or inadequately focused”. A TTOs core mission may be defined as moving research results and other ideas and technologies, most often originating at a certain higher education institution or public laboratory into use (Guston, 1999).

**Outcomes:** Capturing the number of licenses has traditionally been the most popular mode of measuring TTO performance (Siegel et al 2003, Bray and Lee, 2000). Digregorio and Shane (2003) suggest that top universities will always look to spin-off” but ‘second rank’ universities are more likely to use licensing, explaining why the number of licenses is a popular metric. Thursby and Thursby (2002) suggest the possibility of learning-by-doing effects on the ability of university TTOs to become more efficient at generating license
revenue. It is argued by Collier (2008) that if a TTO is to be successful, it should be in a position to produce satisfactory returns to reimburse for its sustained business. Applying this model of performance, the next level of accomplishment is to produce a surplus of income in order to invest in embryonic discoveries at a point before venture capital funds generally becomes available, addressing the ‘Valley of Death’ phenomena. At the superior level of performance TTOs achieve both of these outcomes as well as return cash in the form of dividends for the general purposes of the university (Collier, 2008). While this proposed model is extreme, it does not capture the softer metrics of the TTO. These metrics are captured by figure 2.2 outlines the different modes of metrics commonly used in the university industry technology transfer process rather than an exclusive revenue generating model.

Figure 2.2 : Modes of Metrics

In summary, structure, management, mission, actors, and outcomes are all significant to the TTO and present a complex challenging environment for the TTO which has not been fully explored in previous empirical studies.

2.5 Concluding comments

In spite of relative growth of technology transfer literature a key omission from this literature concerns any systematic analysis of the role of the resources and capabilities of universities and their TTOs (Lockett et al 2003). While the AIM
research offers a framework for technology transfer matters with their contention that context, content and process matters, they conclude their report with calls for a deeper understanding into technology transfer issues. In an Irish context, Jones – Evans et al, (1999: 45) explored Irish TTOs and compared them to Swedish TTO. A criticism of Irish universities was that activities were “reactive, underappreciated, under-resourced and centralised” as well as lacking a cohesive strategic plan. At the end of their article, Jones-Evans et al (1999: 47) called for an examination of the strategies and policies that are undertaken to increase the process of technology transfer from academia into local indigenous business within smaller countries; “very few studies have examined strategies and policies that are undertaken to increase the process of technology transfer from academia into local indigenous business, especially through internal mechanisms such as the industrial liaison office (ILO)”. Furthermore, Phan and Siegel (2006: 26) call for the TTO to be considered from a strategic lens: “our review leads us to the normative conclusion that for technology transfer to succeed, it is critical for university administrators to think strategically about the process”.

**Addressing the Lack of Strategy Studies of TTOs:** While there has been widespread interest in research and studies in academic entrepreneurship, Rotheraermel et al. (2007: 743) contend that “there is still a shortage of research appearing in general management journals thus limiting the impact of scholarship from the management perspective on this area of inquiry as well as the impact on managerial practice in a university setting”. One of the reasons for this may include the TTOs and the empirical studies being at the nascent stage of development. Therefore the area lacks a dominant theoretical paradigm. Subsequently there is a challenge to theory building and theory testing. However the field has implemented sophistication in sampling frames, hypotheses development, statistical analysis and dynamic longitudinal analysis (Carlsson and Fridh, 2002).
Most studies have focused on economic indicators of TTO performance and not much attention has been given to the strategy of the TTOs. However, it can be argued that in a changing academic environment, with a greater trend towards an entrepreneurial university and neoliberal managerialism and the increased theoretical and political attention being placed on the TTO, how a TTO engages in strategy process is of significance for TTOs. Therefore, the study integrates a strategy process lens into the theoretical framework which is built on the idea of the TTO situated in a Triple Helix of stakeholders. TTO research falls into two main types. The majority of this research is based on measuring economic efficiency and performance of the TTO and there is a smaller body of research on the TTO processes and activities. However this research can be complemented by further study. Therefore academics are calling for research into what the TTO actually does, addressing the ‘Black Box’ inside the TTO (Sanders and Miller, 2010). Furthermore, Rothaermal et al (2007) in their comprehensive review of the TTO literature established a research agenda requesting more processual studies of TTOs. Building on this agenda, this research will focus on the strategy process in a TTO.

2.5.1 Contribution of Study

The main contribution of strategy processes in TTOs is in offering a different way to conceptualise TTOs. It embraces the contextualist view (Pettigrew, 1997) that context is a critical aspect of the TTO strategy. However it is also possible that existing ‘economic models’ do not adequately capture the complexity of the role of the TTO and there is a need to consider alternative theoretical perspectives to help TTO scholars and practitioners understand the complexities and contribution of a TTO. Strategy processes in organisations have attracted much interest over the last two to three decades, with many competing explanations and models. These debates will be explored in the following chapter, which will also outline the overarching research question and subsequent sub research questions of the study.
3.1 Introduction

This chapter provides a review of existing theoretical research in the area of strategy, with an emphasis on the antecedents, process and outcomes of strategy. It focuses on defining and clarifying various concepts associated with strategy process and is intended to provide a synthesis of the general literature on strategy process.

3.2 Definition of Strategy

There are many simplifying statements that attempt to capture the multifaceted nature of strategy. Strategy can be defined as the collection of choices the organisation makes in order to survive and succeed in its environment. This is a definition given by many contemporary textbooks (e.g. Johnson and Scholes, 1999, Shrivastava, 1994, Thompson and Strickland, 1995). Most commentators would agree that the discipline of strategic management traces its origins to such landmark works as Chandler’s Strategy and Structure (1962), Ansoff’s Corporate Strategy (1965) and Andrew’s (1971) The Concept of Strategic Management. The teaching origins of the field can be traced to the introduction of a course on Business Policy at the Harvard Business School in the 1920s (Hofer and Schendel, 1978). Placed at the end of the MBA curriculum, the course was intended to put the student in the role of a general manager of a business (Hambrick and Chen, 2008:38). These early academic roots were complemented by a strong practice focus with the establishment of
McKinsey, BCG and Bain. In the 1970s, the field was renamed from ‘Business Policy’ to ‘Strategic Management’ and the concept of strategy was set forth as the central point for investigating management problems (Hofer and Schendel, 1978). During the evolution of strategy, various perspectives of strategy research have come to the fore. The two dominant viewpoints will be examined; these can be regarded as the classical perspective and the modern perspective.

3.2.1 Classical Strategy Perspective

Classical strategy making is supported by a rational ideology. The advocates of strategy in this viewpoint are Chandler (1962) and Andrews (1972). Their work is shaped by clear articulation of goals, objective analysis and the separation of formulation from implementation. Specifically, they interpret the strategy making process as a deliberate process of long-term planning (Ansoff 1965, Lorange and Vancil 1977). As articulated by Volberda (2004: 36): “in these classical strategic management theories, strategy is considered as a deliberate planning process, initiated by top management top-down, based on an elaborate industry analysis and aimed at designing a cohesive grand strategy for the corporation”. This classical viewpoint shaped the fundamentals of the strategy field and is still observed throughout the strategic management literature. When researching strategy as conceptualised from the classical school of thought a strategy as design lens is relevant (Mintzberg and Quinn, 1995). Adopting this lens, the consensus is that strategy development can be a logical process in which analytic and evaluative techniques are employed to examine the forces and constraints on the organisation. Such constraints are considered and evaluated to determine a focused strategic direction and a foundation for the planned implementation of strategy. This is the most commonly held view about how strategy is developed and what managing strategy is about. Strategy as design is suggested as appropriate to apply when the organisation under review is dealing with complexity and uncertainty as the design lens provides a means of coping with complex and uncertain issues in a rational, logical and
structured way (Mintzberg and Quinn, 1995). Furthermore, important stakeholders may expect and value such an approach. Finally strategy as design lens is appreciated as being relevant in organisations where management power and legitimacy are of concern. The assumptions, tools and techniques of design may provide ways in which they can feel in control and exercise control in such circumstances. The deliberate approach to strategy formulation is based on rationality and the process yields grand strategies which are ready for implementation. The approach to strategy has been labelled ‘traditional’, ‘classical’, ‘deliberate’ or ‘design’ approach to strategy formulation (Mintzberg and Waters, 1985).

3.2.2 Modern Strategy Perspective

An alternative perspective emerged in the 1970’s and condemned the classical paradigm on two fronts – the assumption of rationality (Simon, 1947, March and Simon, 1958, Quinn, 1981) and the separation of formulation from implementation (Mintzberg, 1987). The potter/corporate strategist analogy presented in his McKinsey award winning article ‘Crafting Strategy’ (1987) is used to explain what may be considered Mintzberg’s key contribution to the field of strategic management: Emergent Strategy. This self-coined expression describes strategies that appear without clear intentions or in spite of them, “Action drives thinking: strategies can emerge” (1987: 77), “Strategies can form as well as be formulated” (1987: 78). He argued for fusing formulation and implementation of strategy by describing the actions of a potter working his material, discovering new possibilities through the tactile manipulation of the clay and constantly integrating the work of hands with the work of the mind. Over the long term, strategies appear like learned patterns of behaviour, best understood in retrospect, as opposed to ambitious plans projected into the future (Mintzberg, 1987). Furthermore the strategic management field developed to look at areas such as dynamic capabilities and core competencies stemming from the resource based view (Barney, 2001; Leonard-Barton, 1992). The notion that strategy as intended by top management may not
necessarily be realised in practice was not considered until Mintzberg and his emergent way of thinking. This discussion would seem to indicate that strategy is a concept that cannot be used in a uniform manner, i.e. it has no single distinguishable meaning. Strategy would indeed seem to be a cluster concept, the meaning of which does not consist of any one-core definition, but a set of definitions. For example, Mintzberg and Quinn (1995) have proposed that we can mean five different things when we use the term ‘strategy’: plan, position, ploy, pattern or perspective. He has elsewhere (Mintzberg et al, 1999) proposed that strategy has been studied from ten distinct schools of thought. Chaffee (1985) offers a simpler categorization of strategy, based on three models: the linear, the adaptive and the interpretive. All in all, it would seem that no unified conception of strategy could be easily distinguished from the field as Mintzberg (1987, 66-75) notes: “there is no such thing as a purely deliberate or a purely emergent one…effective strategies can show up in the strangest places and develop through the most unexpected means. There is no one best way to make strategy”. Thus as there is no one best way to engage with strategy, the study is interested to learn how the TTOs engage in strategy and predicts strategy process research is the best lens to learn about this.

3.3 RATIONALE FOR STRATEGY IN ORGANISATIONS

Strategy is of interest at individual and organisation levels. Universities are now being primed as key to the national innovation agenda. This section considers the antecedents, processes and outcomes of strategy process as per Pettigrew’s (1992) description of strategy process research. Specifically, this section will describe antecedents of strategy and strategic planning in HEIs.

3.3.1 Antecedents

Strategic planning falls under the remit of the deliberate school of strategy formation. In their work on planning, Steiner et al (1982) differentiates
between traditional and strategic types of planning. Traditional planning systems define improvement objectives, targets and action plans associated with operational priorities which assume a static environment acquiescent to prediction and quantification. Conversely, strategic planning focuses on direction-setting to identify the unpredictable driving forces in the external environment, which typically lacks the earlier level of specificity. While articulation of strategy in strategic plans may be needed for implementation, such plans are not in themselves strategy (Buckland, 2009). As outlined by Mintzberg (1994:108): “planning did not give the company an intended strategy, rather planning was the articulation, justification and elaboration of the intended strategy the company already had. Planning was programming, it was used not to conceive an intended strategy but to elaborate the consequences of an intended strategy already conceived. Then the prevailing question is why plan for strategy?” One of the well argued reasons for planning is for co-ordination, to ensure that actors, internal and external to the organisation pulls together in the same direction, therefore the plans need to be specific (Steiner, 1979). Similarly, Brews and Hunt (1999) argue that strategic plans can be conceptualised as programmes whereby the schedules can be a prime media to communicate not just strategic intentions but also directions as to what each actor must do to realise them. The concept of a strategic plan as a communication method is further argued by Mintzberg (1994) when he outlines that the purpose of a strategic plan is to communicate internally and externally, with plans being used not only to promote the efforts of insiders but also to seek the tangible as well as moral support of influential outsiders (Mintzberg, 1994). Furthermore, in recent empirical work on planning, Martin (2008) shows empirically that strategic plans may contribute to the emergence of new strategies, and not just to programming of predefined strategies. In this context, it is relevant to examine strategic planning in HEIs.
3.3.2 Strategic Planning in HEIs

Strategy is a much investigated concept in management studies, while it has somewhat been disregarded in higher education studies. While strategic planning is common in private industry (Hofer and Schendel, 1978, Mintzberg and Quinn, 1995), with the onset of managerialism in the higher education sector, scholars have begun to investigate the nature of strategy formulation in a university setting (Slaughter and Rhodes, 2004, Denman, 2005, Ferlie, 1992). Universities have been required to develop and extend their mission and tasks and there have been some studies beginning to address the nature of strategy in universities (Hardy, 1991, Gioia and Thomas, 1996, Jarzobkowski and Wilson, 2002). Among these, the request to formulate their own strategy is paramount, whether it has been characterised as strategic planning or defining a mission. Similarly, Bryson (1995) highlight the contribution strategic planning can make to any organisations self concept of sustainability, allowing them to reinvent themselves by envisioning a future beyond today’s status quo. Normative stances on appropriate processes of strategy making in universities have been developed (Keller, 1983, Duerstad, 2000). These include applying rational logic to decision making of universities as outlined by Delucchi (1997: 417) whom describes strategic planning in universities as a normative necessity: “processes which organisations engage in to illustrate that they understand the rules of the game and which confer certain legitimacy upon the organisation”. However, there is a differentiation between ‘planning for show’ because it looks good rather than because it is good (Mintzberg, 1994). What he means by this is that informing important outsiders like financiers, suppliers, government agencies about the substance of the plans, so that they can help organisations to realise them. According to Llewellyn and Tappin (2003), with increasing managerialism in the public sector, public services must also provide transparency to external stakeholders and they argue planning is a way for public sector to communicate objectives and outcomes to their stakeholders. However they note the challenges in such planning exercises as they argue that public sector cultures are uncultivated ground for strategic thinking, “public services constitute a wilderness in this respect”
Strategy is considered an abstract concept to comply with in order to achieve success by transforming university organised anarchy (Cohen et al, 1998) into an organisation with more cohesive, balanced and focused action (Quinn, 1978). In other words, strategy is the means by which universities should become effective organisational actors. In a different perspective, scholars have emphasised the low degree of strategic capability of universities to take action autonomously (Cohen et al, 1998).

The conventional dearth of empirical research into formal strategic plans in a university setting does not imply that universities do not implement strategic planning or adopt strategic decision making (Bryson, 1995). Indeed there have been studies aimed at linking strategy to the organisational nature of the university, conceived as loosely coupled systems (Gioia and Thomas, 1996). The findings of these studies have provided relevant discussions on emergent strategies based on ad-hoc responses by organisations (Weick, 1976). Furthermore, building on organisational configurations and the notion of professional bureaucracy (Mintzberg, 1997), Hardy (1991) drew attention to the relationship between structure and strategy identifying different combinations of strategy formation processes and university distinctive organisational dimensions. The role of the actor emerged as significant in that particular study. Finally Jarzkbkowski and Wilson (2002) examined strategy in top management teams in universities which yielded interesting results, justifying and motivating further studies of the nature of strategy process in a university setting.

3.3.3 Mission Statements

When exploring strategic planning in organisations, mission statements are appreciated as an important indicator of the goals of an organisation, the organisation’s central defining purpose and its raison d’etre (O Gorman and Doran, 1999, Leuthesser and Kohlie, 1997). The authors, Vinzant and Vinzant (1996) are unequivocal in their belief that formal methods of strategic
development, including plans and mission statements are the cornerstone of strategic management. Mission statements are a clear articulation of the internal and external stakeholders of the long term intent of an organisation. A study carried out by Baetz and Bart (1996) of Canadian companies bears this out and they found the main rationales for having mission statements include: to guide the strategic planning system, to define the organisation’s scope of business operations/activities; to provide a common purpose/direction transcending individual and department needs; to promote a sense of shared expectations among all levels of employees, thereby building a strategy corporate culture (i.e. shared values) and to guide leadership styles. Their study also found the least important uses of mission statements included resource allocation and job designs and specifications.

Moreover, mission statements can combine elements as evident by the mission statements analysed using Pearce and David’s (1987) eight item typology. Although developed two decades ago, their scheme continues to be an established framework approved to analyse the content of organisational missions (O’Gorman and Doran, 1999). Santoro and Chakrabarti (1999) looked at to what extent the current university’s mission fits industry’s needs and how does this relate to building university research centres. They argue that the university’s redirected mission and focus, which includes developing and commercialising applied technologies has opened the door for greater industry interaction. Applying the resource based view theory to university and firms, they argue that a ‘meeting of minds’, between industry and academe is beginning to take shape where there is a general positive fit between industry’s needs and the contemporary university’s changing mission. Also the contextual importance of strategy was highlighted by Buckland (2009: 531): “The blandness, similarity and empty contents of mission statements, visions, aspirations across the university sector is making the variation in institutional context, histories, resources, capabilities and by an almost universal search for excellence in things”.

46
3.4 STRATEGY PROCESS RESEARCH

Process research has been defined as research primarily focused on actions that lead to and support strategy. Research in this area has prescriptive and descriptive work on planning methods and decision making with attention directed towards the effectiveness of alternative means for generating and implementing strategy. Strategy process research (Mintzberg and Quinn, 1995, Mintzberg and Waters, 1985, Pettigrew, 1985, Quinn, 1978) has provided rich and systematic descriptions showing that strategy making comprises a variety of actors and contextual influences. “Process research in strategic management is paradigmatically diverse and empirically complex” (Pettigrew, 1992: 7). The great bulk of contributions of process scholars to strategic management have been in the study of choice and change processes as summed up by Van de Ven (992: 172):

“Strategy process is diverse and cannot be contained within any single paradigm…Need to be clear about the meaning of process in our research…Need to be explicit about the theory of process we draw on…Design process research is a way that is consistent without definition and theory of process”

Strategy process research is influenced by the studies of Sztompka (1991) who argues that social reality is not a steady state, but rather a dynamic process. The author argues that social reality occurs rather than exists. This postulation is useful for conceptualising the underlying principles of process research. As such, event sequences are important to clarify in any process analysis but so are the underlying mechanisms which shape those events. This is further supported by Pettigrew when he discusses the purpose of process analysis: “The studies of sequences of events are crucial in any process analysis. However the purpose of process analysis is not just to describe the sequence or tell the story, but to identify patterns in the process often across several carefully chosen cases” (Pettigrew, 1992: 8).
Strategy theorists argue that empirical strategy process research varies in quality as there is a lack of ontological and theoretical discourse to disentangle, debate and simplify the underpinning foundations of process in strategy process. Strategy process research needs a range of more intrusive methods, including case studies. Some examples of strategy process research in different contexts are as follows; Bower (1970) on resource allocation; Miles and Snow (1978) on strategic organisational adaptation; Burgleman (1983) on internal corporate venturing; Guth and Ginsberg (1990) on corporate entrepreneurship; Van de Ven et al (1989) on Innovation and Floyd and Wooldridge (1992) on middle managers.

<table>
<thead>
<tr>
<th>Author</th>
<th>Process Research Context</th>
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<tbody>
<tr>
<td>Miles and Snow (1978)</td>
<td>Strategic Organisational Adaptation</td>
</tr>
<tr>
<td>Burgleman (1983)</td>
<td>Internal Corporate Venturing</td>
</tr>
<tr>
<td>Guth and Ginsberg (1990)</td>
<td>Corporate Entrepreneurship</td>
</tr>
<tr>
<td>Floyd and Wooldridge (1992)</td>
<td>Middle managers</td>
</tr>
</tbody>
</table>

These holistic studies on strategy process outlined in table 3.1 attempt to track simultaneously over time, multiple contextual factors, strategies, decision processes, administrative systems and outcomes and provide multiple benefits to the academic community. Firstly, they provide useful descriptions of structures and systems that lead to improved organisational performance. Secondly, they contribute both through insightful induction, but more often by analysing the differences between an actual process and the theories available to ‘explain it’. Furthermore, Pettigrew offers some direction with his offering of five internally consistent guiding assumptions which in his view are capable
of supporting a wide range of the theoretical and empirical investigation and at the same time, maintaining a sense of coherence in the overall approach (Pettigrew, 1992: 9). They are displayed in Table 3.2.

Table 3.2: Pettigrew’s guiding principles for strategy process study

<table>
<thead>
<tr>
<th>Guiding Principle</th>
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<tbody>
<tr>
<td>Ø Embeddedness: Studying processes across of number of levels of analysis</td>
</tr>
<tr>
<td>Ø Temporal Interconnectedness: studying processes in past, present and future time</td>
</tr>
<tr>
<td>Ø A role in explanation for context and action</td>
</tr>
<tr>
<td>Ø A search for holistic rather than linear explanations of process</td>
</tr>
<tr>
<td>Ø A need to link process analysis to the location and explanation of outcomes</td>
</tr>
</tbody>
</table>

As such the researcher is exploring the past process, as the past impacts what they are doing now as shown by the following quote from Pettigrew: “Understanding the sequence and flow of events is crucial requirement for the process scholar. But history is not just events and chronology. It is carried forward in the human consciousness. The past is alive in the present and may shape the emerging future” (1992: 10). Significantly Pettigrew (1992) argues one of the key merits of strategy process research: “strategy process research is capable of generating sound knowledge not only of processes and outcomes but also of why and how outcomes are differentially shaped by processes” (Pettigrew, 1992: 11). Such process advice is the theoretical underpinning to this study of strategy process. Significant to strategy process research are the actors, resources and patterns.
**3.4.1 Strategy Actors**

Previous studies which have focused on strategy process have highlighted its dynamic nature and have tried to identify characteristics, actions and paths through which strategy is built (Mintzberg et al., 1999). However, other studies have begun to focus on the holistic facets of strategy formulation, taking into account other internal and external actors of an organisation. Hence strategy has been conceptualised as the artefact of multifaceted social dynamics. It is recognised that strategy process is a multi-level process, encompassing more than an organisation’s internal actors (Chakravarthy and White 2003: 198): “Cognition occurs within individuals, individuals interact with other members of their work group, work groups function within organisational structures and routines, organisations compete within industries and industries rise and fall within the broader political context. What occurs at one level affects and is affected by what occurs at other levels. Often this deeply embedded nature of the strategy process is not taken into account”. The authors call for a focus on the reciprocal relationships between managerial action and context (Chakravarthy and Doz, 1992, Pettigrew, 1992) as they conclude that in order to understand strategy processes, it is necessary to look at actors who are powerful in terms of administrative systems and decision processes, investigating how these are used to shape courses of strategic action over time, in adaptation or responses to the environment resources (Chakravarthy and Doz, 1992, Jarzabkowski and Wilson, 2002). The analysis of patterns will show how such multi actor interaction comes into play and how intentions and actions combine (Mintzberg and Waters, 1985).

**3.4.2 Patterns**

It is posited that strategy is a pattern of decisions and actions aiming at realising objectives that are relevant for the organisation, and which compose a coherent sequence developing in time and across relevant areas of activity. To be identified as a strategy, such patterns must be recognised and shared by
organisational members as a collective pursuit of organisational goals. Actor’s rationalisation of a pattern as an organisational strategy can occur before decisions and actors take place (as in strategy formulation, for example in the strategic plan) meanwhile or afterwards, as actors make sense of organisational events in a strategic perspective referring to the duality between deliberate and emergent strategies, the first being intentional, e.g. formulated by management, the second not, e.g. realised according to environmental pressures, external conditions and through the convergence of multiple actors. The intertwining of deliberate and emergent into a realised strategy is crucial to understanding strategy processes, and how actors are involved and how influential external conditions and demands are.

The process authors interest themselves in the patterns in which organisations formulate and implement strategies. The topic can be approached from various disciplines: classical strategists (e.g. Chandler, 1962, Miles and Snow 1978) argue that “structure follows strategy”, i.e. organisational structure should be moulded to best serve the content of strategy, while political theorists argue that strategy execution is a question of power (e.g. Pettigrew, 1990, Eden, 1992), and interpretivist authors emphasize the role of communication and collective sense-making (e.g. Gioia and Chittipeddi, 1991, Liedtka and Rosenblum, 1996). Table 3.3 outlines the topics from various disciplines.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Author</th>
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<tbody>
<tr>
<td>Structure follows strategy</td>
<td>Chandler, 1962, Miles and Snow, 1978</td>
</tr>
<tr>
<td>Strategy Execution is a question of Power</td>
<td>Pettigrew, 1990</td>
</tr>
</tbody>
</table>

This research is focusing on strategy formulation due to the embryonic nature of the TTO and this pioneering research embracing the first strategy process study of TTOs. Thus the aim was to produce an in-depth study of strategy formulation, embracing the relevant antecedents, processes and outcomes.
Looking at strategy implementation also might have diluted the contribution of the study. However, as a future research agenda, a study of strategy implementation in TTOs would complement this study very well.

The strategy formulation process according to Lorange and Vancil (1977), should consist of three cycles. The first cycle is the establishment of corporate objectives, the second cycle in developing formalised programmes designed around meeting these corporate objectives and third cycle involves resource allocation. Three types of strategy processes have been identified in a university setting, amongst top team management and as such deemed relevant for a study of strategy process in TTOs (Jarzobowski and Wilson, 2002). Also, of interest is the study by Lumpkin and Dess (1995) who found that simple strategy process had a high impact on performance in the early growth phases of the organisation, but as organisations matured, the effectiveness of the strategy process lessened and this ultimately impacted upon organisational performance.

The definition of strategy as a pattern of coherent actions produced by a combination of deliberate and emergent strategies entails of multi actor dimension. In this sense, strategy can be seen as the product of convergence of several actors on common actions at the organisational level. This convergence shouldn’t be regarded as a series of intentional actions by one or two actors, but more as a complex process through which strategy is realised thanks to actors’ alignment in producing organisational actions (Mintzberg, and Waters, 1985). Hence deliberate strategies are decided by actors at the organisational and intra-organisational level. Emergent strategies too, originate from actions taken by actors that are within the university perimeter and by actors who at the same time are able to span across boundaries. A central dimension of strategy making is therefore how the different actors converge, by means of their interventions, at different moments, in the strategy making process. This is made up of new emergent strategies. Metaphors involving flow-waves (Mintzberg et al, 1999) and rivers (Pettigrew, 1990) have been productively
used to describe the strategy process. Catching reality in flight as best possible is the way Pettigrew (1992) describes process research. However, it is at best a retrospective methodology of strategy as described by Chakravarthy and White: “The retrospective methodology is like having a movie of the strategy process and running it in reverse. However a movie does not capture everything that happened to all characters in the movie. A movie has a perspective, a point of view. The perspective helps focus the movie and defines its audiences, who it has relevance for” (2001: 191).

3.5 Why Strategy Process Research?

The prevailing question that needs to be addressed of this study is why is it interesting to examine strategy processes in TTOs? Why should TTOs adopt techniques of strategic management? This is a significant question. Firstly it can be said that with the onset of managerialism in the public sector, there has been a turn to the models and language of strategy. According to Ferlie et al (1998) process based models of strategy have analytic resonance in many public sector settings which display the following characteristics; a high degree of politicization and of political behaviour; multiple stakeholders that engage in bargaining behaviour to form dominant coalitions; vague and multiple objectives that are reinterpreted at local level; the lack of strong market pressures that can drive change; limited power of top echelons to impose direction. As shown in the literature review in chapter two, TTOs display many of the listed characteristics and so process models of strategy should have analytic resonance in this setting also. Secondly, there is increased pressure for universities to deliver on their third mission to the economy in the National Innovation Systems framework from a policy perspective. TTOs are a new boundary spanning organisation responsible for delivering on the third mission of commercialising university IP and so are emerging on the strategic agenda both at an institutional level and a policy level. Thus, it is critical to think of them in a strategic nature (Phan and Siegel, 2006). Furthermore, processual models of strategy have been usefully applied within empirical
studies within public sector professional bureaucracies such as universities and hospitals (Mintzberg and McHugh, 1985). Table 3.4 highlights some further types of process research studies.

Table 3.4: Dimensions of Strategy Process Research

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<tr>
<td>Individual Level</td>
<td>Hiller and Hambrick, 2005, Nutt, 1998</td>
</tr>
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</table>

The result of these studies is a set of partly competing, partly overlapping models. Different perspectives and disciplinary contributions provide far more insights into the strategy-process phenomenon than a single perspective could do. Several studies such as those by Burgelman (1996), and Lovas and Ghoshal (2000), have provided the field with profound insights into the actual strategy process in organisations, thereby offering an organic perspective. TTOs are organisations that require to be understood in their own histories and contexts. No model of strategy process will transfer to them without dissonance; rather it is acquired that TTOs acquire models and systems of strategic awareness, management and process that recognise issues, context and processes which actually shape strategic change (Hardy et al 2000). Crucially context is used analytically not just as a stimulus environment, but also as a nested arrangement of structures and processes in which the subjective interpretations of actors perceiving, learning and remembering help shape process (Weick, 1969). A process vocabulary is needed to best capture the process. As the most general level, process questioning involved the interrogation of the phenomena over time using the language of what, who, where, why, when and how in relation to uncovering the link from process to outcomes.
3.6 Strategic Outcomes

The ability to link outcomes with precursor actions and decisions is essential to strategy process research. While single case studies done in this way are of interest, an even more productive design includes comparative cases (Pettigrew and Whipp, 1992, Miles and Snow, 1978). Understanding the link between strategy process and outcome is important. Without it, process research is of little value to practitioners. Therefore, in order to understand the strategy process more fully, this strategy process research focuses on patterns of decisions and actions that accumulate over time into a strategy and results in strategic outcomes. In order to capture a holistic view of strategy process, Van de Ven, (1992) recommends that studies link strategic decisions to outcomes; look at pattern of discrete decisions over time; and view the process from multiple levels. By adopting these recommendations, the research method can be managed better to produce the desired strategy process research. This research has incorporated such advice into its research design, as outlined in Chapter Four.

Praxis of the process which details the day to day activities and stakeholder relationships with institutional, organisational and societal contexts is a way of conceptualising the strategic outcomes of the process. Building a strategic outcome into a process study has a number of practical advantages in spite of being a notably difficult research area. The reasons for doing it are; the outcome provides a focal point for the whole investigation; there is a possibility of exploring how and why variations in context and process shape variability in the observed performance outcomes across a comparative investigation; and the study can exploit comparative case studies of matched pairs of organisations to compare high and low performance. Such case studies would allow researchers to answer questions about the process, context and customisation of strategies that aid building and sustaining superior performance (Pettigrew et al, 2001).
3.7 Strategic Choice

Strategic choice is an element of the strategy formulation process. Choice is at the centre of strategy formulation which is the focus of this research. If there are no choices to be made, there can be little value in thinking about strategy at all. Also TTOs, as shown in the literature review are faced with multiple stakeholders and as default have multiple choices to be made. There will always, in practice, be limits on the range of possible choices. Studies of the TTO have shown them to be limited by their resources (Bercowitz et al. 2001). Furthermore, given their role as a boundary spanner, and dual agent, they are constrained by resources which they have very little power over. In the context of the TTO, the questions is how the genuine strategic choices are made and by whom. Some argue the TTO is limited to devising how best to implement strategies rather than to ponder fundamental choices of future directions for themselves (Muscio, 2009). According to strategic choice theory, even when managers are apparently free to make strategic choices, results may eventually depend as much on chance and opportunity as on the deliberate choices of those managers (Oliver, 1991). This is particularly relevant for the TTO due to the serendipitous nature of the success of their commerciaised IP (Warren et al., 2008).

According to strategic choice theory, when reflecting on outcomes in retrospect, it is often clear that events, and particularly unexpected events, played a major role in determining results (Peng, 2003). For example, the TTOs reacted to an exogenous shock of the Entreprise Ireland’s Technology Transfer Strengthening Initiative, and the resulting resources and outcomes that derived from this policy. When considering choice, it is necessary to take a prescriptive view. Strategic choice scholars argue, any process of choice could be rationally divided into four steps—identify options, evaluate the options against preference criteria, select the best option, and then take action (Child, 1972). Such a linear process suggests that identifying and choosing options can be done based on analytical analysis. However, further strategic choice studies have shown this to be difficult (Peng, 2003). Strategic choices that keep options open may be preferable in an uncertain future reliant on uncertain
institutional environments and pressures within such environments (Oliver, 1991). Furthermore, strategic choice becomes more complex as some options may exist which are not aligned to strategic intent of an organisation (Childs, 1972). Infeasible options may seem highly attractive and may have powerful supporters, so the reasons why they are infeasible may need to be carefully argued with clear evidence in support. This is particularly relevant in the complex environment of the TTO, engaging with a number of conflicting stakeholders as choices of what not to do may be as significant as choosing what to do. The process of choice starts by identifying available options (Child, 1972). The chosen strategy will have to answer the questions ‘what’, ‘how’, ‘why’, ‘who’, and ‘when’, and so the aim of this study is to examine such options in the context of the strategy formulation process of the TTO.

This is important for TTOs in their role as gatekeepers. Siegel et al (2007) found evidence that involvement of TTOs as gatekeepers of the university IP may slow down the commercialisation process due to a keenness to safeguard researchers’ interest and maximize university returns. The original gatekeeper concept as pioneered by Thomas J. Allen (1977) is a key person, who facilitates information transfer by informal communication. Universities may have misunderstood this interpretation of gatekeeper in setting up the university management policies of the TTO as a protector.

3.8 GAPS IN STRATEGY PROCESS RESEARCH

Much of strategy process research include broad and aggregate strategy categories but there are some specifications in terms of strategy process (Hart, 1992) and interpretation modes (Daft and Weick, 1984), routines in decision processes (Mintzberg, 1973) and micro-politics in political process descriptions (Pettigrew, 1985). Single aspects of strategy processes have also been described and analysed, for example, tactics in strategy implementation (Nutt, 1987), heuristics in fast strategic decision making (Eisenhardt, 1989), and strategic issue selling by middle managers (Dutton and Ashford, 1993). However, not much systematic research has focused on the actual activities and
actors involved in the creation and development of completely new strategies. A comprehensive model was captured by Hutzschenreuter and Kleindienst (2006) which this research will use as it captures the antecedents, processes and outcomes of strategy process research. An analysis of the body of literature by the authors revealed three broad categories of factors relevant within strategy-process research: antecedents (A), processes (B), and outcomes (C) (Hutzschenreuter and Kleindienst 2006). Thus the framework provides a basis for what Pettigrew (1997: 340) calls the irreducible purpose of processual analysis: to account for the what, why and how of the links between antecedents, processes and outcomes. This research is anchored by Pettigrew (1992) who argues we need more process thinking in research on strategic organisation and as such find the model a suitable framework to use. Pettigrew (1992) study is aligned to practice and as such is appropriate to a study of a TTO as a boundary spanning organisation in need of direction by exploring the strategic choice in the strategy formulation process.

3.9 CRITIQUE OF STRATEGY PROCESS

An adept literature review would not be inclusive without a critique of the field to date and engaging in its weaknesses. The following section will present three critiques of the field.

First, it is argued that the strategy field is diffused and there are no clear directives and purposes and there are calls for more integration and synthesis of the body of knowledge, methodological approach and the set of problematic areas to enhance and progress the study of the field (Volberda, 2004). Furthermore as a strategy process researcher, gaps in the analysis must be tolerated as there will not be complete scenes in models of findings (Langley, 1999). However, while process research is indeed difficult, the researcher found the process to be fulfilling as she tried to convince the reader why her interpretation of how TTOs engage in strategy process is an interesting contribution to the field of strategy process and technology transfer.
Furthermore there are some critics whom question the merits of strategic planning. Morphew and Hartley (2006: 85) suggest that all of the tools that accompany strategic planning; the articulation of mission, the definition of vision and the publication of the plan itself is predicated upon “threadbare anecdotal evidence”. Elsewhere, Mintzberg (1994) questions the role of strategic planning as he maintains planning should contribute around the strategy making process rather than inside it. Similarly, Weick (1979) questions the retrospective nature of strategic planning as he observes: “organisations persistently spend time formulating strategy, an activity that literally makes little sense given the arguments advanced here. Organisations formulate strategy after they implement it, not before. Having implemented something- anything- people can then look back over it and conclude that what they have implemented is a strategy” (1979: 188). Furthermore, from a strategy point of view, planning is one of many strategic practices in which narratives about strategy are constructed. However, meaning is open to multiple interpretations; the present activities are impossible to know as they are unfolding in many different places and the interpretation of this only becomes clear over time; and finally the future is simply an imaginative construction. Also many of these operational activities might individually not be seen as particularly strategic, but collectively add up to more than can be encompassed in a strategic plan (Martin, 2008). Yet, it is in examining the strategic artefacts of strategic plans and mission statements, that the researcher can complement the findings on the antecedents, processes and outcomes of strategy and may contribute most clearly to understanding how TTOs formulate strategy. Ultimately the research will provide an insight into the processes as called for by the technology transfer field (Rothenmel et al, 2007).

3.10 CONCLUDING COMMENTS

Hendry and Seidl (2003) argue to be productive, empirical research needs to be guided by theory and the aim of this chapter was to explore the theory of
strategy, in particular the theory on the process of strategy. In framing the terrain of this study, the theoretical parts pertinent to a study of strategy formulation process from the perspective of TTO in a university setting have been ascertained. Based on the analysis of the literature, the study has been built on a specific framework that conceptualises strategy as an ongoing process of deliberation and emergence of strategic actions, which is based on Mintzberg’s work (Mintzberg, 1987).

Furthermore the findings will be structured based on the framework outlined by Hutzschenreuter and Kleindienst (2006) encompassing key antecedents, process and outcome factors, and the interrelationship among them. The study will explore the effects of the individuals involved in strategy processes and the phases prior to and after the actual process by incorporating the antecedents, choice and outcomes of the process as outlined by the authors as making a significant contribution to strategy process research.

Finally the study will apply the theoretical underpinnings of Pettigrew by seeking to follow the ‘irreducible purpose of processual research’ to account for the what, why and how of the links between antecedents, processes and outcomes (1992: 340). Specifically the process of strategic choice will be explored. There are a number of contributions this research will make as outlined in the next section.

3.10.1 Contribution

The first proposed contribution is to further examine the process of strategy formulation in TTOs. Against this backdrop, TTOs are conceived as organisations able to formulate, adapt and integrate their strategies in accordance with the multiple actors involved in one side, and the changing environmental conditions on the other side. This research proposes to contribute to the literature on strategy process in a unique context by attempting to answer the overarching question regarding to what extent TTOs engage in strategy process? To date, the development of universities strategizing has been largely devoid of the incorporation and analysis of
context and process that is known from the private sector to be vital in the effectiveness of strategic analysis (Buckland, 2009: 531).

The second contribution to the research question brought about by extant work on strategy process is applying strategy process to a new context such as a boundary spanning organisation as a TTO. The research is using existing framework as outlined by Hutzschenreuter and Kleindienst, (2006). The framework provides a basis for what Pettigrew calls the ‘irreducible purpose of processual research’ to account for the what, why and how of the links between antecedents, processes and outcomes (1992: 340). This should not be seen as a minor contribution. Indeed, by applying established strategy process research concepts to a new field, the research is addressing calls from Pettigrew, 1992 and Van de Ven, 1992 who both say we need more process thinking in research on strategic organisations. There is little or no evidence that coherence of the strategy process in TTOs has been advanced in the literature or come to prominence. Therefore, the main research question of this study asks: “To what extent the TTO engages in strategy process?” The sub research questions that are closely related to the main research question are “How do TTOs formulate strategy? How do key actors influence TTO strategy process? How are strategic outcomes of the TTO shaped by TTO strategy process, and context? The following chapter will address the research design for the study.
CHAPTER FOUR: METHODOLOGY

“The more that you read, the more things you will know. The more that you learn, the more places you’ll go”

Dr Seuss

4.1 INTRODUCTION

The research was conducted in a context of a TTO in a university with a number of stakeholders such as TTO Directors, TTO Commercialisation Specialists, government agencies, academic entrepreneurs and university management. The following chapter will detail research design intended to address the research questions of this dissertation including the research question, case design, data collection, out in the field, data analysis, and bias before concluding with limitations of the study.

4.2 RESEARCH QUESTION

In identifying one or more research questions to be addressed, it is important to ensure that the questions are appropriate in terms of their interest, significance and value for both the research and technology transfer practitioner communities. A significant contribution involves detailing a context or situation in a way that the assumptions underlying prior theory are challenged (Bansal and Corley, 2011: 235). Drawing on the overarching research on literature reviews in chapter three and chapter four, the overarching research question of the study is to examine the to what extent the TTO engages with strategy. In doing so there are three sub research questions as presented in table 4.1.
Table 4.1: Research Questions

<table>
<thead>
<tr>
<th>Principal Research Question</th>
<th>To what extent do TTOs engage in strategy process?</th>
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<tbody>
<tr>
<td>Sub Research Question 1</td>
<td>How do TTOs formulate strategy?</td>
</tr>
<tr>
<td>Sub Research Question 2</td>
<td>How do key actors influence TTO strategy process?</td>
</tr>
<tr>
<td>Sub Research Question 3</td>
<td>How are strategic outcomes of the TTO shaped by TTO strategy process and context?</td>
</tr>
</tbody>
</table>

4.3 CASE DESIGN

The study sought to get at richness and depth of the study. It was decided that case study design was most appropriate for the study. The choice of method was to conduct qualitative research, to interview and explore the how and why type questions. It is important to recognise that the case studies can be partly or purely quantitative. However this did not suit the research question. Case studies were also used because of their strong association in practice. Enterprise Ireland, in their reporting, employed stories to communicate the success of TTOs. Thus, as the research is of interest to policy makers, the intrinsic nature of case studies complements such story telling conducted by one of their key stakeholders, Enterprise Ireland.

4.3.1 Why Case Study Design?

Yin (2003) suggests the following conditions suit case study research. Firstly when asking ‘How or Why’ questions, secondly when the researcher has no control over behaviour events and finally when the area of study is of a contemporary, not historical focus. Also, case study research is an appropriate research strategy where a contemporary phenomenon is to be studied in its natural context (Yin, 2003) and ‘the focus on understands the dynamics present in single settings’ (Eisenhardt, 1989: 534). There are research areas within technology transfer where theory and understanding are not well developed as
shown in chapter two. These include areas where a phenomenon is dynamic and not yet mature or settled, such as strategy underpinning TTO activities or where a set of definitions are not yet clear or widely accepted, such as the legitimacy of TTO, or where there is little understanding of how and why processes or phenomena occur, or where the experience of individuals and the context of actions are critical (Rothaermel et al, 2007). Also there is a contemporary focus associated with TTOs. While their presence began to grow in the United States since 1980 with the passage of the Bayh Dole Act (Grimaldi et al, 2011), in Ireland, they only began to adopt a significance presence with the Technology Transfer Strengthening Initiative 2007. Thus, as they have been on the strategic agenda of government and university management since 2007, it can be deemed they are a contemporary organisation phenomenon. Table 4.2 outlines the suitability of case study for this study according to Yin (2003) conditions.

<table>
<thead>
<tr>
<th>Yin (2003) Conditions</th>
<th>Suitability for area of study</th>
</tr>
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<tbody>
<tr>
<td>How or Why questions</td>
<td>Research questions are looking at how strategy is formulated</td>
</tr>
<tr>
<td>No control over behaviour events</td>
<td>The aim of processual study is to ‘capture reality in flight’ (Pettigrew, 1992) and thus not to impede on the natural occurring of the process</td>
</tr>
<tr>
<td>Contemporary, not historical process</td>
<td>This study examines the time period since the launch of the Technology Transfer Strengthening Initiative in 2007 and examines the process up until 2011, capturing a contemporary timeline</td>
</tr>
</tbody>
</table>

In order to obtain insights into the extent of TTO strategy process, the study focuses on detailed analysis of a number of cases. This afforded a foundation for intricate design of the research project where a suitable unit of analysis and number of cases could be determined. The researcher designed the study as a multi case study design. The case study is the TTO as using the definition of a case study by Yin (2003:13):

“A case study is an empirical inquiry that…investigates a contemporary phenomenon within its real-life context, especially when…the boundaries between the phenomenon and context are not clearly evident”.

65
4.3.2 How to distinguish case from context?

The question of determining case from context is an important issue that the researcher had to address, as many researchers fall into this trap of confusing the two concepts (Denzin and Lincoln, 2000). In order to undertake case study research, the researcher needed to be aware of the nature of case study research and followed Stake’s (2000:445) philosophy.

“Place your best intellect into the thick of what is going on. The brain work ostensibly is observational but more basically it is reflective.”

The unit of analysis identifies what constitutes a case. The unit of analysis may be an individual, a group, an organisation or it may be an event, or some kind of phenomenon. It is connected to the means in which the major research question is initially defined and is usually at the level being addressed by the question (Yin, 2003). The unit of analysis must also presents adequate breadth and depth of data to be gathered to facilitate the research question to be sufficiently addressed. Therefore, the case is the TTO and the context is the university and the national innovation system.

4.3.3 Multiple Case Studies

Case study research may adopt single or multiple-case designs. A single case study is suitable where it characterises a critical case (it meets all the necessary criteria for testing a theory), where it is an extreme or unique case, or where it is a revelatory case (Yin, 2003). Multiple case designs allow cross case analysis and comparison and the investigation of a particular phenomenon in diverse settings. Multiple cases may also be selected to predict similar results (literal replication) or to produce contrasting results for predicable reasons (theoretical replication (Yin, 2003: 46). As well as recognising what characterises a case study, the researcher was aware of what a case study was not and thus ensuring not to call something a case study when it in fact was not
a case study. ‘Case study research is not a methodological choice but a choice of what is to be studied (Stake, 2000, p. 435). And so the researcher needed to select what to study. Also, there is a misconception that case studies just fall into the realm of qualitative but Yin suggests otherwise when he concludes that case studies ‘can include and even be limited to quantitative evidence’ (Yin, 2003:14). Case study enables the capture and understanding of context when studying the phenomena of TTOs, and can be used to achieve of variety of research aims using diverse data collection and analysis methods. However, statistical generalisation to a population is not the goal of a case study research as cases are not sampling units. Rather, theoretical or analytical generalisation is suitable, where case study research results are used to develop theory or test previously developed theory (Yin, 2003). The researcher’s decision was to study multiple cases.

### 4.3.4 Case Selection

Multiple case studies allow literal or theoretical replication and cross-case comparison. There is no ideal number of cases. Yin (2003) suggests that more replications give greater certainty, but that in some situations, for example, where rival theories that are very different are being tested, fewer replications may be necessary. Eisenhardt (1989) suggests between four and ten cases are desirable for theory building using case study research. Another consideration is the timeframe and the resources available to the researcher. In a case study project undertaken by a student researcher in order to meet the requirements of doctoral research, the resources and funding available are limited and a particular deliverable must be produced, i.e. a dissertation. The researcher chose multiple case studies according to the logic defined by Eisenhardt (1989) who advocates it is best to use four/ten cases for multiple case studies. The researcher selected one pilot and four cases in the beginning as she was unsure of her ability to get access to the seven. However, based on her perseverance and the interest in the study from all TTOs, the full population of seven universities TTOs was obtained, all of whom received TTSI funding.
Replication logic was applied, not sampling logic to design the case protocol. Initially the selection criteria were based on research income of university (the context) and size of the TTO. According to the TTO literature, other empirical studies have taken this as criteria for cases and thus have validity as selection measures (Wright et al, 2008). Yin (2003) also prefers multiple cases to be used and advocates theoretical replication as opposed to literal replication. While Yin and Eisenhardt are from the same school of thought and agree that multiple case studies work better, Stake (2000), while an advocate of the case study takes a different stance. Stake (2000) is a fan of the intrinsic case and he promotes using one case study when it is a critical case, or an extreme case of the phenomenon under investigation. Cases can also be defined according to Yin’s (2003) classifications of extreme unique case, representative/ typical case/ revelatory case/ longitudinal case. Table 4.3 outlines case selection.

Table 4.3: Case Selection

<table>
<thead>
<tr>
<th>TTO</th>
<th>University</th>
<th>TTO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N students approx</td>
<td>N staff approx</td>
</tr>
<tr>
<td>Alpha</td>
<td>- 20,000</td>
<td>2000+</td>
</tr>
<tr>
<td>Beta</td>
<td>- 20,000</td>
<td>- 2000</td>
</tr>
<tr>
<td>Charlie</td>
<td>20,000 +</td>
<td>2000</td>
</tr>
<tr>
<td>Delta</td>
<td>- 20,000</td>
<td>2000+</td>
</tr>
<tr>
<td>Echo</td>
<td>- 20,00</td>
<td>- 2000</td>
</tr>
<tr>
<td>Foxtrot</td>
<td>- 20,00</td>
<td>- 2000</td>
</tr>
<tr>
<td>Golf</td>
<td>- 20,000</td>
<td>- 2000</td>
</tr>
</tbody>
</table>

4.3.5 Pilot study

The researcher chose Alpha as a pilot. The reason behind this is the researcher wanted to “examine the case from which we feel we can learn the most. That may mean taking the one most accessible, the one we can spend the most time with” (Stake, 2000: 44). The pilot yielded rich data was gathered which influenced the decision of the researcher to use the rich data in the actual data
interpretation of cases. Furthermore, pre pilot the researcher engaged in conversations with stakeholders who were knowledgeable on the area.

4.3.6 Case Study Methods

Yin (2003) outlines six sources of evidence; documentation, archival records, interviews, directs observation, participant observation, and physical artefacts. The following table 4.4 outlines the type of data collected for each method.

<table>
<thead>
<tr>
<th>Case Study Sources of Evidence</th>
<th>Examples used in Data Collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Documentation</td>
<td>TTO websites, IP contracts, Mission Statements, Planning Documents, University Strategic Plans, Government Documents</td>
</tr>
<tr>
<td>Archival Record</td>
<td>Business plan template from the TTSI Policy document outlining the need for TTOs</td>
</tr>
<tr>
<td>Interviews</td>
<td>TTO Directors, Commercialisation Specialists, Industry Liaison Roles, Operation Manager, TTO managers. Government actors</td>
</tr>
<tr>
<td>Direct Observation</td>
<td>Yes</td>
</tr>
<tr>
<td>Participant Observation</td>
<td>No</td>
</tr>
<tr>
<td>Physical Artefact</td>
<td>Signage around campus, reporting lines of TTO</td>
</tr>
</tbody>
</table>

In summary, the research adopted one of Yin’s (2003) core principles to ‘use multiple sources’ to triangulate the date in an effort to make results credible. Credible research allows research to be generalised across the wider TTO population which is an important issue in this research. Generalisibility is the extent to which conclusions can be drawn on one thing (often a population) based on information about another (often a sample) (Silverman, 2006) or the extent to which the finding can be generalised to another context (Eisenhardt and Graebner, 2007). By interviewing multiple stakeholders in each TTO
setting, the researcher attempted to capture the pervading view of each institution, thus supporting generalisibility by using triangulation of data sources.

4.3.7 Disadvantage of case study research

However, there are disadvantages of case study research method. The data collection and data analysis stages in case study research are both subject to the influence of the researchers’ role in the project, and depend on the researcher’s interpretations of interview data, secondary data and events. This may jeopardise the validity of the research findings, although as Yin (2003:19) notes, bias may enter into the design and conduct of other types of research also. Furthermore, case studies typically make use of qualitative data. Data analysis can be difficult as qualitative data analysis methods are not as well established as quantitative methods and the volume and variety of data collected may make analysis challenging (Miles and Huberman, 1994). These and other practical difficulties (time limitations of study) may suggest case study research to be a less attractive research strategy than survey research methods. However the researcher, cognisant of the susceptible nature of case studies to bias and concerns of generalisibility, put measures in place to counteract bias which will be outlined further in the chapter.

4.4 DATA COLLECTION

Turning to the means of data collection used in the field, a number of primary and secondary research methods were deployed and weaved together in order to provide a coherent picture – what can best be described as a process of ‘triangulation’ (Yin 2003:97-99). Whereas primary data collection methods, such as interviews, are administered and controlled by the researcher, data that is already collected, such as strategic plans and policy reports, is deemed to be secondary data.
4.4.1 Obtaining The Participation Of Organisations In Case Study Research

Research questions should be of interest and importance to the potential participant organisations to gain their input into the study. If the area of research is particularly relevant to the participants of the study and the specific research question is one which the participants have an interest in learning the findings of the study, then it is more likely that they will contribute to the study (Silverman, 2006). Before beginning data collection, it was necessary to reach an agreement with the participating case study sites concerning the confidentiality requirements relating to the case study data and findings, and any limitations on the disclosure of the identities of the case study participations. A brief covering letter describing the nature and context of the research project and its objectives was sent to all potential case participants. It outlined the research timeframe, the proposed nature of the case participants’ involvement in the project and the expected research outcomes. These outcomes were stated in terms of their value to the participant organisation. See Appendix H.

This section describes how the researcher gained access to the research subjects. Her doctoral supervisor, Dr James Cunningham is one of the leading experts on technology transfer in Ireland, having previously written a leading book, ‘Strategic Challenges for Technology Transfer’ with his colleague Brian Harney. As a result of the success of the book, TTO professionals and the interested government agencies were aware of the work coming out of the researcher’s institution on TTOs and thus were responsive to the request of interviews. The researcher emailed each member of the TTO offices individual emails (Email in Appendix H). The researcher also contacted government agencies and they were very interested in meeting with her. She selected Forfás and Enterprise Ireland. Forfás as policy advisors who outlined how the activities of the TTO are now on the national agenda and Enterprise Ireland as
funders, discussed their role as the driving force behind the Technology Transfer Strengthening Initiative.

Names and positions of all potential case participants were obtained before they were contacted for participation in interviews and interview time was only used to obtain information that could not be obtained in any other way. Factual and other uncomplicated types of data (age and size of TTO) were collected for other sources (e.g. annual reports, strategic plans, internal newsletters and other organisational bulletins) to reflect the culture within the organisation and the issues which were currently of interest and concern to the TTO Director and employees. The researcher found that a well organised and categorised set of case data facilitated the task of analysing the case study evidence as she could easily set up cases on NVivo, listing the attributes collated from the secondary data.

What quickly emerged as the researcher started to engage with participants was that this topic was of huge interest to both the technology transfer practitioner community and the government agency stakeholders. There was a very quick response time for people replying to the researcher and expressing their interest in participating. The researcher received an email response within the day in most case interviewees. Also the researcher spoke to at least one representative from every TTO in the country, allowing for a full population study. From the government side the researcher contacted the Minister of Enterprise, Trade and Innovation and executive management in Enterprise Ireland. Both were very keen to participate and discuss the strategic priority university industry technology transfer is for the country. The relevance and importance of the research was also confirmed, when the literature review of this dissertation, ‘Legitimacy, Mission and Management: Key Strategic Challenges for the TTO’ won a prize at acclaimed practitioner conference Association of University Technology Managers (AUTM). AUTM is a living, dynamic, global network of more than 3500 technology transfer professionals who work in academic, research, government, legal and industry entities.
4.4.2 Collecting Case Study Data From Case Participants

Effective and efficient data collection for case study research required careful planning and judicious use of both the case participants’ and researcher’s time. Collecting case study data was time-consuming and difficult at times. There were a couple of instances where the interviewee was suspicious of the questions that were being asked in the interview. On later reflection of the reasons behind this, the researchers surmised this was due to the complex context of the TTO. At the time of data collection, the TTOs had recently been reviewed by Enterprise Ireland and may have felt ‘over analysed’ or suffering from ‘review fatigue’. Also, the researcher learned over time that the TTOs, due to the nature of what they do, spent a lot of time justifying their position to academics, university management and to industry. This happened to varying degrees amongst the different cases. And so, some were a little sceptical of a doctoral researcher exploring the way they do things. However, the researcher worked at reassuring them and won their trust by preparing herself with sufficient background information about each case site prior to commencing data collection and also persuaded the participants by presenting the value of the study. The following table 4.5 outlines different mechanisms used to build trust with the case participants.
Table 4.5: Mechanisms to engage with case participants

<table>
<thead>
<tr>
<th>Mechanisms to engage with case participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>➢ Informal chats with former members of TTOs, academics who had interacted with TTOs</td>
</tr>
<tr>
<td>➢ Joined Linked In TTO Discussion Groups and read archival and current conversations which highlighted some of the issues TTOs were dealing with (Example Spunout and Technology Transfer Ireland)</td>
</tr>
<tr>
<td>➢ Attending TTO presentations to industry</td>
</tr>
<tr>
<td>➢ Researched TTO websites analysing communication of activities, team members, strategic focus</td>
</tr>
<tr>
<td>➢ Researched university strategic plans, university quality reviews, and university annual reports to gauge the level of third mission activity within each university. In particular looking to ascertain if third mission seemed central to activities or mandated by government intervention</td>
</tr>
<tr>
<td>➢ Researched newspaper headlines of various success stories issued by the TTOs. These were in the Sunday Business Post, the Examiner and on Finfacts website</td>
</tr>
</tbody>
</table>

4.4.3 Semi-Structured Interviews

Interviews are essential sources of information for case study research (Yin, 2003: 84), and are arguably the primary data source where interpretive case study research is undertaken as it is through interviews that researchers can best access case participants’ views and interpretations of actions and events. The semi structured interviews became interesting conversations in which the interest in the topic of the interview and in the interviewee’s views and experiences is combined with the opportunity for the case participant to reflect on events and actions and provide his/her insights into these conversations. Semi structured interviewing is deemed one of the most effective and efficient methods of data collection, as recognised by Hermanowicz, (2002:480).

‘…it is among the most basic and fundamental of methods, and one which, if executed well, brings us arguably closer than many other methods to an intimate understanding of people and their social worlds’

As well as interpreting what the interviewees said and what was written in the policy reports, it was also necessary to take meaning out of the unspoken messages as articulated by Poggi (1965: 56): “a way of seeing is a way of not
seeing”. Using the research questions, a topic guide was developed for informal use during the semi-structured interviews and analysis of secondary data. An understanding of the nature and objectives of the interview is important. Thus, the type and nature of qualitative interviewing is quite diverse: difficult, uneven and at times problematic (Silverman, 2006).

4.4.4 Dealing with Difficulties of Data Collection

Data collection in the field required planning for dealing with the difficulties of gathering data in a real life environment not controlled by the researcher (Yin, 2003: 66-69). The researcher learned to adapt to unanticipated changes to case participants schedule and the important lesson that availability must be accommodated within the overall data collection schedule. For example, taking the ‘red eye’ train from Galway to Dublin for a case participant interview, only for the interview to be cancelled while waiting in reception. Also, the researcher learned that adequate resources, time and facilities should be provided. As the TTO professionals turned out to be quite the talkers, a 50 minute scheduled interview relayed into 2-3 hour interviews. Therefore, the researcher learned to schedule only one interview a day. Finally, the researcher learned the value of networking when she attended an Enterprise Ireland ‘Applied Research Forum’ and was introduced to Dr Alison Campbell, OBE, TTO Director in King’s College. She was one of the reviewers on the panel set up by Enterprise Ireland to review the activities of the TTO. She gave some useful insights of the Irish TTO ecosystem. The researcher subsequently met her at the AUTM event where she was representing AURIL/PRAXIS.

4.5 RESEARCHERS ROLE IN CASE STUDY

Effectively carrying out case study research demands certain qualities and skills on the part of the researcher: initiative, pragmatism, the ability to take advantage of unexpected opportunities and optimism and persistence in the
face of difficulties and unexpected events, especially during data collection activities (Hermanowicz, 2002). The successful completion of case study research required enthusiasm and intense curiosity about the phenomenon being investigated, and a desire to communicate the results of research. Table 4.6 outlines the researcher’s role in the multiple case studies.

Table 4.6: Researchers role in Case Study

<table>
<thead>
<tr>
<th>Initiative</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Informal Conversations</td>
</tr>
<tr>
<td></td>
<td>Email to participants</td>
</tr>
<tr>
<td></td>
<td>Attending Government agency technology transfer events</td>
</tr>
<tr>
<td>Pragmatism</td>
<td>Scaling back ‘strategy’ concept: Common case of PhD over –excited/ naïve enthusiasm</td>
</tr>
<tr>
<td></td>
<td>Or intruder syndrome</td>
</tr>
<tr>
<td>Ability to take advantage of unexpected events</td>
<td>Enterprise Ireland event in Guinness Storehouse where met Alison Campbell</td>
</tr>
<tr>
<td></td>
<td>Notice at Washington Conference of AUTM literature review competition</td>
</tr>
<tr>
<td>Optimism and Persistence in the face of challenges</td>
<td>Turning up at interviews, travelling to them only for it to be cancelled</td>
</tr>
<tr>
<td></td>
<td>At times, maybe because of the nature of the TTO funding structure, found them to be defensive. One reason may be due to review fatigue (Forfas report and EI three wise men report, interim review)</td>
</tr>
<tr>
<td></td>
<td>Also may have been defensive as justifying their position- lack of certainty over future of Enterprise Ireland funding.</td>
</tr>
</tbody>
</table>

4.6 Out in the Field

Data collection involved both in-depth face to face interviews as well as the accumulating of secondary data material. Secondary data related to background information on the local context as well as data, brochures, and reports relating to university-industry linkages. The interviews consisted of semi-structured questions relating to the processes involved in university-industry knowledge and technology transfer. Data collection was conducted during the period 2009-2010. Primary research consisted of in-depth interviews with key
individuals throughout all areas of the TTO, focusing on the strategy of the office, policies and processes. The results of these interviews will be central to the findings of this study. As previously outlined the focus in the interviews is on the “why” and “how” the strategies being chosen as opposed to “what” is being transferred. These interviews were response driven and followed up on the responses of the interviewee as opposed to following a structure. Selection of interviewees was a result of secondary research as to the key players involved in the strategy of the commercialisation of university technologies and an investigation as to other contributing factors. Random selection is not necessary as the qualitative nature of the research requires expert insights and views.

As part of the data collection, the researchers conducted 36 semi-structured interviews which were held with current TTO personnel in the seven cases and where they acknowledged as relevant to specific strategic activities, interviews were conducted with non TTO members such as government agencies and other key stakeholders. The audio-taped interviews were of 60-90 minutes duration and transcribed after the interview. In total, 296 pages of interview transcriptions were analysed. Standard questions were utilised to warrant validity and consistency. However, semi-structured interviews were important for the interpretative approach taken, by which current and retrospective strategy formulation processes were reflected upon by interviewees. Also, during location visits, the researchers requested a copy of supporting organisational documentation, such as organisational charts, strategy documents and reports. Multiple data types such as documents, observation and interviews as well other publicly available documents were used to build comprehensive and in-depth analysis.

4.6.1 Collecting Interview Data

The findings in the seven case studies are primarily based on in-depth semi-structured interviews with all roles in the TTOs and a sample of policy makers
from Enterprise Ireland and Forfás, which took place over the course of 2009 and 2010. For a study of this nature, it was vital to secure multiple views from all roles in the TTO and to get the stakeholder perspective also. Table 4.7 presents the distribution of persons interviewed by role.

Table 4.7: Overview of Interviews, by Role

<table>
<thead>
<tr>
<th>Role</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>TTO Director</td>
<td>7</td>
</tr>
<tr>
<td>Commercialisation Specialists</td>
<td>12</td>
</tr>
<tr>
<td>Business Incubation Managers</td>
<td>5</td>
</tr>
<tr>
<td>Office Manager</td>
<td>2</td>
</tr>
<tr>
<td>Industry Liaison Officers</td>
<td>4</td>
</tr>
<tr>
<td><strong>Government agencies</strong></td>
<td></td>
</tr>
<tr>
<td>Enterprise Ireland</td>
<td>4</td>
</tr>
<tr>
<td>FORFÁS</td>
<td>1</td>
</tr>
<tr>
<td>Department of Enterprise, Trade and Employment</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>36</strong></td>
</tr>
</tbody>
</table>

4.6.2 Tape Recordings and Note Taking

The researcher tape-recorded every interview, and then transcribed the text word for word. The transcribed text became the core data that are analysed.

4.6.3 Taking Notes

After each interview the researcher created a Daily Interpretive Analysis (Silverman, 2006) which consisted of observations of the interview and overall interpretations, intuitive thoughts, the look and feel of the interview. Observations played an important function of informing and revising the kind of questions that were asked in subsequent interviews with that particular case. Concerns at that time were also documented. Finally it was essential that the
notes included information about the interview, and sufficient information to link the notes to the tape recording that were made. Standard data for each interview were documented which were:

- Date
- Time
- Location
- Interview ID

4.7 Data Analysis

Following Eisenhardt (1989) the data was analysed by the researcher by first conducting within case analysis for each case to find themes emerging in the analysis, followed by cross-case analysis to make comparisons and find patterns. Triangulation with secondary data was also conducted to increase the validity of the study. Such secondary data was analysed according to Garfinkel (1967) idea of ‘documentary method of interpretation.’ This is a process in which a set of appearances may be objects, events, persons or symbols are taken as evidence of some underlying patterns. He suggests that the documentary method of interpretation is a feature of common sense whereby the researcher engages in under-covering processual activities of an organisation.

4.7.1. Establishing Rigour in Writing up Case Study Research

Regardless of the researcher’s philosophical perspective or choice of research methods, in order to establish credibility, the researcher must describe in detail how the research results were arrived at, and to establish validity in the view of
the researcher, the researcher must present a coherent, persuasively argued point of view and so the following section outlines how the results were arrived at. Miles and Huberman (1994: 21-23) describe data analysis as consisting of three concurrent activities:

- Data reduction refers to the process of selecting, simplifying, abstracting and transforming the raw case data
- Data display refers to the organised assembly of information to enable drawing conclusions. Data display includes narratives, matrices, graphs, tables and various charts.
- Conclusion Drawing

The literature identifies two principle categories of challenge to research creditability (Silverman, 2003):

- Validity, or “…the extent to which the data collection truly reflect the phenomenon being studied”
- Reliability, or “…the extent to which research findings would be the same if the research were to be repeated at a later date, or with a different sample of subjects”

Issues of validity and reliability are of vital importance in case study research (Yin, 2003). Miles and Huberman (1994) and Silverman (2006) argue that data collection and data analysis should overlap to create flexibility in data collection procedures and so that the researcher remains open to new ideas or data. At each stage of the process; research design, data collection and data analysis, efforts were made to ensure credibility of the findings. For example, to ensure construct validity the researcher used multiple sources of evidence; in the data analysis stage, the researcher performed pattern matching, explanation building, and addressed rival explanations to ensure credibility of internal validity of findings. In the research design, the external validity was made credible as used replication logic in multiple case studies, and finally the credibility of the reliability of the case was enhanced as the researcher used a
case study protocol and developed a case study database in NVivo during the data collection phase. A summary of these tactics are presented in Table 4.8 below.

<table>
<thead>
<tr>
<th>Credibility Tests</th>
<th>Case Study Tactics</th>
<th>Phase of Research in which tactic occurred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construct Validity</td>
<td>Use multiple sources of evidence</td>
<td>Data Collection</td>
</tr>
<tr>
<td>Internal Validity</td>
<td>Do Pattern Matching</td>
<td>Data Analysis</td>
</tr>
<tr>
<td></td>
<td>Do Explanation Building</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Address rival explanations</td>
<td></td>
</tr>
<tr>
<td>External Validity</td>
<td>Use replication logic in multiple case studies</td>
<td>Research Design</td>
</tr>
<tr>
<td>Reliability</td>
<td>Use Case Study Protocol</td>
<td>Data Collection</td>
</tr>
<tr>
<td></td>
<td>Develop case study database</td>
<td></td>
</tr>
</tbody>
</table>

Source: (Adapted from Yin, 2003)

Two qualitative data techniques were used; coding literature based taxonomy and pattern searching via maps. The analysis progressively moved from very broad categories to key themes and constructs (Miles and Huberman, 1994). Data were coded using NVivo software package. Multiple sources facilitated the researcher to interpret a reasonably holistic representation of TTO processes within their context (Pettigrew 1990). Finally, to appreciate the contextual implications of the university sector, during the time of study, and more specifically, how such a context was interpreted by the members of TTO, secondary data in terms of policy documents and government initiated inquiries and reports were considered. All data were stored in NVivo 8, a qualitative data analysis software program. Using writing as an analytic device the researcher categorised and re-categorised coded sections to identify thematically coherent interpretations of the work of TT Professionals. The researcher adopted a reflexive approach to the empirical data that draws on pre-existing theories (i.e. strategy formulation to guide analysis). Yin (2003:151) notes that a case study report ‘must be composed in an engaging manner’ with not only a clear writing style but also ‘one that constantly entices the reader to continue reading.’ The case study report must be comprehensive and include
adequate support to substantiate the findings. Secondary data that is not necessary for understanding and assessing the case study analysis and conclusions should be omitted. The objectives of writing up case studies are to assume an articulate writing style and to present the significant evidence astutely and efficiently. Table 4.9 presents a summary of the main steps in data collection and analysis process.

Table 4.9: Summary Of Main Steps In Data Collection And Analysis Process

<table>
<thead>
<tr>
<th>Steps in Data Collection</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mapping the national context and the universities</strong></td>
<td>National Level: Attending policy and practitioner conferences, conversations with leading experts, examining policy documents</td>
</tr>
<tr>
<td><strong>Case Selection</strong></td>
<td>Identified TTOs based on network, websites and general information search</td>
</tr>
<tr>
<td><strong>Initial Case investigation</strong></td>
<td>Internet search and informal conversations</td>
</tr>
<tr>
<td><strong>Document Collection</strong></td>
<td>Obtained plans, presentations from interviews</td>
</tr>
<tr>
<td><strong>Data Transcription</strong></td>
<td>Transcribed the interviews from tape, focus on revealing process</td>
</tr>
<tr>
<td><strong>Mapping the central events over time</strong></td>
<td>Writing narratives about the strategy formulation process, and making tables describing time, actors and events</td>
</tr>
<tr>
<td><strong>Matching theoretical concepts</strong></td>
<td>Working with theory and data in an iterative process</td>
</tr>
</tbody>
</table>

4.7.2 Coding

The goal of the coding process was to connect specific quotes to analytic concepts and categories. Some of the categories preceded interviews and were based on assumptions from informal conversations and participating in communities on Linked In. Others emerged from the data itself, such as unexpected observations and new insights. The researcher learned that coding categories evolve through interactions with the data.
4.7.2.1 Coding First Steps

Codes stuck closely to the data in order to preserve words, preserve events, portray viewpoints and suggest contexts. The initial phase of coding involved naming each line segment of the transcript. It was essential to have an open-mind for this part and to avoid preconceptions. The researcher looked for verbs, allowing processes to emerge.

4.7.2.2 Analysis

Following initial coding, the analysis of findings became directed and more conceptually motivated whereby the researcher chose analytic categories of interest, by research question. Subsequently, she compared the findings across interviewees and observations. The researcher extended each category which ultimately led her to find typical cases and outlier cases.

4.7.2.3 Definition of Each Case

The final stage of analysis involves explaining how codes/ categories may relate to one another by integrating into theory from the literature review. This required looking for such things as causes, contingencies, consequences and conditions. The researcher was conscious of the dangers of inducing causality in qualitative data. The researcher understood causality to be a description of a visualizable sequence of events, with each event clearly leading to the next. The researcher was conscious to make the description to be more than plausible, it must be thorough and systematic (Charmaz, 2006).
4.7.2.4 Data Importation

All interviews were transcribed and imported into NVivo. Secondary data details were also imported. NVivo stores data in ‘nodes’ which are repositories for themes and categories and one such node type is a case node which has a single file which stores each participants contribution from any source, be it their interview script or strategic plan, or TTSI business plan. These case nodes, once populated are then physically linked to attributes in order to distinguish which case they belong to. Thus, intangibles such as ‘vision’ and ‘tension’ can be intersected with tangibles such as TTO size, age of TTO for detailed analysis in order to help the researcher understand the phenomena under scrutiny.

4.7.2.5 Field Notes And Observations

Observations from the field are not captured in the interview transcripts but do play a crucial role in discerning meaning. A memo function in NVivo allowed the researcher to capture times when the interview respondents’ tone of voice suggested that some of the comments made were cynical or not fully supported by the interviewee. Linking this point of the transcript to the audio sound byte facilitated a holistic approach to the data and meant the analysis was not conducted solely on the text from the transcript. Memos were used to capture the context of the interview, information that was given before or after the tape recorder was on, helped build a more concise context to the data. Memos also serve to track thinking processes. They were used to record the researcher’s thoughts throughout the process of breaking down the data into ‘units of meaning’ and defining nodes so that such definitions may be clearly understood by study supervisor.
4.7.2.6 Coding Framework

Nodes hold data which has been coded from sources. All nodes created in the study were defined by the researcher for clarity and to test for coding consistency. The researcher engaged in the following steps in the process of coding:

Phase 1: Broad Coding is coding by category/question, which will be automated through NVivo. This phase is broad and includes all the data. Broad coding involved using automated processes to preorder the data according to the interview question guide. Gathering all the responses to a question regardless of what order or length of time the question took up in each in-depth interview.

Phase 2: Cross-coding allows participant responses to be coded to more than one question. Cross-coding involved taking all the text coded to a question and coding the data against other relevant questions. For example, if a person in responding to category 1, (Strategy Formulation) made a comment, which also was relevant to category 3, (Outcomes), this text segment or unit of meaning would also be coded against category 3. Thus, any comment offered in the in-depth interviews was systematically considered against each of the other seven categories for relevance during the cross-coding phase of analysis.

Phase 3: Coding-on imposes a hierarchy or breaking down of themes into subthemes, discerning if each participant's responses could be aligned with the same question. Basically, the literal response will be coded and interpretation of what was said will be coded. Coding-on involved breaking down all the contents of the themes generated in phases 1 and 2 by means of line-by-line manual interpretive coding based on content. Subthemes emerged under each of the categories, which, in turn, had several subcategories of their own. These child nodes were often further coded into ‘grandchild’ nodes until all views were represented and all themes and subthemes, no matter how small, were explored completely. Figure 4.1 shows coding diagram.
Figure 4.1: Diagram showing Coding Hierarchy

- **Strategy Formulation**
  - Antecedents
    - Key Drivers to Planning
    - Different Approaches to TTSI
  - Assessing Best Practice
    - Benchmarking
    - Professional Development Activities
  - Agenda Setting
    - Appropriating and Allocating Resources
  - Mission Statements
    - Alignment to University
  - Deliberate or Emergent

- **Key Actors**
  - TTO Professionals
  - Enterprise Ireland
  - University Management
  - Academics
  - Industry

- **Outcomes**
  - Engaging in strategic review
  - Recognising Hard Metrics do not capture value
  - Evolving to Soft Metrics
  - Managing Metrics
  - Internal Driven
  - External Driven
  - Manipulating Metrics
  - Demand for Jobs
  - Value for Money
  - Changing mindset of academics
4.8 Bias

The matter of biases introduced by the researcher during the collection and analysis of case data needs to be considered. Two types of bias may be recognised: the effects of the researcher on events and the behaviour of participants at the case study site, and the researcher’s own beliefs, values and prior assumption, which may prevent adequate investigation and consideration of possible contradictory data and unduly influence the analysis of case study evidence. Bias arising from the researcher effects at the site are in one sense unavoidable: the researcher is influencing what is happening just by the sharing of the concepts and interpretations with personnel at the site. The researcher noticed this in terms of discourse. If the researcher used a phrase at the beginning of the interview, by the end of the interviewer, the interviewee had repeated back the phrase to her in a different context. Also, making sure the participants are fully informed about the purpose of the research and how it is to be conducted is another method advised which the researcher also implemented by issuing a comprehensive email detailing the interview process (See Appendix H) (Miles and Huberman, 1994: 233). Biases in the researcher’s collection and analysis of case data can be counteracted by using multiple sources of evidence (triangulation of data) to provide multiple instances from different sources (Miles and Huberman, 1994: 234 – 235).

4.9 Limitations of Methodology

The research design and methodology of this study have certain limitations and operate with set assumptions. Firstly, this study looks only at universities and not Institutions of Technology as knowledge creating organisations and only looks at colleges with localised offices for commercialisation and so generalisibility of results may be affected.
Secondly, there is a relatively small sample of cases under investigation and their location in a single economy may be problematic. However this was overcome by the following activities; attending AUTM and Technology Transfer Society to discuss the findings of the research with leaders in the academic and practitioner fields; participating in discussions on Spin-in, an international linked in group dedicated to addressing TTO issues debates. Also the study was validated by using the full population of seven Irish university TTOs in the study.

Thirdly, the study of process in TTOs is not real time and the researcher did not engage in a longitudinal ethnographic study. However, real time studies of strategy processes are more difficult. It is unlikely that a firm engaged in a new strategy would allow a team of researchers to observe its evolution from multiple vantage points (Chakravarthy and White, 2001: 201). The real difficulty for strategy researchers is to identify ex ante a decision or action as belonging to a strategy stream and so the researcher was influenced by the advice of Pettigrew (2007: 201): “The ability to link outcomes with precursor actions and decisions is essential to strategy process research, Given the current state of the art, researchers should perhaps identify interesting strategy dynamics and work backwards across levels the precursor conditions and the processes that stimulated, guided and channelled, directed and limited subsequent actions and decisions”.

4.10 Concluding Comments

To conclude, this chapter has outlined the research methodological approach employed to undertake the research. To reiterate, this chapter was segmented into several main elements. It began by highlighting the use of case study as the main research strategy for this study. Within this section it detailed the specific research procedures and data collection and analysis strategies. It then outlined the appropriateness of an interpretist paradigm to the research and finally concluded with some of the limitations of the study, while emphasising how the researcher addressed research reliability and validity. The following chapter will outline the Irish Technology Transfer system by presenting a strategic positioning analysis of Irish TTOs, followed by an introduction to the full population of Irish university TTOs who are the focus of this study.
CHAPTER FIVE: THE STRATEGIC CONTEXT FOR TTOS IN IRELAND

“Ideas won't keep. Something must be done about them.”

Alfred North Whitehead

5.1 INTRODUCTION

This chapter brings together the key contextual elements which position the research agenda. There are two objectives for this chapter. The first objective is to provide a strategic positioning analysis of TTOs in an Irish context. Understanding the strategic positioning of TTOs within their environment will contextualise a strategy process study of TTOs, the findings of which will be presented and analysed in the upcoming chapters. The chapter draws attention to the policy context of the research by giving an overview of the documents which shaped the development of TTOs in Ireland and encouraged universities in Ireland to engage with industry. The analysis here is sourced from government reports and from interviews with leading government members, responsible for implementing and monitoring the government initiatives to strengthen and support TTOs in Ireland. The second objective is to introduce the cases of the study. By presenting the contextual background of TTOs, the study reveals insights into the ‘black box’ of the TTO (Sanders and Miller, 2010). These contextual elements were considered most significant to anchor the thesis, frame the research gaps identified in extant literature and build theory in this field. Thus this chapter 'sets the scene' for what follows in subsequent chapters of the thesis.

5.2 STRATEGIC POSITIONING OF TTO

The strategic position of an organisation is concerned with the impact on strategy of the external environment, an organisation’s strategic capability,
organisation culture and the expectations and influence of stakeholders by exploring the purpose of the organisation. Specifically, the chapter will address each of these facets, beginning with the external environment.

5.2.1 The External Environment

The external environment in which the TTO operates is discussed under the following headings: Political agenda; Policy initiatives; Political actors; Economic environment; and Funding challenges.

5.2.1.1 Political Agenda

The Irish government played a key role in encouraging university industry linkages. As part of the EU’s Lisbon Strategy, the Irish government set a target of lifting economy-wide research and development (R&D) spending to 2.5% of gross national product (GNP) by 2013. In 2008, overall investment in R&D was 1.6pc of GDP, disappointingly low when compared to countries such as Japan (5.1pc). However, a Forfás report outlined how overall Research AND Development (R&D) performance continued to improve in Ireland in 2008, maintaining the positive growth trends seen over recent years (Forfás, 2009). The average annual growth rate in R&D spending activity performed in the State over the last decade was 11.3%. This strong growth rate placed Ireland among the top R&D growth performing countries in the OECD, labelled as “R&D catching-up” countries. One of the key indicators identified by the European Commission and the OECD in measuring a country’s progress toward building a stronger knowledge economy is R&D expenditure intensity. This is defined as the ratio of total R&D expenditure in all R&D performing sectors of the economy to overall economic activity, as measured by Gross Domestic Product (GDP) or Gross National Product (GNP). Ireland’s total R&D intensity ratio was estimated to be 1.51% of GNP in 2007. This was marginally ahead of the 1.55% of GNP ratio figure recorded in 2006. Ireland is
in the third tier of countries in relation to performance in this R&D metric. Gross R&D spending in the government, higher education and business sectors of the economy is estimated to have increased by 6.4% in current prices in 2008. This increase in the R&D intensity ratio is expected to bring Ireland closer to the OECD and the EU27 averages, although this ratio improvement has been assisted by the rapid decline in Gross National Product throughout the year. Expenditure on R&D in the higher education sector (HERD) rose to an estimated €713 million in 2008. The HERD intensity ratio (HERD as a % of GNP) is therefore 0.46% which is above the OECD and EU 27 averages of 0.39%. Figure 5.1 outlines total R&D expenditure on R&D as a % of GDP/GDP of Ireland compared to other countries.

Figure 5.1: Total R&D Expenditure as a % of GDP (latest year of data availability for each country)

Another key metric in determining the commercialisation activity of the country is a patent count which was published in the World Patent Report 2007. In terms of patent activity, Ireland’s activity level is growing but remains low. One explanation, as Forfás (2004, p.21) outlines, is ‘Ireland’s dual industry
structure and a foreign-owned sector that, with few exception, does not carry out high value-added activities in Ireland.’ The growth rate in patent filing at the EPO between 1995 and 2000 was 26 per cent per annum. Residents of Switzerland are the biggest filers of patent applications at the European patent office, followed by Luxembourg and the Netherlands. However, Ireland is lagging behind its competitors at national level but nevertheless; Ireland’s share of European and US granted has been increasing but remains low as illustrated in figure 5.2.

Figure 5.2: Patenting Filing

![Figure 5.2: Patenting Filing](image)


The European Innovation Scorecare (2008) captures the key strengths and weaknesses for Ireland in relation to EU 25. Accordingly, Ireland is classed as innovation followers, with innovation performance below those of the innovation leaders, such as Sweden, Finland and the UK, but above that of the EU average. Interestingly, Ireland’s performance has been increasing fastest within this group, followed by Austria with growth rates of 2% as calculated by average annual growth rates over a 5 year period as outlined in figure 5.3.
Ireland is in the group of Innovation followers, with an innovation performance above the EU27 average. It is a growth leader within this group of countries with a rate of improvement just above that of the EU27. Relative strengths, compared to the country’s average performance, are in Human resources, Throughputs and Economic effects and relative weaknesses are in Firm investments and Linkages AND entrepreneurship. Over the past 5 years, Human resources and Finance and support have been the main drivers of the improvement in innovation performance, with particular attention to strong growth in Private credit (16.8%), Business R&D expenditures (20.0%), Non-R&D innovation expenditures (29.3%) and Community trademarks (17.6%). Performance in Firm investments, Linkages AND entrepreneurship and Innovators has worsened, in particular due to a decrease in Non-R&D innovation expenditures (-5.7%). These levels are depicted in Figure 3. Effectively, to date there has been a strong emphasis on the input side into the innovation process, namely finance and human support. However, this has not transpired into effective outcomes as proved by decreasing levels of
entrepreneurship and innovators. Figure 5.4 depicts Ireland’s innovation performance as per the European Scorecard.

5.4: Ireland’s Innovation Performance

![Figure 5.4: Ireland’s Innovation Performance](http://www.proinno-europe.eu/)

In summary this section provides the underlying context for this study. Although the Irish system has been improving, the focus has predominantly been aimed at the inputs into the innovation process such as finance and human support. This has led to significant improvement in various innovation reports. However, Ireland is still lagging behind its main competitors in terms of output. The next section will detail the government’s policy efforts put in place to resolve this situation.

5.2.1.2 Policy Initiatives

Numerous policy reports have promoted closer links between industry and the third level sector. These include ‘Ahead of the curve: Ireland’s place in the Global Economy’ (ESG, 2004); ‘Building Ireland’s knowledge economy- the Irish action plan for promoting investment in R&D in 2010’ (Forfás, 2004) and ‘Promoting Enterprise- Higher Education Relationships’ (Forfás, 2007). Table 5.1 outlines other policy initiatives. These policy reports outlined all
played a role in shaping the principal document for placing an importance on the role of the university in economic development.

<table>
<thead>
<tr>
<th>Title of Report</th>
<th>Recommendations of Report</th>
</tr>
</thead>
<tbody>
<tr>
<td>White Paper on Industrial Policy, 1984</td>
<td>➢ Highlighted need to increase technology transfer from Irish HEIs to industry</td>
</tr>
<tr>
<td>Programme for Action in Education, 1984-1987</td>
<td>➢ Highlighted need to increase technology transfer from Irish HEIs to industry</td>
</tr>
</tbody>
</table>
| Barriers to Research and Consultancy in the Higher Education Sector, 1996 | ➢ Need to strengthen the interface between HEIs and industry based on application and exploitation of scientifically derived knowledge  
➢ Creation of a climate in which academics will be able and willing to interact with industry  
➢ Establishment of new institutional mechanisms and structures at college and national level to facilitate the development of links with industry |
| Tierney Report, 1995                                | ➢ Curriculum development and research endeavour be linked to the needs of businesses in Ireland to the greatest extent possible                                                                                           |
| Building Ireland’s Smart Economy, 2004              | ➢ Significant emphasis on the economic return for the major taxpayer funding of research                                                                                                                                   |
| Strategy for Science, Innovation and Technology, 2006-2013 | ➢ Strategic priority to developing third mission of universities and the strengthening of TTOs                                                                                                                           |

While these reports played a role in creating an ethos for closer industry academic linkages and building a foundation for university industry technology transfer, the Strategy for Science, Technology and Innovation (SSTI) (2006 – 2013) represented the government’s comprehensive plan to guide Ireland into becoming a knowledge-driven economy. The overarching vision of the SSTI is to ensure that; ‘Ireland by 2013 will be internationally renowned for the excellence of its research and will be to the forefront in generating and using new knowledge for economic and social progress within an innovation driven culture’. As a result of this strategy, research commercialisation and technology transfer are emerging as new missions for Irish HEIs and Technology Transfer Offices. On the input side within HEIs this means investing in academic research and on the output side this has led to a
strengthening of Technology Transfer Offices in order to exploit IP for commercial gains. HEI- industry relations have many different facets and knowledge is transferred via many different channels. One of these channels is Technology Transfer office, which have been set up with the aim of creating more supportive framework condition for closer collaboration and more intense communication between HEIs and industry. TTOs have been defined by OECD as “…organisations or parts of an organisation which help staff at public research organisations to identify and manage the organisations intellectual assets, including protecting intellectual property and transferring or licensing rights to other parties to enhance prospects for further development. It is argued that in most cases more systematic and better transfer mechanisms will positively affect the quality of research and the frequency and quality of innovation (Siegel et al, 2003). Under the Strategy for Science, Technology and Innovation 2006 – 2013, the strategy action proposed is to strengthen institutional competence of Technology Transfer Offices and among researchers in order to better capture, protect and commercialise ideas and know-how. The overarching vision of the SSTI was to ensure that: 'Ireland by 2013 will be internationally renowned for the excellence of its research and will be to the forefront in generating and using new knowledge for economic and social progress within an innovation driven culture. As a result of this strategy, research commercialisation and technology transfer emerged as new missions for Irish universities and TTOs. On the input side within universities, this was characterised by significant investment in academic research from government agencies. On the output side this has lead to a strengthening of TTOs in order to exploit IP for commercial gains under the government initiative ‘Technology Transfer Strengthening Initiative’. Under the SSTI, the strategy action proposed to strengthen institutional competence of TTOs and among researchers in order to better capture, protect and commercialise ideas and know-how. Table 5.2 presents the main aims of the SSTI.
Table 5.2: Main aims of the Strategy for Science, Technology and Innovation 2006-2013

<table>
<thead>
<tr>
<th>Objective</th>
<th>Proposed Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Academic research</strong></td>
<td>- Significantly increase the number of research teams led by internationally competitive Principal Investigators&lt;br&gt;- Upgrade existing research infrastructure and develop new facilities&lt;br&gt;- Develop sustainable career paths for researchers&lt;br&gt;- Enhance the mobility of researchers&lt;br&gt;- Double the number of PhD graduates in science, engineering and technology to one thousand per annum by 2013.</td>
</tr>
<tr>
<td><strong>Graduate schools</strong></td>
<td>- Establish a number of graduate schools to provide high-quality training of researchers, and equip them with generic and transferable professional skills that are relevant modern knowledge-based enterprise economy&lt;br&gt;- Accommodate industrial placements to facilitate development of enterprise expertise.</td>
</tr>
<tr>
<td><strong>Commercialisation</strong></td>
<td>- Increase outputs of economically relevant knowledge, know-how and patents from third-level institutions&lt;br&gt;- Strengthen the Intellectual Property/ Commercialisation functions within HEIs and provide them with expertise to translate research into applications.</td>
</tr>
<tr>
<td><strong>Industrial research</strong></td>
<td>- Transform the quality and quantity of research undertaken by enterprise – both and in cooperation with third-level institutions&lt;br&gt;- Grow business annual expenditure on R&amp;D from €1 billion in 2003 to €2.5 billion and&lt;br&gt;- Develop a number of industry-led research-driven Competence Centres with research facilities in third-level institutes.</td>
</tr>
<tr>
<td><strong>Sectoral research</strong></td>
<td>- Enhance the contribution of research to economic and social development across relevant areas of public policy and&lt;br&gt;- Provide a competitive fund to encourage excellent research in areas of social, economic or environmental need, such as sustainable agriculture, treatment of specific medical conditions, and energy security.</td>
</tr>
</tbody>
</table>

Source: Department of Enterprise, Trade and Employment, Innovation in Ireland (2008)

Following on from this policy, the government published its ‘framework for sustainable economic renewal’, entitled *Building Ireland’s Smart Economy*. The introduction explains that the framework ‘sets out the Government’s vision
for the next phase of Ireland’s economic development’. A significant part of the focus is the encouragement of research and development, and entrepreneurship. The government intends to create an ‘Innovation Island’, making Ireland ‘the innovation and commercialisation capital of Europe – a country that combines the features of an attractive home for innovative multinationals while also being an incubation environment for the best entrepreneurs from Europe and further afield’. The Innovation Task Force was appointed to advise the government on how to turn Ireland into an international innovation hub and to support the development of a smart economy. The Taskforce is examining options to increase levels of innovation and the rates of commercialisation of research and development on a national basis, with a view to accelerating the growth of indigenous enterprise and to attract new knowledge intensive direct investment, building on the existing Government Strategy for Science, Technology and Innovation (SSTI). Interestingly, membership of the Taskforce includes representatives from the private sector, Third Level Education and relevant Government Departments and Agencies in an effort to establish closer linkages with industry and the third level sector. The importance of university research has continued to grow as Ireland tries to close the “innovation gap” between itself and other major industrialized nations.

It can be surmised that the Irish policy is positioning universities as critical ingredients in the nation’s ability to remain competitive. However, policy initiatives to date have largely focused on the supply side. There has been increasing funding for basic research. However, there has been a lack of attention to the demand side to spur innovation and commercialisation. To date, government policies treat technology transfer as a by-product of other goals and as such have failed to focus effectively on the commercialisation process. There are a number of different political actors in involved in the university industry technology transfer space in Ireland as outlined in next section.
5.2.1.3 Technology Transfer Strengthening Initiative

The Technology Transfer Strengthening initiative represents a coordinated national approach to technology transfer by Enterprise Ireland in partnership with the higher educational institutes in Ireland. In 2007, Enterprise Ireland established a new department called the Technology Transfer Exploitation Network to manage the 230 million euro Technology Transfer Strengthening initiative. Enterprise Ireland engages with both industry and research, thus as deemed the most appropriate agency to increase the levels, and relevance, of interaction between the two communities. In addition to managing the direct support to the Technology Transfer Offices in the higher educational institutes, the Technology Transfer Exploitation Network team in Enterprise Ireland delivers supports, such as customised training events, in a focused, centralised way.

Performance data is regularly collected and compared with information on international trends to set targets. According to report from Enterprise Ireland, the strengthening initiative has been deemed a success as indicated by the three-fold increase in the average number of spin-out companies created in the five-year period since it was introduced. This rose from an average of seven per annum in the period 2002-2006 to an average of 24 per annum between 2007 and 2011. Furthermore, there has also been also been a 400pc increase in the amount of technologies licensed to companies by Higher Education Institutes (Enterprise Ireland, 2011). From 2005 to 2010, invention disclosures increased from 135 to 431, patent applications increased from 83 to 101 licenses, options and assignments increased from 12 to 93, and the number of spin-outs increased from 5 to 31. As regards the destination of licenses, in 2007-2010, 32% of licences from universities and PROs went to spin-outs of these organisations. A further 29% went to Irish SMEs with 35% of licenses going to multinational companies.
Furthermore, in response to an increased focus to create more spin-out companies, Enterprise Ireland in December 2008 launched a search for Business Partners - successful entrepreneurial individuals to match up with prospective spin-out companies emerging from publicly funded research in higher education institutes. Once formed, new companies can apply for support from Enterprise Ireland’s high-potential start up fund. Many of the spin-out companies formed to date have moved into campus incubation centres which offer new companies a supportive environment to begin operations from, based on campus in close proximity to research expertise with centralised office supports. Of the 35 spinouts established in 2009 about half are in the information technology space and half in the bioscience/food arena. Examples include Analyze IQ Limited, an NUI Galway spinout that creates technologies used to analyze complex mixtures of illegal drugs, pharmaceuticals, and contaminants. Other spinouts include the mobile software company Cauwill Technologies, launched by the University of Limerick, and Trezur Limited, a digital music application developer backed by the Dublin Institute of Technology and Enterprise Ireland (Silicon Republic, 2010).

In 2012, the government of Ireland announced they were extending the scheme and introducing a second round of support for the technology transfer system in Ireland. Quoting the head of technology transfer in Enterprise Ireland, "The extension of funding for a second phase of the Technology Transfer Strengthening Initiative will enable us to increase the flexibility and responsiveness of the system to make it a key resource for industry in Ireland" (O Morain, 2012). The objectives of the second phase include the development of an efficient and flexible response to industry's requests for access to intellectual property and giving spin-out companies the best possible start. A new dimension to the initiative will be introduced which will create regional clusters sharing resources and expertise. The objective of such clusters is to deliver an enhanced service for industry in Ireland.
The Irish technology transfer system has been extensively reviewed. In 2009 and 2010, TTO directors from the US and the UK recommended “focusing on deals, deals, deals”. In 2010, the Innovation Task Force Report recommended “making it easier for the entrepreneur”. Also in 2010, a review by AD Little and Forfas recommended “standardising national procedures and model contracts”. The Task Force also suggested developing a national IP Protocol which establishes “ground rules” around ownership and access to all state supported IP. The Task Force also suggested establishing a national office for IP generated in the higher education system which would be a single point of contact for entrepreneurs. Figure 5.5 outlines the map of Ireland’s Technology Transfer System.

Figure 5.5: Map of Ireland’s Technology Transfer System
5.2.1.4 Political Actors

There are a number of different public institutions and statutory bodies which play important roles in the Irish National System of Innovation to perform the objectives of the SSTI. The first five: Forfás, Industrial Development Authority, Science Foundation Ireland and Enterprise Ireland are the responsibility of the Government Department of Enterprise, Trade and Employment. The other two – the research councils and the Higher Education Authority are overseen by the Department of Education and Science.

**Forfás:** Established in 1994, Forfás is the body in which the legal powers of the State for the promotion and development of industry, science and technology are largely vested. It is the national policy and advisory board for enterprise, trade, science, technology and innovation. It provides the Department of Enterprise, Trade and Employment (DETE) and other stakeholders with analysis, advice and support on issues related to enterprise, trade, science, technology and innovation. It also provides administrative and research support to a number of independent bodies including: Advisory Council for Science, Technology and Innovation, Expert Group on Future Skills Needs (EGFSN), Management Development Council (MDC), National Competitiveness Council (NCC) and the Small Business Forum. It also hosts the Office of the Chief Scientific Adviser to Government.

**Industrial Development Authority (IDA) Ireland:** IDA Ireland is a state-sponsored agency funded primarily through Government grant aid. Broadly, the key objective of the IDA is to attract and retain foreign direct investment (FDI) in Ireland, and in so doing contribute to Ireland’s economic development. Specifically, it works to develop the strong base of over 1,000 overseas companies already located in Ireland and also to attract new investment. IDA success to date in attracting inward investment is a major driving force behind the growth of the Irish economy.
Science Foundation Ireland (SFI): Science Foundation Ireland (SFI), the National Foundation for Excellence in Scientific Research was established in 2000 and is modelled on the National Science Foundation in America. SFI is responsible for the management, allocation, disbursement and evaluation of expenditure for investment in academic researchers and research teams who are most likely to generate new knowledge, leading edge technologies, and competitive enterprises in the fields underpinning two broad areas: Biotechnology, and Information and communications technology.

Enterprise Ireland: Enterprise Ireland provides intense supports for Irish owned businesses (employing between 10 and 250) involved in manufacturing and internationally traded services. They also support start-ups and micro businesses (less than 10 employees) in the same sector, provided they have the potential to achieve rapid growth and international expansion. These later businesses are referred to as High Potential Start-Ups (HPSUs), of which about 70 start-ups receive Enterprise Ireland support each year. In particular, Enterprise Ireland (EI) is a government agency responsible for the development and promotion of the technology transfer system in Ireland as part of the Technology Transfer Strengthening Initiative. As part of its commitment to facilitating the commercialisation of research, it financially supports the academic researchers to commercialise their work and to link with Irish companies through a number of funding schemes including a Commercialisation Fund

Research Councils: To support an increased policy focus on research and development, two core research councils were established. The Irish Research Council for Humanities and Social Sciences (IRCHSS) was constituted in 2000 and the Irish Research Council for Science Engineering and Technology in 2001. Both research councils operate and manage numerous research schemes, such as graduate and post-graduate fellowships, and research grants for new and established academic researchers.
**HEA:** The Higher Education Authority is a statutory body with responsibility for the planning and policy development for higher education and research in Ireland. The HEA has wide advisory powers throughout the whole of the third-level education sector. In addition, it serves as the funding authority for the universities and institutes of technology. One of the key research funding programmes administered by the HEA is the Programme for Research in Third-Level Institutions (PRTLI) which was launched in 1998. It has invested €1.2 billion to date over five funding cycles (See table 5.3) in strengthening national research capabilities via investment in human and physical infrastructure. The aim of the programme is to advance Ireland in its bid to establish itself internationally as a premier location for carrying out world class research and development in all academic disciplines. The PRTLI awards are evaluated by an international panel of distinguished researchers and scholars on the basis of excellence in: Strategic planning and focus, Inter-institutional collaboration, Research quality and impact of research on teaching and learning.

<table>
<thead>
<tr>
<th>Cycle</th>
<th>Year</th>
<th>Funding Period</th>
<th>Buildings AND Equipment €(M)</th>
<th>Research Programmes AND People €(M)</th>
<th>Total €(M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1999</td>
<td>1999 – 2003</td>
<td>177.5</td>
<td>28.6</td>
<td>206.1</td>
</tr>
<tr>
<td>2</td>
<td>2000</td>
<td>2000 – 2004</td>
<td>48.8</td>
<td>29.7</td>
<td>78.5</td>
</tr>
<tr>
<td>3</td>
<td>2001</td>
<td>2001 – 2006</td>
<td>178.0</td>
<td>142.4</td>
<td>320.4</td>
</tr>
<tr>
<td>4</td>
<td>2007</td>
<td>2007 – 2012/2013</td>
<td>131.3</td>
<td>129.4</td>
<td>260.7</td>
</tr>
<tr>
<td>5</td>
<td>2011</td>
<td>2011–2016</td>
<td>248</td>
<td>99.6</td>
<td>347.6</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>783.6</td>
<td>429.7</td>
<td>1.2 Billion</td>
</tr>
</tbody>
</table>

Source: http://www.hea.ie/en/prtli
5.2.1.5 Economic Environment

The economic environment also has a significant effect on the strategic positioning for the TTOs. Funding is an important consideration for the TTO. Table 5.4 outlines the initiatives introduced by Enterprise Ireland to support researcher engagement with industry. This funding is critical to enabling TTOs to conduct their business. Also the funding enables the academics to get involved. This funding is the reason TTOs are in existence in Ireland and continue stay in existence today.

Table 5.4: Enterprise Ireland Initiatives supporting university-industry engagement

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Proof of Concept</strong></td>
<td>- €50,000-€100,000 per project</td>
</tr>
<tr>
<td></td>
<td>- 12 months duration</td>
</tr>
<tr>
<td></td>
<td>- Staff on contract welcome to apply</td>
</tr>
<tr>
<td></td>
<td>- 3 Calls for Proposals per year</td>
</tr>
<tr>
<td><strong>Technology Development</strong></td>
<td>- €100,000 - €400,000 per project</td>
</tr>
<tr>
<td></td>
<td>- 18-36 months duration</td>
</tr>
<tr>
<td></td>
<td>- Staff on contract welcome to apply</td>
</tr>
<tr>
<td></td>
<td>- 3 Calls for Proposals per year</td>
</tr>
<tr>
<td><strong>Innovation Partnerships</strong></td>
<td>- This programme supports collaborative research projects between Irish HEIs and companies. The financial support in this case is provided to the college. The proposal process and administration of the project is managed by the participating institute</td>
</tr>
<tr>
<td><strong>Innovation Vouchers</strong></td>
<td>- SMEs spend their €5,000 vouchers in HEIs in exchange for innovative solutions to small business challenges. There is also the option for groups of 10 companies to apply for a 'pooled innovation voucher' up to the value of €50,000 to spend with one research team</td>
</tr>
<tr>
<td><strong>Commercial Case Feasibility Support</strong></td>
<td>- Funding support of up to €15,000 can be obtained by researchers in partnership with their Technology Transfer Office or equivalent office for a short Feasibility Project to scope and develop their commercial case for their technology in advance of submitting a Commercialisation Fund Support application to the programme</td>
</tr>
<tr>
<td><strong>Commercialisation Fund Support</strong></td>
<td>- Funding Support is available for projects that address a “gap or need in the market” by developing innovative technologies that will ideally be ready for licensing to Irish industry or may form the basis of a new start up in 2-5 years. It is recognised however that some technologies may need a longer time to get to market than others. Proposals from all disciplines in the fields of Science and Engineering with costs ranging from €80,000 to €350,000 will be accepted</td>
</tr>
</tbody>
</table>


105
Such funding responsibility was recognised by a senior representative from Enterprise Ireland as outlined in Vignette #1 below. They funded the offices in the beginning but now their role as evolved as they fund the translation of research from universities out into industry.

**Vignette # 1:**

“We have been involved in the developing of the offices...Our role has to be very clearly in the translation. In other words, we have nothing to do with protection. It’s about being a player in supporting the structure which facilitates the interaction between industry and universities. Funding collaborative research, and funding conferences to allow interactions to take place...I see us as an investor and a player in building relationships. Not the running TTO, that’s TTO business. Our concern is with how we can help the offices with a single point into industry.”

### 5.2.1.6 Funding Challenges

Currently the TTOs as part of the Technology Transfer Strengthening Initiative are measured on the number of licenses, spin-outs, and number of invention disclosures. By the end of 2009, three years into Enterprise Ireland technology transfer strengthening program, participating institutions had more than doubled the number of inventions identified per year, more than tripled the number of licenses and options executed, and more than quadrupled the number of start-ups companies formed on the basis of university intellectual property (Enterprise Ireland, 2010). Relative to their levels of research support, in terms of those metrics, Irish universities are comparable to their counterparts in the United States and the rest of Europe. Enterprise Ireland deliberately does not trace revenue from technology transfer deals. Its intent for the technology transfer program is not necessarily to raise funds for universities but to develop new Irish companies. Therefore there is a strategic emphasis on getting deals done rather than extracting the most revenue as shown in table 5.5.
Table 5.5: TTO Metrics

<table>
<thead>
<tr>
<th></th>
<th>Licenses</th>
<th>Spin-outs</th>
</tr>
</thead>
<tbody>
<tr>
<td>pre TTSI (3 year average)</td>
<td>33</td>
<td>10</td>
</tr>
<tr>
<td>2009</td>
<td>94</td>
<td>35</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>“Cost” of a spin-out</th>
<th>“Cost” of a license</th>
</tr>
</thead>
<tbody>
<tr>
<td>US*</td>
<td>€50m</td>
<td>€6m</td>
</tr>
<tr>
<td>EU**</td>
<td>€30m</td>
<td>€8m</td>
</tr>
<tr>
<td>Ireland</td>
<td>€20m</td>
<td>€7m</td>
</tr>
</tbody>
</table>

* AUTM 2007
** ASTP 2008

Perhaps due to the embryonic nature of the TTO system here in Ireland and also because of the fact they were modelled on the UK and US, at a time when these regions were focusing on hard metrics, the leading stakeholder has not considered measuring the softer metrics of the TTOs as outlined in vignette 2.

**Vignette #2:**

“we haven’t really tackled that one as such, I do know some of universities have been talking about that...they are looking at the kind of broader spectrum of knowledge transfer... how would that enter into the fold of what the TTO does...the bigger universities would have the broader level of activity going on anyway”

Enterprise Ireland officials say they hope to renew the state financing for the technology transfer program at the end of its five years. But some university officials are concerned, particularly in the current economic climate as will be discussed in chapter six. However, institutions welcomed in 2011 when Enterprise Ireland pledged up to €250 million toward an investment fund that could create a new source of financing for academic start-ups. Response according to government representative re continuation of funds:
Vignette #3:

“I haven’t heard that the assistant secretary, who is in charge of this space, is going to review it. There is still substantial funding. Our budget this year is 120 million, SFI have 150 million. Total is 270m so that is big money. The issue is that it hasn’t been cut back, but it hasn’t been increased. That has caused SFI and us difficulties. There isn’t going be more money but there is money. But I didn’t hear people talking about review. It says we are going in the right direction. There are other influences on it now like the innovation task force. Of course if there is a change in government, that can affect policy. At the moment there is certainty, no one is suggesting any dramatic change that I hear of anyway.”

5.2.1.7 Outcomes

In April 2010, Forfas were commissioned to research the IP practices of TTOs in the Irish Technology Transfer System. The review considered what Ireland seeks to achieve from its national strategy and whether the appropriate policies and levers are in place. It also assessed the impact and suitability of existing policies and practice and benchmarked Ireland against international best practice. The review's methodology comprised a wide consultation with 78 stakeholders from 42 organisations including central Government, state agencies, multinational companies (MNCs), small and medium enterprises (SMEs), HEIs and TTOs. Consultations took place between 15th October and 22nd December 2009 and comprised 5 round-tables held in three locations nationally and a series of one-to-one interviews. There was also specific strategy recommendations from the Forfas report as follows: ‘Each HEI should develop a commercialisation strategy, TTO mandate and performance metrics which takes into account the importance of the role of building and managing relationships and IP portfolios and reduces the levels of effort TTOs spend on ‘reactive’ activities’. This is significant for the findings of the study.
5.2.2 Strategic Capability

One way of thinking about the strategic capability of an organisation is to consider its strengths and weaknesses. The objective is to form a view of the internal influences and constraints on strategic choices for the future. This section will outline the strategic capability of the TTO as recognised by strengths and challenges of the system and influencing actors.

5.2.2.1 Strengths of the Irish Technology Transfer System

There are a number of strengths of the Technology Transfer System. These are summed up by a representative from one of the leading government agencies as Ireland being a small open economy, and TTOs are now comfortable in their stature and are in position to grow.

Vignette #4:

Ireland is a small country. If you wanted to meet all the relevant parties’ tomorrow afternoon you can. In industry, people know each other and all that. For that reason we have the opportunity. Industry will never be happy, by definition, they are always looking for more than universities can provide. Will industry remain committed? TTO are now comfortable in their position and will grow in stature.

According to the Forfas (2010: 16) report, the following strengths are acknowledged: “In comparison with international standards and whilst mindful that Ireland’s system is still relatively new, the national measures are performing well above expectations and are achieving good value for money. Overall the findings show that Ireland’s system for commercialising IP from the HEIs is making strong progress. Ireland’s national policies and guidelines for managing and commercialising IP arising from publicly funded research are internally consistent, in line with international good practice and provide a good starting point for implementation. They are also consistent with the
policies set out in the SSTI and Smart Economy documents. General consensus was that the processes used for implementing the national measures were effective, although, given that many of the measures are recently established and are progressively evolving to more advanced systems this is, in some cases, being perceived as instability.”

5.2.2.2 Challenges of the Irish Technology Transfer System

In spite of the outlined strengths there are also some challenges for the technology transfer system in Ireland. For all the focus, funds, and activity on technology transfer since the implementation of the TTIS, government and university leaders face some challenges as they encourage third mission activities. One such major challenge for small countries is that products and start-up companies need to be good enough to compete internationally, because Ireland alone, with a population of 4.5 million isn’t a big enough market to keep them viable (Blumenstyk, 2010). Even though Ireland’s commercialisation push is ‘still in its infancy’ some hurdles here aren’t that different from the ones found in the established TTOs in in United States, Britain and Canada. For example finding venture capitalists to back early stage ideas that come out of academic labs and more fundamentally satisfying short term expectations with a long term economic strategy to prevent companies from falling into the valley of death funding trap. A further challenge of managing expectations is articulated by the government agency stakeholder.

Vignette # 5:

There is a need for greater clarity on what industries we want to impact. You hear statistics that 80-90% of SMEs don’t interact with HEIs. My response is why do they need to? It is completely irrelevant for some people. We should focus on large multinationals, and the spin-outs which are research intensive and growing medium sized firms. We need to be clear on whether the needs are relevant and what you expect to get from the deal.
5.2.2.3 Influencing Actors

There are a number of influencing actors in the technology transfer system in Ireland. This section will outline how the leading stakeholder, Enterprise Ireland interprets some of the various roles

**TTO:** The leading stakeholder views the TTO should be taking a type of evangelic role in delivering third mission outputs for the benefit of Ireland Inc, as outlined in vignette 6:

**Vignette #6:**

“It is probably not written down on anyone’s job descriptions anywhere but I would feel that they do provide that role in saying that we are a university of Ireland and the people of Ireland expect that whatever is going on in there does some good. As well as just training up the next generation of students but the fruits of the research that are going on there, done by very clever people can benefit Ireland and they are to facilitate that and it’s a communications role as well. The TTOs need to have that in their minds… I don’t know, maybe I am getting a bit evangelic about this stuff”

**VP of Research:** The VP of Research role is viewed as the protagonist of the process by the government agency as outlined in vignette 7. The representative of the government agency discusses the evolving role of the VP of Research from one where they didn’t have a lot of awareness of the TTO, to one where they are the strategic players driving the TTO forward. This change in the role of the VP of Research and the impact of the change in role is discussed further in chapter six, from the perspective of the TTOs.
Vignette #7:

“I do think that the VP research, in many cases is much clearer on their role and their focus. 15 years ago, VP research wouldn’t have been a bit interested in TT. The VP research is interested now and much more in touch…They have a much clearer interest. I think they appreciate at a national level; people are expecting universities to get involved in technology transfer. They understand from a relationship at government level, they need to be interested. The office of VP research that office has grown in stature. Not just in technology transfer but in the area of gaining research funding for the university. They do, typically, in most universities, take the TTO part of their job seriously”.

5.2.3 Purpose

Another component of the strategic position of an organisation is to explore the major influences of stakeholder expectations on an organisation’s purpose. Purpose is encapsulated in an organisation’s vision, mission and values. The concept of legitimacy is significant when discussing the purpose of an organisation. This section explores how legitimacy is conferred from stakeholders and how the power configurations internally within the TTO and externally with its stakeholders can influence purpose. The objective of this section is to outline briefly the major influences of stakeholder expectations on an organisation’s purpose. Purpose is encapsulated in an organisation’s vision, mission and values. Vision, mission, stakeholders, power configurations internally within a TTO and externally with its stakeholders can influence purpose. Each of these relating to the purpose will be outlined addressing the growth of the TTO and the strategic role of the TTO.
5.2.3.1 Growth of TTO

Previous empirical studies of Ireland examined the role of the Industry Liaison Office in 1998 and found “little evidence of a proactive effort to work more closely with industry to widen the scope of the university’s research results and to create new business employment” (Jones-Evans et al, 1999: 523). In a later study, Pandya and Cunningham (2000) singled out a lack of resources, both in terms of monetary and support structures as a major inhibitor of technology transfer and commercialisation in Ireland. The most recent study of Ireland’s universities has highlighted dramatic increases in spinout activity at Ireland’s universities. According to figures from TTOs at Ireland’s third-level institutes, 35 spinouts were formed in 2009 across the country’s 10 major institutes, up from an average of 10 per year in previous years. The driving factor behind this growth is the Technology Transfer Strengthening Initiative (TTSI), set up by Enterprise Ireland in 2007 to increase the commercialisation of IP in Irish universities and to transfer this IP into industry. A key element of the TTSI was the establishment of TTOs across the 10 institutes, which include the seven member bodies of the Irish Universities Association plus Waterford Institute of Technology, Dublin Institute of Technology, and the Royal College of Surgeons in Ireland. The data also shows that the number of licenses issued to manufacturers or developers has risen significantly, from an average of 33 per year before the TTSI initiative to 102 last year (Enterprise Ireland, 2010).

5.2.3.2 Strategic Role of TTO

However in spite of the growth of TTO, and the increased performance of the offices, the government agency does not posit the TTOs to be in a strategic role when it comes to driving the third mission as reflected in vignette 8. However, the government agency senior manager did reflect on a potential increasing strategic role for the TTO should the third mission activities of the universities grow in significance.
Vignette #8:

“In many case they don’t have the status. The real power in the universities is with the academics so the VP of Research and Provost, and the TTO would be seen as part of the administration of university as opposed to the core. I think the people in charge in some universities are gaining stature by virtue of being there and being good people. Their personal influence is increasing. But I don’t think the office would be up there in the middle of the debate on strategy. The university leaders correctly see teaching as number one, then research relating to teaching, and then there is the third leg which is developing. When you think about where university is going, or graduate intake, in terms of calibre you wouldn’t normally think of TT having a role in that. It’s only if the third leg increases, they will get more strategic. Right now, the TTO itself wouldn’t get enough visibility for strategic purposes”

Interestingly, a representative from another government agency argues that TTOs need to be both strategic and operational in their role. This is interesting as it defends a strategic position for the TTO but also offers an insight into the potential conflict of interest amongst the differing government agencies, thus heightening the complexity in which the TTO operates as a boundary spanner amongst these conflicting stakeholders. The prevailing question is how do TTOs make strategic choices in such a complex environment.
Vignette #9:

“They have to be strategic and operational. They are very operational in process. In terms of day to day activities, it is an operational thing, they have to have processes, procedures, mechanisms, you know, and use all the various tools at their disposal to make sure that happens... But they do have a very strategic role internally because they are at the interface between the research, in academic institution and the outside world and you know, so they will understand what it is that the people on the inside need to do to satisfy the people on the outside, and they understand the frustrations and challenges that the people face on the inside when they are faced with demands from people on the outside... They are there to service. It’s like the shop window of the university, the industry are the customers who come in to buy something and the researchers are the suppliers to fill the shelves so they have to manage the internal and the external relationships. The TTO needs to understand that”

5.2.4 Culture

Cultural influence can be organisational or national. This section introduces cultural features as relevant to the TTOs in Ireland by examining natural culture and organisational culture.

5.2.4.1 National Culture

A previous empirical study of TTOs in Ireland highlighted the reactive nature of the TTOs in Ireland. “The situation in Ireland has been mainly reactive, unappreciated, under-resourced and centralized” (Jones-Evans et al, 1999: 542). By looking at how the TTOs were set up, the cultural challenges become apparent. The following is a quote from one of the leading stakeholders on how the offices were set up which offers insight into how the offices may be reactive as they were not funded to recruit business development type roles.
Vignette #10:

“We looked to experts. By experts I mean practitioners from the states, from the UK and US, the main two places of where it happens. For example, Tom Hockaday from Cambridge, and those kind of people from the states and we used them to help us to determine how we would approach the issue. In particular, with the ratio of research funding and case person. So essentially we agreed to fund on the basis of business plans that the universities used to hire people and that has happened. We hired and funded case managers and some administration people, including in the larger universities, a contract manager type of role. Now what we haven’t funded, and deliberately so, is business development people. I mean people who are not good at tech transfer but people who work with companies. To use Enterprise Ireland jargon, a development advisor, a person who works with a company to try and get established. So we funded people for the actual tech transfer process.”

5.2.4.2 Organisational Culture

The organisational culture is changing to embrace the third mission. One source of evidence of this was the creation of the ITTIG, the professional affiliation of the TTOs of Irish HEI’s in 2010. The purpose of the group is to seek to collaborate, ensure best practice, and to present a transparent and coherent TTO approach. Currently the membership includes all universities, RCSI, WIT, DIT and a representative from all the other Institutes of Technologies. However, there are plans in place to widen the stakeholder involvement once the organisation has established a presence in the political field. What this represents is the TTOs in Ireland are making attempts to establish legitimacy amongst their stakeholders. In particular from a policy perspective, as their funding source for the future is unclear. The current stage of development of the TTO was summarised by a leading representative of one of the government agencies when he said:
**Vignette #11:**

“So I think we have now reached a point where we have an established structure. We have people gaining more experience. We are at a stage we have reached, we have lots of issues, and some were outlined by Forfas report and the Innovation Task force. Innovation task force tends to be a little bit higher level, the AD Little charters out what needs to be done and the various issues raised there...They will begin to address the issues and the issues, as identified there, around the nature of the agreement and the paperwork and who gets priority”

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5.2.5 Strategic Positioning Summary

This section presented a strategic positioning analysis of TTOs in Ireland by analysing the external environment, the strategic capability, culture and purpose of the TTOs in Ireland at a collective level. The purpose of this section was to offer an insight into the political initiatives and actors, the funding challenges, the strengths and weaknesses of the TTO landscape, the key actors in the technology transfer process as interpreted by the government agency amongst other insights. The objective was to present the complex, challenging environment in which the Irish TTOs operate as a boundary spanner and to present the strategic environment in which they exist. The next section introduces the cases.

5.3 INTRODUCING THE CASES

Empirical data was collected in seven TTOs as noted in chapter four. The researcher obtained access to the full population of university based TTOs. Given the relative lack of prior research, this study uses qualitative data from seven case studies to examine the role of strategy process in TTOs.
5.3.1 Overview of Cases

And so, while the cases were introduced in the methodology chapter, it is worthwhile to restate them here as per table 5.6.

Table 5.6: Reintroduction to Cases

<table>
<thead>
<tr>
<th>TTO</th>
<th>University</th>
<th>TTO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N students</td>
<td>N staff approx</td>
</tr>
<tr>
<td>Alpha</td>
<td>- 20,000</td>
<td>2000+</td>
</tr>
<tr>
<td>Beta</td>
<td>- 20,000</td>
<td>- 2000</td>
</tr>
<tr>
<td>Charlie</td>
<td>20,000 +</td>
<td>2000+</td>
</tr>
<tr>
<td>Delta</td>
<td>- 20,000</td>
<td>2000+</td>
</tr>
<tr>
<td>Echo</td>
<td>- 20,000</td>
<td>- 2000</td>
</tr>
<tr>
<td>Foxtrot</td>
<td>- 20,00</td>
<td>- 2000</td>
</tr>
<tr>
<td>Golf</td>
<td>- 20,000</td>
<td>- 2000</td>
</tr>
</tbody>
</table>

The seven cases were established in the years between 1982 and 2008.

5.3.2 Reporting Structure

All of the seven cases have commonality in their structures, with each of them having a TTO Director role. Furthermore all seven cases have commercialisation specialist roles. The breakdown of roles is predominantly divisible into two broad domains: (a) Biotechnology and Life Sciences and (b)
Engineering, Information AND Communication Technology (ICT) and Physical Sciences. Some of the cases have more specific roles such as Physics and Lifesciences. Furthermore, five of the seven have dedicated contract roles, with the other two outsourcing contacts to an external party. Also, all seven cases have a campus development type role to support spin-outs in their incubation centres. One of the cases resourced their roles a little differently and thought outside the box to hire a communications manager. Six of the seven cases report into the Vice President of Research. In the outlier case, the TTO reports into the Chief Operating Officer, whose role also includes overseeing the cutting of the campus grass. The TTO Director of the case discussed how such a structure signified the lack of strategic priority on the TTO from the university’s perspective, as interpreted by their reporting structure. Funding for the offices was secured from Enterprise Ireland for staffing the office and detailed processes and procedures were put in place in six of the cases. There is one outlier case in regards funding that had gathered externally sourced funding for their office by setting up a board of directors and acquiring funds from financial companies. Finally, the offices are predominantly supported by Enterprise Ireland, with some support from their universities.

5.3.3 Activities

From an analysis of case websites and relevant marketing material of the cases the following activities are published as the main services of the office, which can be categorised into hard and soft activities, outlined in table 5.7.
<table>
<thead>
<tr>
<th>Hard</th>
<th>Soft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identification and Protection of Intellectual Property (IP)</td>
<td>Communication and co-operation with industry and business community</td>
</tr>
<tr>
<td>Commercialisation of IP AND Technology</td>
<td>Encourage and support entrepreneurs and knowledge-based ventures</td>
</tr>
<tr>
<td>Provision of customised IP seminars</td>
<td>Provide policy advice and support for commercialisation</td>
</tr>
<tr>
<td>Negotiation of IP terms in Contracts, CAs etc - in liaison with Contracts, Issue, negotiation and execution of IP agreements including NDAs, MTAs, licences</td>
<td>Promotion and marketing of technologies available for transfer, Advice on establishing campus companies</td>
</tr>
<tr>
<td>Promoting and supporting the initiation, growth and development of Campus Companies</td>
<td>Connecting university researchers with industry and the market place</td>
</tr>
<tr>
<td>Working with the development agencies in enhancing the competitive position of existing industry</td>
<td>Developing a culture of research commercialisation at the university</td>
</tr>
<tr>
<td>Provide business and marketing strategies for possible commercialisation</td>
<td>Contributing to the growth of Ireland’s knowledge economy</td>
</tr>
</tbody>
</table>
5.4 CONCLUDING COMMENTS

To conclude, this chapter outlined the key contextual elements which position the research agenda of exploring strategy process of seven case TTOs in Ireland. To reiterate, this chapter was segmented into two parts. It began by offering a strategic positioning analysis of TTOs in an Irish context by outlining the environmental context. Specifically the chapter drew attention to the policy context of the research by giving an overview of the SSTI which shaped the development of TTOs in Ireland. The analysis was sourced from government reports and from interviews with leading government members, responsible for implementing and monitoring the government initiatives to strengthen and support TTOs in Ireland. The chapter then moved to present a collective description of the full population of seven TTOs in Irish universities. The following chapter, chapter six, will now outline the most interesting findings from the study of strategy process in Irish TTOs.
CHAPTER SIX: FINDINGS

‘If there were only one truth, you couldn’t paint a hundred canvases on the same theme’

--Pablo Picasso, 1966

6.1 Introduction

Having introduced each of the cases individually and given an overview of the university technology transfer system in Ireland in chapter five, chapter six will integrate the findings from each case and discuss the strategy process concepts, as informed by the literature review in chapter three. In doing so, the research explores the extent to which TTOs engage in strategy process. That is, the key strategy process findings from each case are integrated together, thus lending itself to the identification of interesting commonalities and differences in relation to the strategy processes demonstrated by TTOs in the university industry technology transfer process. A recap of the research questions are highlighted in table 6.1.

Table 6.1: Recap of Research Questions

<table>
<thead>
<tr>
<th>Principal Research Question</th>
<th>Sub Research Question 1</th>
<th>Sub Research Question 2</th>
<th>Sub Research Question 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>To what extent do TTOs engage in strategy process?</td>
<td>How do TTOs formulate strategy?</td>
<td>How do key actors influence TTO strategy process?</td>
<td>How are strategic outcomes of the TTO shaped by TTO strategy process and context?</td>
</tr>
</tbody>
</table>

6.2 TTO STRATEGY FORMULATION PROCESS

This research question seeks to explore how TTOs formulate strategy with the intention of contributing to the calls of the extant TTO literature for recognition of the strategy process of the TTO (Siegel et al, 2007, Jones Evans et al 1999). To capture the detail of this, the structure of the section is divided up into three
separate parts. Specifically the antecedents, strategy processes and strategic artefacts are examined to determine how TTOs formulate strategy. The first section incorporates the antecedents to planning, including the key drivers for planning and assessing best practice. The second section agenda setting, focuses in particular on resource appropriation and allocation, and alignment to the university. The third subsection addresses strategic artefacts with regards the utilisation of mission statements.

6.2.1 Antecedents

Whilst this research agenda is primarily concerned with the extent to which the TTOs engage in strategy formulation processes, it would be insufficient not to look at the key drivers to planning first as pointed out by Hutzchenreuter and Kleindienst (2006) who suggest that understanding the key drivers of planning offers a complete picture of the strategy process and that an important deficiency in analysing the processes of strategy can be the absence of adequate attention to the stimulus for planning. To this end, the following section looks at the key drivers which contributed to the planning efforts of the TTO. As part of addressing the key drivers to planning, the research will address how the offices assessed international TTO best practice, as this was identified in the NVivo analysis as significant.

6.2.1.1 Key Drivers to Planning

In all seven cases, the TTO Directors engaged in formal planning when the Technology Transfer Strengthening Initiative (TTSI) was being introduced by the government agency, Enterprise Ireland, in 2007. Full detail of the impact of the TTSI is outlined in chapter five. Each of the seven cases addressed the call from the Irish government under the auspices of Enterprise Ireland to submit a business plan in return for funds to strengthen the office. Each TTO Director submitted a business plan, outlining resource allocation intentions for the
individual offices. The business plans were formulated outlining resources requested and the associated metrics expected. These were prescriptive as there was a template dictating the structure (see Appendix B for outline of the form), as required by the funding agency, Enterprise Ireland. All seven TTO Directors outlined a proposed budget including details of the costs associated with the recruitment and employment of additional TT staff; costs associated with essential administrative staff; costs associated with purchase / development of procedures software and training costs for staff. The desirable metrics were subdivided into primary and secondary metrics by the government agency. These consisted of primary metrics: technology transfer licences, collaborative R&D agreements, researchers moving to industry as a result of technology transfer agreements, number of disclosures, and number of spin-offs and the secondary metrics: the number of patents filed and granted.

6.2.1.2 Different Approaches to TTSI

While the stimulus was the same, the TTOs responded in different ways. The TTO Director of Delta explained how a focus on getting funding to hire the right people was the objective of their business plan for Enterprise Ireland, “part of it is getting the right people…each university had to fulfil certain criteria to get the funding” (I-TTO-D5). While six of the seven cases created the plan for the purpose of the TTSI, one of the cases were less directed by the Enterprise Ireland call and had its own strategic plans in place prior to the government call. Charlie had been involved with commercialising IP long before the TTSI. The TTSI funded the offices based on the research income of the universities in return for expected metrics such as invention disclosures, patents and spin-outs. Case Charlie drew up its plan for the government based on its own strategic planning while the rest were shaped by the TTSI: “We had our own plans in place before the TTSI” (TTO-I-C1).

However the validity of creating plans for funding under the TTSI was questioned by the TTO Director of Delta who refuted the credibility of such an exercise as in many of the cases the TTOs were not staffed yet, and thus
predicting metrics may have been unrealistic “Funding was all based on what your research income is and expected invention disclosures, how many patents, and how many spin-outs you were expecting, based on past experience, and this was before we brought in any commercialisation specialists so we were shooting in the dark” (TTO –I –D1). Furthermore, the funding structure of the offices provides insights into the planning approach to TTSI by the TTOs. In five of the offices, over half of the office is funded by TTSI and therefore it can be concluded that they are heavily reliant on their influence for human capital costs. TTO Charlie has less than 50% of staff reliant on funding and therefore is less reliant on their influence. Table 6.2 presents an overview of the planning approaches by TTO to TTSI. As well as the TTSI, there are other influences which affect how the TTOs plan. The Innovation Taskforce, and the Forfás AD Little Report, details of the group and report are outlined in chapter five, play a role in determining what the TTOs will look like and this has been recognised by the TTO Director of Beta: “the AD Little report and the innovation taskforce report will all determine what we do” (TTO- I- B1).

Table 6.2: Overview of planning approaches to TTSI

<table>
<thead>
<tr>
<th>Case</th>
<th>% Funded by TTSI</th>
<th>Planning Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha</td>
<td>Over 50%</td>
<td>Reactive to TTSI</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No strategic plans in place prior to TTSI</td>
</tr>
<tr>
<td>Beta</td>
<td>Over 50%</td>
<td>Reactive to TTSI</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No strategic plans in place prior to TTSI</td>
</tr>
<tr>
<td>Charlie</td>
<td>Less than 50%</td>
<td>Own Plan</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Strategic plans in place prior to TTSI</td>
</tr>
<tr>
<td>Delta</td>
<td>Over 50%</td>
<td>Reactive to TTSI</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No strategic plans in place prior to TTSI</td>
</tr>
<tr>
<td>Echo</td>
<td>Over 50%</td>
<td>Reactive to TTSI</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No strategic plans in place prior to TTSI</td>
</tr>
<tr>
<td>Foxtrot</td>
<td>Over 50%</td>
<td>Reactive to TTSI</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No strategic plans in place prior to TTSI</td>
</tr>
<tr>
<td>Golf</td>
<td>Over 50%</td>
<td>Reactive to TTSI</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No strategic plans in place prior to TTSI</td>
</tr>
</tbody>
</table>
6.2.2 Assessing Best Practice

Strategic planning in higher education institutions can be defined as a process by which the institutions assess its current state and the likely future condition of its environment (Ferlie, 1992). One way to achieve this is by assessing best practice amongst similar institutions. There were a number of activities in which the offices sought best practice when preparing for their TTSI application. This gives an insight into strategy formulation of the office by examining the TTO activities benchmarking and engaging in professional development activities.

6.2.2.1 Benchmarking

In seeking best practice the TTOs engaged in benchmarking against national and international TTOs as they were: “…conscious of benchmarking against best practice” (TTO- I- A1). The TTOs engaged in benchmarking pre and post TTSI.

Pre TTSI: One of the TTOs benchmarked themselves against European and US TTOs pre the implementation of TTSI. The TTO Director of Case Charlie discussed how he benchmarked the office on an international bearing point and how they now position themselves as a European TTO as they look to the UK and the US most often as the constituencies to benchmark against: “We set our targets comparing ourselves to the UK and the US using reports from AUTM and the like to measure invention disclosures and spin-outs. We used it as a yardstick – this is where we want to be and we have made them” (TTO- I- C1). Also case Charlie participates in international TTO surveys, shaping their identity as a European TTO. Therefore, benchmarking prior to TTSI has shaped their formulation of strategy to become a European TTO.
**Post TTSI:** All of the TTOs discussed the significant role of Enterprise Ireland in benchmarking post the implementation of the TTSI. It is common practice in Enterprise Ireland where meetings are held regularly with TTO Directors and the outcomes for each office are reported on to compare their performance against the performance of other national TTOs. This post TTSI benchmarking activity represents the TTOs strategy formulation being influenced by their national standards, rather than positioning themselves as a European TTO.

### 6.2.2.2 Professional Development Activities

As well as benchmarking using Enterprise Ireland and Association of University Technology Managers (AUTM) data, the TTO professionals attended courses to learn of best practice. The researcher observed Praxis-Unico and AURIL training folders on display in some of the offices (TTO- O – A, B, C, D, E, F). TTO Directors and Commercialisation Specialists all referred to similar types of training or displayed training folders from such technology transfer professional organisations as AUTM and Proton Europe, thus keeping up with international best practice. While the courses did not focus on the strategic practices of a TTO, their attendance and public display of the training materials contributes to legitimising their presence on campus. As well as attending Praxis and AUTM training courses to keep up to date with operational efficiencies, the management team of Beta sourced best practice from technology transfer journals such as the Journal of Technology Transfer and Research Policy, referring to empirical work from leading technology transfer academics such as Don Siegel and Mike Wright.

Furthermore, the TT professionals in each of cases participated in external training courses. The courses typically were focused on building up core skills of the TTO professionals such as negotiation skills and patenting courses. Three of the cases discussed attending international training events. In Beta they attended courses held by Praxis Unico, the educational not-for-profit organisation set up to support innovation and commercialisation of public
sector and charity research for social and economic impact: “I’ve been on 10 - 15 courses. Praxis is very good...The benefit is networking, realising everyone has the same problems as us” (TTO- I- B4). The researcher of this study attended the international Association of University Technology Managers Annual Meeting in February 2011, where she was invited to present her award winning literature review paper at their annual conference. There she met international TTO professionals. Representing the Irish Technology Transfer network there were Commercialisation Specialists from Foxtrot and Golf. However, in spite of the TTO professionals expressing the benefit of such sessions, the content of the courses were heavily focused on the operational side of the technology transfer process, and little on the strategic side.

Furthermore, two of the TTOs focused more on the Enterprise Ireland delivered training courses: “EI puts on training courses 1 – 2 times a year, put on a 2 day event, you go and focus on core area. I’ve been on negotiation courses, that you just pick out yourself. It’s up to each individual to see where their weaknesses are and to up skill. The more you do the better you get” (TTO- I- A2). This is evidence of the internal focus of the TTO in attending internal delivered training.

However, in spite of seeking best practice, two of the seven TTOs were aware of the contextual differences of each university setting as Case Echo recognised that the heterogeneity of university contexts play a key role in how the TTO engages in benchmarking activities: “it is very hard to compare…we have to do things in a slightly different way so there is no model out there for us, but we have looked at the way different people do things in different ways. Like companies, all universities have advantages” (TTO-I-E2). Furthermore, the TTO professionals in case Golf emphasised the importance of the institutions to differentiate the TTOs: “it’s the same, you are all doing the same sort of stuff. What makes you unique is the university”. Table 6.3 and table 6.4 presents an overview of the activities of TTO when engaging in the process of assessing best practices of other TTOs.
Table 6.3: Recap Of Benchmarking Activities

<table>
<thead>
<tr>
<th>Benchmarking</th>
<th>Pre TTSI</th>
<th>Post TTSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beta</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Charlie</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delta</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Echo</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foxtrot</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Golf</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 6.4: Recap Of Professional Development Activities

<table>
<thead>
<tr>
<th>TTO</th>
<th>Approach</th>
<th>Professional Development Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha</td>
<td>Predominantly Internal</td>
<td>Attended International Training Courses Attended National Training Course</td>
</tr>
<tr>
<td>Beta</td>
<td>Predominantly Internal</td>
<td>Researched best practice from academic journals Attended International Training Courses</td>
</tr>
<tr>
<td>Charlie</td>
<td>Predominantly External</td>
<td>Attended International Training Courses Participate in European Surveys</td>
</tr>
<tr>
<td>Delta</td>
<td>Recognise the value of context</td>
<td>Attended International Training Courses</td>
</tr>
<tr>
<td>Echo</td>
<td>Predominantly Internal</td>
<td>Attended International Training Courses</td>
</tr>
<tr>
<td>Foxtrot</td>
<td>Predominantly Internal</td>
<td>Attended International Training Courses</td>
</tr>
<tr>
<td>Golf</td>
<td>Predominantly Internal</td>
<td>Attended International Training Courses</td>
</tr>
</tbody>
</table>

6.2.3 Agenda Setting

As part of strategy formulation process the TTOs engaged in agenda setting activities. There was evidence of different types of agenda setting activities which varied from operational focused when allocating resources to alignment to university which embraced a stakeholder orientation. Core agenda setting activities centred on appropriating and allocating resources and aligning themselves to the university. The findings show variance in activities pre and post TTSI.
6.2.3.1 Appropriating and Allocating Resources

As part of the agenda setting processes, the TTOs engaged in allocating resources. The resource allocation process explanation of strategy development is that realised strategies emerge as a result of the way resources are allocated in organisations (Burgelman, 1983). Appropriating and allocating resources emerged as significant to the strategy formulation process in TTOs. The TTO Director of case Charlie recognised how universities are all very different therefore deciding on what skills the TTO needs will be different in each university: “A lot of tech transfer you learn it on the job. Every university is different; culture will make it different (TTO- I- C3). TTO director from Foxtrot and Golf echoed this sentiment, “You can’t teach this, you can’t bring someone in and say this is your training and you all walk out a tech transfer expert. A lot of is learning as you go along” (TTO- I- F3) and “It’s almost like learning law, case by case. The analogy of case manger, every case is different, you learn something and you apply it to the next case. Something else will come up that you haven’t come across before” (TTO – I- G2). Recognising learning on the job as a skill for the office lends itself it a laissez faire process.

However, while three of the seven cases placed high value on learning on the job, two TTO Directors has a more planned approach, specifically aspiring for firm criteria for their TTO staff. For example, the TTO Director of Beta stipulated: “industry experience, or have spent a number of years in a technology transfer office (TTO- I- B1). The TTO Director of case Echo stressed the need for a PhD in the area when hiring his case managers. The reason for requiring a PhD is very interesting and reveals the agenda setting intentions of the particular office: “otherwise they won’t have creditability with academics: it’s like badge of honour, otherwise they would be seen as administrator. Also some of PIs that we deal with now, don’t have PhDs themselves, so it is almost like a reverse situation” (TTO- I- E2). Critically, they looked for a PhD to add to the reputation of the TTO, thus seeking to acquire legitimacy from the Principal Investigators. Furthermore the TTO
Director from Alpha stressed that he looked for people skills with less importance on knowledge of the technology. He emphasised the negotiation and selling necessities of the role “the most important thing is people skills: it would be nice if you know a bit about technology, patents, and start-ups. But the most important thing is people skills, you cannot have a stick to beat the academic with, you cannot say you must do that, you must convince them, you have to have people skills, it is the most important thing” (TTO- I- A1). Commercialisation Specialists also discussed the need for credibility amongst the academic community. One of the case managers from Delta reiterated this: “you have to be able to have credibility and sensitivity towards the academic mindset and also you have to have an understanding of commercial drivers of both sides of equation” (TTO- I- D2). The reason behind this to because the TTO needs to: “be able to manage the two different worlds” (TTO- I- D2).

Table 6.4: Appropriating and Allocating Resources

<table>
<thead>
<tr>
<th>Case</th>
<th>Core Competences</th>
<th>Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha</td>
<td>People Skills</td>
<td>Planned competences</td>
</tr>
<tr>
<td>Beta</td>
<td>Industry or TTO Experience</td>
<td>Planned competences</td>
</tr>
<tr>
<td>Charlie</td>
<td>Learning on the Job</td>
<td>Laissez Faire</td>
</tr>
<tr>
<td>Delta</td>
<td>People Skills</td>
<td>Planned competences</td>
</tr>
<tr>
<td>Echo</td>
<td>PhD</td>
<td>Planned competences</td>
</tr>
<tr>
<td>Foxtrot</td>
<td>Learning on the Job</td>
<td>Laissez Faire</td>
</tr>
<tr>
<td>Golf</td>
<td>Learning on the Job</td>
<td>Laissez Faire</td>
</tr>
</tbody>
</table>

A clear tension is emerging between the difference approaches of a laissez faire led process where the TTOs value learning on the job and a planned competences approach where the TTOs had a clear plan for what type of core competences the office needed. Interestingly the justification behind the core competences was to gain commitment and acquire legitimacy from the key stakeholders, such as the academics.

6.2.3.2 Alignment to University

As well as submitting plans for the TTSI, the cases were part of the planning activities within their own universities. University strategic plans are
increasingly placing an emphasis on the research commercialisation as the third pillar of the university, along with teaching and research. In each of the cases, there was a section in the strategic plan of their university dedicated to the third mission of the university, which falls under the remit of the TTO. Table 6.6 outlines excerpts from university strategic plans of a sample of the seven case TTOs to demonstrate this trend towards universities embracing third mission activities in Irish Universities.

Table 6.6 Excerpts from a sample of university strategic plans from the cases

<table>
<thead>
<tr>
<th>Sample of University Strategic Plans</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘…The strategic plan places the third pillar of innovation as a central aspect of their future plans, along with research and teaching’</td>
</tr>
<tr>
<td>‘…We will contribute to the revitalisation of the Irish economy by seeking to support the translation of our research outputs into innovative products, processes and services led by our TTO’</td>
</tr>
<tr>
<td>‘…The return to the Irish Economy is an outcome of the technology transfer office’</td>
</tr>
<tr>
<td>‘…A commitment to knowledge transfer and innovation, which is underpinned by an intensification of knowledge dissemination and a particular focus on technology transfer and commercialisation to support the development of the knowledge and innovation economy’</td>
</tr>
</tbody>
</table>

However, there is variation when examining the alignment of the TTO to their university strategic plan. There are three levels of alignment that emerged in the findings: alignment, lack of alignment and somewhat alignment.

Alignment: Two of the seven cases were deemed to be aligned with the university, as when they described formulating their strategy for engaging with industry, the TT professionals are aligned to the strengths of the university when managing IP. Case Charlie have a long list of contacts that they have built up over the years in the core sectors of the university and they also positioned their commercialisation specialists in the core sectors: “from a strategic point of view, we have case managers in the core research themes areas…that is where they are putting in their top academics, and where the best inventions are coming out and we are reacting to that” (I-TTO-C5). Case Alpha discussed the research area of food science not being a priority for the
university and thus they do not engage in activities with members from the food industry: “strategically it isn’t something that Alpha would take on board. We wouldn’t refuse it but it’s not where PRTLI is invested” (TTO-I- A5).

**Lack of Alignment:** However, another TTO reflected on the lack of alignment of TTO activities to the university strategic plan. For example Delta admitted that their invention disclosures were not aligned to the strengths of the university: “probably doesn’t reflect university strengths as per strategic plan” (TTO -I- D1). Also case Foxtrot and Golf discussed a broad strategy, where invention disclosures came in from all corners of the university. Interesting these two universities receive the least amount of research funding and the findings suggest they might not have developed an area of research expertise and so the TTO is reacting to that, and hedging their bets by taking in all invention disclosures: “Our IP comes from the four corners of the university (TTO-I-G1).

**Somewhat Alignment:** On the other hand, two of the case TTOs strategy were somewhat aligned to the university. For example, case Echo was a proponent of planning with the university strengths in mind when devising future strategies for the office: “However we should think about where are our core skills. The university is not going to be the best at anything, but together different disciplines, chemistry and engineering, for sensors, you can start to put together to develop excellence” (TTO-I-E1). Also, case Beta discussed how they plan to build expertise in the core strengths of the university: “We would do that, the core of the university, the core areas that we know very well, and their capabilities and to couple that up with internally, or externally, people ring us up and say I am looking for x, y, z, to do something and we would know people, sometimes it works, other times it doesn’t” (TTO- I- B2). “The core focus of the university, we would reflect that with our case managers, not precisely but we would make sure we have someone covering off the research themes of university” (I-TTO- B6).
To further explore alignment with the university and how the university perceived the TTO function as part of their core mission, an examination of the university mission statement was undertaken. Using secondary data from mission statements from universities and TTOs, in five of the seven cases, it can be argued that there is recognition of the TTO role, albeit somewhat indirectly in most cases. The output of the TTO was referenced as generating a return to the economy, which is what the role of the TTO is claimed to do by some theorists (Etzkowitz 2003a). Table 6.7 below displays a sample of the mission statements of universities, as per their mission reference to TTO activities.

Table 6.7: University Mission Statements including TTO role

<table>
<thead>
<tr>
<th>Sample of University Mission Statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘…enhance intellectual, cultural, social and economic life locally, regionally and globally’</td>
</tr>
<tr>
<td>‘…contributing to social, cultural and economic life in Ireland and the wider world’</td>
</tr>
<tr>
<td>‘…globally and locally connected in terms of its contribution to economic, social and cultural life’</td>
</tr>
<tr>
<td>‘…foster creativity and knowledge to stimulate change for the benefit of society’</td>
</tr>
</tbody>
</table>

Therefore, it can be surmised that there is both alignment and lack of alignment to the university strategic plan amongst the TTOs a summary of which is outlined in table 6.8.

Table 6.8 Overview of Alignment to University

<table>
<thead>
<tr>
<th>TTO</th>
<th>Aligned to University Strategic Plans</th>
<th>Part of University Mission Statement</th>
<th>Overall Analysis of Level of Alignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha</td>
<td>Alignment</td>
<td>No</td>
<td>Medium to High</td>
</tr>
<tr>
<td>Beta</td>
<td>Somewhat Alignment</td>
<td>Yes</td>
<td>Medium to High</td>
</tr>
<tr>
<td>Charlie</td>
<td>Alignment</td>
<td>Yes</td>
<td>High</td>
</tr>
<tr>
<td>Delta</td>
<td>Lack of Alignment</td>
<td>No</td>
<td>Low</td>
</tr>
<tr>
<td>Echo</td>
<td>Somewhat Alignment</td>
<td>No</td>
<td>Medium</td>
</tr>
<tr>
<td>Foxtrot</td>
<td>Lack of Alignment</td>
<td>Yes</td>
<td>Low to Medium</td>
</tr>
<tr>
<td>Golf</td>
<td>Lack of Alignment</td>
<td>Yes</td>
<td>Low to Medium</td>
</tr>
</tbody>
</table>
6.2.4 Strategic Artefacts in Strategy Formulation: Mission Statements

Another way to explore how TTOs formulate strategy is by examining strategic artefacts such as mission statements (Collins and Porras, 1991). Mission statements are a clear articulation to the internal and external stakeholders of the long term intent of an organisation. After conducting analysis of the TTO mission statements using the Pearse and David (1987) typology (details of which are outlined in chapter four), it can be ascertained that the mission statements of all case TTOs specify the target customers and markets and also specifies the geographic domain. However, only five of the seven identify principal products/ services. Furthermore, only one of the seven incorporated the specification of key elements in the philosophy, the identification of self-concept or the identification of desired public image. And so it can be argued that the mission statements of case TTOs are incomprehensive. Table 6.9 presents the mission statement analysis as per the Pearse and David (1982) typology.

Table 6.9: TTO Mission Statement Analysis

<table>
<thead>
<tr>
<th>TTO</th>
<th>The specification of target customers and markets</th>
<th>The identification of principal products/services</th>
<th>The specification of geographic domain</th>
<th>The identification of core technologies</th>
<th>The expression of commitment to survival, growth and profitability</th>
<th>The specification of key elements in the philosophy</th>
<th>The identification of self-concept</th>
<th>The identification of desired public image</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case 1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Case 2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Case 3</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Case 4</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Case 5</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Case 6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Case 7</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Furthermore, the role of the mission statement as a strategic artefact can be explored by the responses of the TTO professionals to the function of the mission statement in their environments. As the analysis showed, strategic plans of the TTO didn’t emerge as significant to the strategy formulation process of the TTO as the majority of them were developed in response to the
TTSI. Therefore mission statements are more interesting to analyse to determine how TTOs formulate strategy. Mission Statements are relevant to the strategy formulation process as they provide evidence of the strategic approach taken when formulating strategic artefacts. There was evidence of mission confusion, somewhat clear mission and clear mission. By examining mission statements in TTOs, there is evidence of lack on engagement when it comes to strategy formulation for some of the cases where there is mission confusion and somewhat clear mission. This is symptomatic of the rushed nature of responding to TTSI demands and consistently in a fire-fight mode where strategy is operational focused.

**Mission Confusion:** In regards the role the mission statement plays within the TTO, there is evidence of mission confusion and it appears that the mission statement is limited in its capacity to communicate the long term intent or the raison d’etre of the organisation. For example, a commercialisation specialist from Case Foxtrot was unsure of who they were working in the best interest for: “who are we here for? Get the best role for the university? Get the best role for the country?” (TTO- I- F4). In another case, case Alpha, in spite of the mission statement being stated in the TTO website, there was confusion amongst their commercialisation specialists: ‘there has never been a statement of what the TTO should be, ever’ (TTO- I- A6). This may be due to the process in which that particular mission statement was devised without consultation from the key staff in Case Alpha: “I was never asked to feed into it, I used to ask my staff to input into our mission, instead of being made up by people, not part of the team, taking on board themselves to come up with a one liner” (TTO-I- A5). This is also an example of TT professionals holding allegiance to practices they favoured in their former workplace, and as such a tension is formed which makes it difficult to gain commitment from such stakeholders.

**Somewhat Clear Mission:** However, other cases had a clearer message of the mission of their TTO. A commercialisation specialist from Case Beta claimed:
“the TTO mission is tech transfer with obligations to the university, as its employers if you like, to the PI and to really manage the expectations” (TTO-I- B2). Another case TTO, Delta has a clear idea of what they would like to be TTO mission: “I would be an advocate of TTO mission is getting the technology into practice. Who cares whether it’s in Ireland or not. If in Ireland, it’s great. If not, let’s not forget about it. Make sure we get the best bloody deal. It’s still an export” (TTO- I- D2). For these cases, the mission statement offers some clarity as to the purpose of the TTO.

**Clear Mission:** Finally, two of the cases were very clear on their mission. The mission of Echo revolved around picking the winners, and not the taking more shots on goal approach: “We only spend a lot of time on the ones that we really care about this, the potential of the idea, the potential of the science and the academic as well. You have to have both. They will have to want to cross over to the dark side” (TTO – I – E3). Here the TTO didn’t engage in extra activities outside of their core mission. For example they did not write research contracts. Another TTO, case Charlie was also very clear on its mission of commercialising technology from its best star scientists: “Our mission is to capture the best IP coming from these star researchers.” (TTO- I – C1) The TTO Director of this case gives clear instructions to his case managers to prioritise the star scientists and give 5/6 researchers top service from the TTO: “I pay special attention to our star performers and advise my team to do the same. I tell them, Babysit them, Give the A level service to the star performers “(TTO – I- C1). For these cases, the mission statement as a strategic artefact communicates the intent of the organisations and provides clarity of direction.

**6.2.4.1 Meetings**

By exploring how TTOs formulate strategy, meetings emerged as significant as the findings show that the meetings in the majority of the TTOs focus on more operational issues, and less of strategy matters, therefore there is little evidence of activities leading to strategy formulation in the formal way in the majority of
cases. Interestingly, while they all focused on the operational activities, the approach to meetings varied. Case Echo had a formal structure where the TTO as a group met once a week, every week: “We meet on a regular basis, once a week, the whole of the TTO. We would meet for a couple of hours on a Thursday and we would give an update for 20 minutes each, typically on what’s going on. What’s the latest on such and such. We would all have 2/3 hot topics that you would be trying to get over the line” (TTO-I-E4). Here operational decisions were discussed. However, there was little evidence of strategy formulation taking place at these weekly meetings. The meetings focus more on operational issues and less of strategic issues. Case Alpha were much less formal and would meet less regularly, in a more ad-hoc fashion: “we meet as a group every second month to discuss whether inventions are commercial lead or industry lead” (TTO-I-A2). However again, the nature of these meetings suggest an operational focus. It was in case Charlie where the TTO professionals discussed having bi-annual meetings where performance appraisals were performed for each member of staff representing strategy formulation activities. Furthermore, in case Charlie the TTO Director and Manager would meet with the university board and their board of directors to discuss strategy issues that are linked to strategy formulation such as funding for wetlabs, expansion of the offices and selection of spin-in companies into the incubation centre as they seek to create “an innovation ecosystem in our incubation centre” (TTO-I-C1).

6.2.5 Deliberate or Emergent

Thus far, the chapter has examined how TTOs formulate strategy. The final part of the question addresses the dichotomy first explored by Mintzberg (1987) when he argued strategies can be deliberate or emergent. No study of strategy formulation would be conclusive without an exploration of whether the strategy is planned or emergent, as this is one of the contentious dichotomies in the field of strategy. Tracking the TTO activities as per Mintzberg’s (1987) debate is a useful lens to explore the strategy formulation
activities in the TTO strategy process as the analysis highlights the challenges for strategizing in the TTO.

**Deliberate Strategy:** There was little evidence of planned strategy formulation in TTOs. When asked why this is the case, the TTOs outlined a number of problematic issues with formulating strategy in a planned manner. The longevity of the process was stressed by TTO professional in Golf: “you can’t teach tech transfer, you can learn it but you can’t teach it. You can’t say you want an ecosystem and a tech transfer system backing it next week, it takes time to grow” (TTO- I- G1). Furthermore, the long time frame for outputs and the serendipitous nature to the success of a TTO as outlined by TTO Director of Delta when outlining how the TTOs were not in the best position to formulate a planned strategy: “It would be a rule of thumb. Research is such a vague and non specific science so you have to say eventually it will happen, all going to plan it could take 15 months, that is about as accurate as it could be” (TTO- I- D1). TTOs operate in an uncertain environment as they rely on academic IP in order to initiate the technology transfer process. Also, ultimately the quality of IP will determine the success of the IP exploitation by the TTO. Because of this, the nature of the technology transfer process from the perspective of the TTO can be deemed serendipitous. Such uncertainty demands a certain level of reaction and limits proactive activity.

**Emergent Strategy:** While there was little evidence of planning strategy formulation, the TTOs described the emergent nature of strategy formulation that occurs in their offices. The TTO Director discussed the embryonic nature of the TTO system in Ireland as a whole and as such they are only is a position to adopt a reactive and passive role: “This is very much a system in transition” (TTO-I-G1). Chapter Five presented similar sentiments in Vignette #6 from a top executive from the leading government agency in this space of the reactive role of the TTO. Similarly, Case Echo stressed the reactive nature of their role, whilst acknowledging their strategy formulation activity: “We do it actively but we don’t do it proactively, maybe even reactively” (TTO - I- E1). The TTO
Director of Foxtrot discusses how strategy emerges rather than formulated in a planned sense due to lack of resources to be allocated in their office. Specifically, this poses a challenge regarding the volume of IP that may potentially come into the TTO and they may not have the sufficient resources planned to deal with such demand: “We don’t have the bandwidth to go into every nook and cranny of IP” (TTO- I- F3). TTO Director of Alpha discusses the emergent nature of their strategy when discussing the strategic alignment to the university, as there is still a high contention of reactivity: “From a strategic point of view, we have case managers in their core research themes areas. That is where they are putting in their top academics and where the best inventions are coming out and we are reacting to that” (TTO- I- A3). Furthermore the TTO Director of Beta illustrated the potential vast array of IP that could be going into the TTO which highlights the challenges of planned strategy: “What is disclosed to us comes from every corner of the university” (TTO – I- B1). Also, the nature of their core function perhaps responds best to this reactive type nature of the TTO. Case Beta TT professional appear to be reactive and passive in their challenging environment: “We are reacting to changing climate” (TTO- I- B2).

Umbrella Strategy: The TTO Director of Case Charlie claims there are both planned and emergent elements to strategy in TTOs: “Mixture of them all. First of all, you look to what you have. There is pragmatism to it all even though we might speak of high mission start of stuff. So if you look back and say here is our 5 year plan, here is what is on our books. You can have rule of thumbs on how many IDF’s you might expect, very rough, it depends on how long it takes things to mature” (TTO- I- C1). However, there is evidence of strategists shaping strategy formulation in Case Charlie. The TTO Director outlined how their TTO will become more creative in how they manage and exploit IP opportunities in the future as the economic climate becomes more challenging and the funding dries up: “If pipeline dries up, we will be more proactive in terms of getting more out of IP”(TTO- I- C2). Table 6.10 presents an overview of deliberate and emergent strategy formulation approaches in TTOs.
Table 6.10: Deliberate and Emergent Strategy Formulation in TTOs

<table>
<thead>
<tr>
<th>TTO</th>
<th>Deliberate Strategy Formulation</th>
<th>Emergent Strategy Formulation</th>
<th>Type of Strategy Formulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha</td>
<td>Posed Challenge</td>
<td>Reactive: Dependency on academic IP</td>
<td>Emergent</td>
</tr>
<tr>
<td>Beta</td>
<td>Posed Challenge</td>
<td>Reactive: Dependency on academic IP</td>
<td>Emergent</td>
</tr>
<tr>
<td>Charlie</td>
<td>Planned</td>
<td>Proactive: Strategist engaging in creative thinking</td>
<td>Umbrella</td>
</tr>
<tr>
<td>Delta</td>
<td>Posed Challenge</td>
<td>Reactive: Dependency on academic IP</td>
<td>Emergent</td>
</tr>
<tr>
<td>Echo</td>
<td>Posed Challenge</td>
<td>Reactive: Lack of resources to plan to cater for all IP in college</td>
<td>Emergent</td>
</tr>
<tr>
<td>Foxtrot</td>
<td>Posed Challenge</td>
<td>Reactive: Lack of resources to plan to cater for all IP in college</td>
<td>Emergent</td>
</tr>
<tr>
<td>Golf</td>
<td>Posed Challenge</td>
<td>Reactive: Longevity of the technology transfer IP commercialisation process</td>
<td>Emergent</td>
</tr>
</tbody>
</table>

6.2.6 Concluding Comments on Research Question One

The objective of research question one was to explore how TTOs formulate strategy by examining antecedents to planning, agenda setting activities and strategic artefacts. In six of the cases, the planning was an example of planned strategy formulation in response to government agency demands or planning as a normative activity. The strategic intentionality is brought into question, as six of the cases are responding to demands of stakeholder here as opposed to planning strategically themselves. The outlier being Charlie, as they had plans in place before the TTSI which fed into their plans for the TTSI. The embryonic nature of the system was stressed as reason to why planning is a normative activity. According to TTO Director of Delta, “it takes time to grow and mature. You can do different things to speed it up but you can’t say I am going to plant a seed and want an apple tree next year and I want loads and
loads of apples, which is the position EI is putting us in, and the government are putting them in that position” (TTO-I-D1).

Furthermore, there was variance in how the TTOs engaged in agenda setting and assessing best practice activities as part of strategy formulation. The typical activities were benchmarking, attending courses, meetings, and allocating resources. Five of the seven TTOs pursued agenda setting activities at local and national level, were operationally focused and internally driven. The outlier focused on international benchmarking and positioning themselves as a European TTO. Resource allocation was based on understanding the academic mindset. Other TTO Directors mandated the TTO team to have PhDs, in order to acquire legitimacy from the academics involved in the project. Furthermore, the findings varied in how the TTOs used mission statements as strategic artefacts, from the mission statement providing clarity of purpose to the opposite end of the continuum where TTOs were confused in their role. How strategy was formulated in the TTO appeared to be more of emergent in nature as TTOs reacted to the serendipitous nature of their environment as they are heavily reliant on volume and quality of academic IP. Also they are reliant on government funding to continue the process. These contextual challenges of the system drove most of the TTOs to be passive and reactive. However one of the TTOs, Charlie engaged in strategic thinking as they recognised the need to be more creative with the IP as the funding dries up. The next section will address explore findings of research question two.

6.3. KEY ACTORS INFLUENCE ON TTO STRATEGY PROCESS

University industry technology transfer is driven by many actors. The intermediary role of a TTO is concerned with the practical transfer and application of knowledge, normally in pursuit of national (innovation/economic) policy goals and to support industrial capability development (Sanders and Miller, 2010). In looking at strategy processes, the objective of this study, relationships with stakeholders are significant (Freeman, 1984). As indicated in the literature, the TTOs play the role of
boundary spanner and as such interact with a multitude of different stakeholders (Siegel et al 2003). During the course of the data collection and analysis of this research agenda, it emerged that the actors were significant to the strategy process and thus it is necessary to outline each of their roles during the strategy processes. The key actors who emerged in the analysis as significant to the technology transfer process in the Irish University TTOs are TTOs themselves, university management, academics, policy makers and industry (Siegel et al 2004). Specifically, the stakeholders are outlined in table 6.10, categorised by their internal or external status. The role of each stakeholder is discussed below. By understanding the role of key actors, we will get an insight into the extent to which the key actors influence the strategy processes of TTOs. Table 6.11 presents the actors involved.

<table>
<thead>
<tr>
<th>Internal Actors</th>
<th>External Actors</th>
</tr>
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<tbody>
<tr>
<td>TTO</td>
<td>Policy Makers</td>
</tr>
<tr>
<td>University</td>
<td>Industry</td>
</tr>
<tr>
<td>Management</td>
<td></td>
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<tr>
<td>Academics</td>
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</table>

6.3.1 TTO Professionals

From the analysis of the findings there were variations in how the TTOs interpreted their own role in the university industry technology transfer process. The categorisation ranged from undervalued to facilitator to visionary as will be outlined below.

**Undervalued:** Three cases of the TTOs interpreted their role to be undervalued at both a national level and institutional level. For example, a TTO professional from case Golf argued: “there seems to a lack of a champion really. I think that the people who are on the innovation bandwagon might have other agendas beside pure development of technology” (TTO- I- G3). Furthermore, a commercialisation specialist from Beta discussed how they are
never appreciated for getting things right: “This is the rock and the hard place, tech transfer is. When things go right, they forget about your contribution, when things go wrong, you are the ones who get the blame from both sides. The academics will say you held them up. The business partners will say who are over valuing the technology” (TTO- I- B2). Interesting, the TTO professional from one of the cases, case Alpha, with a background in industry referred back to their former industry life and articulated frustrations with the bureaucracy of the university which inhibited their role in the process: “Well, you know, coming from industry where I was able to knock on door of CEO if there was an issue and things would happen, Here, things get buried in the engine room. It is hard to get your voice heard” (TTO- I- A2). In similar vein, when interpreting their own role in the negotiation and selling process they viewed themselves in an operational capacity. “Dogsbody” (TTO-I-G3) and “Donkey” (I- TTO- A1) and “Bottle-washers” (TTO- I- B2) were all adjectives used to depict their undervalued, operational type of role the TTO perceive themselves to be playing in technology transfer process.

**Facilitator:** Two of the case TTOs perceived their role to be more facilitative: “I see my role as removing barriers, saying to academics we will identify IP, wrapping it up so you can commercialise it” (TTO- I- D1). Case Foxtrot viewed their role as a protective role: “TTO is the only line of defence” (TTO- I- F1). For Alpha, there was facilitation amongst the office and with the university management team: “I think we are even across the TTO: everyone has their own inputs and offers up ideas. Obviously then, my level and at director, then VP research upwards, they all have input. There’s not one dominant voice, or one particular sector left out” (TTO-I- A2).

**Visionary:** Two of the cases perceived their role to be visionaries of the process. The TTO Director from Delta made it clear that the technology liberation from the university was a priority: “We are not looking at technology transfer, we are looking at technology liberation, and we want to get the technology out. I don’t want patents like the Book of Kells that you come and
look at and say isn’t that wonderful we have so many patents” (TT0- I- D1). This TTO Director has a very clear vision: “I had a vision as to what I was doing and that was get the thing up and running as soon as possible, remove any barriers and then get the pipeline going” (TT0- I- D1). Furthermore at case Charlie, the TTO Director spoke of his vision surrounding the construction of a purpose built incubation centre: I wanted to build the best incubation centre in Europe and I have” (TTO-I-C1). While at Foxtrot, frustration was expressed of the bureaucratic nature of the university system which inhibits the visionary capability of the TTO: “We have an executive officer group, high level planning thing in college, we had to get permission from them and then we had to take it through the finance group, then research group, this is the situation, this is why it’s not working” (TTO- I- F1). Summary of key findings highlighted in table 6.12.

<table>
<thead>
<tr>
<th>Case</th>
<th>TTO Influencing Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha</td>
<td>Dogsbody</td>
</tr>
<tr>
<td>Beta</td>
<td>Facilitator</td>
</tr>
<tr>
<td>Charlie</td>
<td>Visionary</td>
</tr>
<tr>
<td>Delta</td>
<td>Visionary</td>
</tr>
<tr>
<td>Echo</td>
<td>Facilitator</td>
</tr>
<tr>
<td>Foxtrot</td>
<td>Dogsbody</td>
</tr>
<tr>
<td>Golf</td>
<td>Dogsbody</td>
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</tbody>
</table>

6.3.2 ENTERPRISE IRELAND

The TTOs relationship with Enterprise Ireland varied from being supporters, barriers, and pawns. Each of these will be described below.

**Supporter:** Two of the cases recognise Enterprise Ireland as supporters of their role in the university industry technology transfer process. The TTO Director of Golf argued that Enterprise Ireland as funders of the process are the key drivers of the process and so are key influencers in the process. They view their role to be supportive of the TTOs and steering the process in the right direction: ‘all their programs are directed at the right thing and they are throwing money at the right stuff’ (TTO- I- G2). Similarly, TTO professionals
of case Alpha argue that in the contentious environment in which the TTOs operate amongst the multitude of conflicted stakeholders, that indeed Enterprise Ireland can be very supportive of the direction and legitimacy of the TTO: “...they can be your best friends in the world. Academics have own agenda, businesses have own agenda. EI aims to support us and bridge the gap” (TTO-I-A2).

**Barrier:** However, while some of the TTOs commended Enterprise Ireland for being the drivers of the process and supportive of the TTO, two of the cases interpreted their role to be at times the reason behind slowing up the process. Case Delta blamed the bureaucratic nature of the organisation as the source of the barrier: “I find them to be a bit of a barrier to progressing things, a bit bureaucratic (TTO-I-D2). Similarly, case Foxtrot claims mismanagement of the direction and skewed expectations of the outcomes of the system are the reasons behind the stakeholder being a barrier of the TTO strategy: “Part of the problem is that EI don’t know what they want, and that is part of the evolution of tech transfer in Ireland” (TTO-I-F3). Furthermore, a tension was outlined by the TTOs of the lack of certainty over the continuation of funding of the offices from Enterprise Ireland’s TTSI: “We are not being told if it is being continued” (TTO-I-B1). TTO professionals from Alpha even discussed distributing their resumes as they are concerned for their future: “I know these guys have put their cv’s out there so they are on the market again” (TTO-I-A3). TTO professionals from Delta expressed concern about the consequences of not funding the system and how the progress they have made will have been in vain: “It’s not like a light bulb, it’s not like you can switch if off and then back on and everything will be back up and running...If you switch the research funding off, the Principal Investigators will go and they won’t come back” (I-TTO-D2). Under TTSI TTOs has relied on government funding to support the hiring and development of staff. The majority of the core staff in TTOs are funded by Enterprise Ireland funding. As these initiatives come to an end, concerns persist about the viability of professional TT in Ireland. “We have seven people in tech transfer, and before TTSI we basically had two. Of those seven people, one is funded by the college, one is funded by an SFI
overhead, and the other five are funded by EI, effectively the whole office” (TTO – I- B3). These doubts from TTO professionals have come to fruition as three of the TTO Directors positions have been vacated in 2011.

**Pawn:** Interesting one of the case TTO Directors, Case Beta recognised that Enterprise Ireland are not to blame and are mere pawns in the game: “I think Enterprise Ireland recognises that this is a long term game. A lot of stuff is out of their control. If they are given the budget they can continue, if they are not given the budget to fund this then the whole thing could be shut down” (I-TTO- B1). Such uncertainty contributes to the tensions in the technology transfer system in Ireland. Summary of key findings highlighted in table 6.13.

<table>
<thead>
<tr>
<th>Case</th>
<th>Enterprise Ireland Influencing Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha</td>
<td>Barrier</td>
</tr>
<tr>
<td>Beta</td>
<td>Pawn</td>
</tr>
<tr>
<td>Charlie</td>
<td>Supporter</td>
</tr>
<tr>
<td>Delta</td>
<td>Pawn</td>
</tr>
<tr>
<td>Echo</td>
<td>Barrier</td>
</tr>
<tr>
<td>Foxtrot</td>
<td>Supporter</td>
</tr>
<tr>
<td>Golf</td>
<td>Supporter</td>
</tr>
</tbody>
</table>

Interestingly, picking up on the last finding of EI as pawns who are not driving the process, the prevailing question remains as to who is the key influencer in the process.

**6.3.3 University Management**

The role of the university management team, in particular the Vice President of Research, emerged as a significant in the study. They were viewed as Blind Mice in the beginning, disinterested in the activities of the TTOs. However as the third mission becomes more on the strategic agenda of universities, the university management are taking a higher level of interest in the processes of
the TTO and their role has evolved into an Institutional Guardian in some of the cases.

**Blind Mice:** In all seven TTOs, the Vice President of Research was not appreciated to be knowledgeable when it came to technology transfer at the beginning of the TTSI. For example, in case Charlie, which has a longer tradition of third mission activities, than any other TTO in the country, the TTO Director claims: “the VP of Research didn’t have a strong hold on it” (TTO- I C2). Similarly the TTO Director of Delta noted similar sentiments and portrayed a picture of the TTO flying under the radar of the university management team: “when we started to do this, the university would have looked at us and said what are they doing, well there are not costing us anything, let them off” (TTO- I- D1). There was a strong impression of the Case Delta acting under the radar of the university management team: “if the university was taking a closer eye on it, I mightn’t have gotten away with changes” (TTO-I- D1). The TTO Director of Delta set his agenda in a conflicted, challenging manner: “in a way I forced conflict, it was my way of demonstrating that the existing policy was not workable. The easiest way to prove that the policy wouldn’t work to give me the justification to change it” (TTO-I- D1). When setting out the agenda for the office, there were tensions as the Director acted outside the boundaries of the usual protocol within the professional bureaucracy of the university setting: “I had the nerve to do it without asking for permission” (TTO- I- D1).

In these two cases, the university was accused of being unaware of the potential of the TTO. The activities of the TTO were flying under the radar of the university at the beginning and only brought to the attention of VP research and university president through their successes. This was the case in the larger universities and in the smaller ones. For example case Echo, which is housed in one of the smaller universities, also discussed activities being carried out under the radar of the university management team: “The university is small enough to do things under the radar and do a little bit of Seek and Forgive. You can get stuff done by stealth and by bringing people along. It is small enough to be able to do it. Plus it was a green field’s site. Noone was
doing this” (TTO- I- E1.) One of the other TTOs, case Alpha, argued the reason behind lack of awareness from the university management team was that they were not funding the system, and therefore lacked the interest to take notice of the activities of the office: “The university is not putting money into it, so to a large extent, it doesn’t care about the outputs, it’s the new kid on the block” (TTO- I- A2). In the case of Alpha the TTO professionals do not believe their university recognises the capability of the TTO: “I don’t think the university has woken up to what the TTO can do” (TTO- I- B2). This may be due to the TTO focusing their activities at the external environment. Also, Case Foxtrot experience is that they do not have the support of their university management team. The TTO Director stressed a danger for the university by overlooking their TTO: “I have been trying to suggest to university that they are losing autonomy over IP because they are non engaging in supporting their TTO” (TTO- I- D2).

**Institutional Guardian:** However, for some of TTOs, the situation has changed with the VP of Research taking the role of an institutional guardian of the TTO. This was partly a result of the successes of the TTO, which brought them up from under the radar and also partly due to the change in the economic climate and the impetus for the universities to play a more significant role in the National Innovation Systems and deliver on their third mission to create jobs and economic revenue. However, the new role of the VP of Research has brought tensions to the TTO as outlined by TTO Director of Delta: “I had a call from the university management saying he doesn’t remember seeing this being discussed at all the committees and I said look the old way wasn’t working. I can change it and potentially I can give you 9/10 campus companies a year or I can leave it and make 1 and it will be embarrassing because we will be completely left behind” (TTO –I- D1). However, one of the key tensions of the increased role of the VP of Research was articulated by the TTO Director of Charlie who raised concern about the different expectations of the outcomes of the TTO: “The VP of Research and the university president don’t want to stop money coming in, regardless of the consequences” (TTO- I- C1). And so while they may be institutional guardians of the TTO, difficulties arise when there
are different expectations of the outcomes of the strategy process amongst the key actors. Summary of key findings highlighted in table 6.14.

<table>
<thead>
<tr>
<th>Case</th>
<th>VP of Research Influencing Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha</td>
<td>Blind Mice</td>
</tr>
<tr>
<td>Beta</td>
<td>Blind Mice</td>
</tr>
<tr>
<td>Charlie</td>
<td>Blind Mice → Institutional Guardian</td>
</tr>
<tr>
<td>Delta</td>
<td>Blind Mice</td>
</tr>
<tr>
<td>Echo</td>
<td>Blind Mice</td>
</tr>
<tr>
<td>Foxtrot</td>
<td>Blind Mice → Institutional Guardian</td>
</tr>
<tr>
<td>Golf</td>
<td>Blind Mice</td>
</tr>
</tbody>
</table>

From the analysis of all case studies at the beginning of the TTSI, the university management team were unaware and disinterested in the potential of the TTO. However, their role is evolving due to changes in institutional and national policy to embrace the third mission. Therefore, they are becoming more of a protagonist in the process.

6.3.4 ACADEMICS

When discussing the role of the academics, the analysis of findings once again showed variation amongst the cases. While all cases recognised that the academics were a powerful stakeholder group, how the TTOs engaged with this actor varied.

**Powerful:** The academics were recognised as a powerful and often problematic group to interact with. The TTO Director of case Delta outlined how he was threatened at one stage during the process: “I was threatened three times by academics for the way I interpreted the policy. A lot of those senior academics throwing their weight around” (TTO – I- D1). Furthermore, in case Beta the power of the group was acknowledged: “Here the academics rule the roast” (TTO –I- B1). However, the TTOs recognise that the academics are the core input into their process and so it is essential to gain their commitment to the process: “We are only as good as the researcher IP” (TTO- I- F1). This
supports findings from a study by Jensen et al (2003) in their aptly entitled study: ‘We are only as good as the Sh*t we get to work with’. Albeit recognising the powerful grouping of the academics the TTOs reacted in different ways to engage academic commitment to the TTO.

**Activities to engage Academic Commitment:** Case Foxtrot discussed how the levels of motivation to engage in the process varied: “The PIs I deal with cover the whole spectrum. The ones that are clued in or some that aren’t” (TTO –I – F2). All TTOs recognised the need to build relationships with this key actor group and the study found they did do so different ways.

**Introduction Sessions:** Case Alpha continued to stress the need to manage expectations of the academics in the processes. Efforts were made to engage from the very beginning of a researcher’s career in the university whereby the TTO professionals attended the induction day of strategic research centres of their university. Here they made an introductory presentation, outlining the services they provide, thus putting steps in place to build relationships with academics from the very beginning: “It’s really all about relationships” (TTO-I-A2). Other approaches include in Alpha, Charlie and Beta the TT professional offer a starter pack for academics outlining the steps in the process, with the intention of managing expectations from the very beginning. This is a similar initiative introduced by Lita Nelson in MIT (AUTM 2011 conference).

**Evolution Over Time:** As the TTOs evolve the process of gaining commitment from the academics is becoming somewhat easier and the academics are beginning to engage with the TTO. For example, the TTO Director from Delta claim that: “recognition is growing on campus about IP” (TTO-I-D1). This supports the process as “academics are keen from a CV point of view” (TTO-I-D3). Interesting the older TTOs, such as case Charlie, reminisce on the time spent on the beginning building up an awareness of the TTO and building trust: “we spent an awful lot of time on the start is culture
change and culture management, universities are typically open innovation and there is thing called academic freedom, they like to do research” (TTO- I- C4). They spend less time on it now as a culture of entrepreneurship has been built on campus from serial entrepreneurs that have worked with the TTO: “If you get involved in one and it sells for lots of money, then people will say if that eejit can do it, I’ll go off and do it. It’s making it part of the culture, making it easier for people to do. The American bit of it’s a badge of honour to have two or three failures before you have success. Over here, it is still if you fail everyone is going to make you stand in the corner and laugh at you. We have to move away from that nonsense” (TTO- I- C1). While case Charlie spends less time building the culture, they have put initiatives in place to sustain the culture, such as having a weekly drop in clinic for PI consultation

**Purposeful relationships:** One of the TTO Directors, from case Beta put initiatives in place to encourage the development of such relationships. He placed the commercialisation specialists in with the academics in order to purposively build relationships. He also hired a former principal investigator from one of the leading research centres on campus, one of their former star scientists to build relationships and: “encourage them to look with their IP radar on and try to help them to identify what can be commercialised” (TTO-I- B2). Also Case Alpha recognised the need to spend time with the academics: “Technology transfer is a contact sport, the more time you spend on the ground talking to researchers the more ID you get. They learn more about the process, there is a two way flow of information, you learn about them, they learn about you and the market. It’s a relationship, it’s all about trust” (TTO- I- A2).

**Application of Technology:** Five of the seven cases also use high technology such as YouTube and Linked-In to build legitimacy for the office and encourage a culture of entrepreneurship on campus.

**Informal Approach:** Others took a more informal approach and focused on building informal relationships with the academics, to build trust. For
example, case Echo chooses to conduct informal activities: “we spend a lot of time with academics. Not doing presentations, more having coffee with them, playing football with them, getting to know then, and getting the personal relationships going” (TTO- I- E1). Summary of key findings highlighted in table 6.15.

Table 6.15: TTO Activities to engage Academics

<table>
<thead>
<tr>
<th>Case</th>
<th>Activities to engage Academics</th>
<th>Type of Approach</th>
<th>Intentionality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha</td>
<td>Presentation at induction</td>
<td>Formal</td>
<td>Gaining Legitimacy</td>
</tr>
<tr>
<td>Beta</td>
<td>Hiring former PI as commercialisation specialist</td>
<td>Formal</td>
<td>Building Trust</td>
</tr>
<tr>
<td>Charlie</td>
<td>Starter packs for Academics</td>
<td>Formal</td>
<td>TTO recognition</td>
</tr>
<tr>
<td>Delta</td>
<td>YouTube Videos</td>
<td>Formal</td>
<td>Promote technologies</td>
</tr>
<tr>
<td>Echo</td>
<td>Having Coffee, playing football</td>
<td>Informal</td>
<td>Build Relationships</td>
</tr>
<tr>
<td>Foxtrot</td>
<td>Building up a culture of entrepreneurship</td>
<td>Informal</td>
<td>Gain Commitment</td>
</tr>
<tr>
<td>Golf</td>
<td>Clinic for Academic Consultation</td>
<td>Formal</td>
<td>Build Relationships, Gain Commitment</td>
</tr>
</tbody>
</table>

6.3.5 INDUSTRY

Given the prominent role of industry in the technology transfer process, one would presume they would be a significant influencer of the TTO strategy process. However the findings suggest otherwise. Their roles can be categorised into Key Players and Poor Relation.
**Key Player:** Only one TTO explicitly identified industry as a customer in the interviews and in their mission statements. The Technology Transfer Manager of case Charlie identified: “we have two sets of customers, researchers and industry. We should spend time with both, listening, learning” (TTO-I-C4). This supports the finding of Case Charlie as more focused on external stakeholders than the rest of the TTOs. Also, case Beta was found to focus on the industry stakeholder as observed when the researcher attended a session given by a commercialisation specialist of Beta to a gathering of industry in a particular research domain. The TTO professional practiced an engaging manner with an emphasis on story telling. Success stories of the TTO were the main focus of the presentation as he engaged in TTO services processes (TTO-O-B2).

**Poor Relation:** There was very little mention of industry focus from the other TTOs, other than case Alpha stating intentions to engage with industry: ‘We should do more of that industry stuff but we don’t have the time’ (TTO-I-A2). A potential reason behind that the lack of industry focus can be found from one of the Government agency representatives who argues that: “the commercialisation specialists were not hired for business development, this is the next stage of development” (GA-I-1) This again reinforces the dependency of the majority of TTOs on the government agency for structures and responsibilities of the office. Summary of key findings highlighted in table 6.15. This is further supported by the Community Innovation Survey (2010) which illustrates that 6.8 per cent of companies have any engagement with industry. Summary of key findings highlighted in table 6.16.

<table>
<thead>
<tr>
<th>Case</th>
<th>Industry Influencing Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha</td>
<td>Poor Relation</td>
</tr>
<tr>
<td>Beta</td>
<td>Poor Relation</td>
</tr>
<tr>
<td>Charlie</td>
<td>Key Player</td>
</tr>
<tr>
<td>Delta</td>
<td>Poor Relation</td>
</tr>
<tr>
<td>Echo</td>
<td>Key Player</td>
</tr>
<tr>
<td>Foxtrot</td>
<td>Poor Relation</td>
</tr>
<tr>
<td>Golf</td>
<td>Poor Relation</td>
</tr>
</tbody>
</table>

Table 6.16: Role of Industry as influencer in strategy process of TTO
6.3.6 CONCLUDING COMMENTS - RESEARCH QUESTION TWO

The findings of research question two find that there are a number of actors who influence the process to varying degrees. The table 6.17 highlights the main findings of research question two.

Table 6.17: Overview of key influencers in TTO strategy process

<table>
<thead>
<tr>
<th>Actor</th>
<th>Influencing Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>TTO</td>
<td>Undervalued</td>
</tr>
<tr>
<td>Enterprise Ireland</td>
<td>Supporter</td>
</tr>
<tr>
<td>University Management</td>
<td>Blind Mice</td>
</tr>
<tr>
<td>Academics</td>
<td>Powerful</td>
</tr>
<tr>
<td>Industry</td>
<td>Poor Relation</td>
</tr>
<tr>
<td></td>
<td>Visionary</td>
</tr>
<tr>
<td></td>
<td>Facilitator</td>
</tr>
<tr>
<td></td>
<td>Barrier</td>
</tr>
<tr>
<td></td>
<td>Pawn</td>
</tr>
<tr>
<td></td>
<td>Institutional Guardian</td>
</tr>
</tbody>
</table>

As depicted in table 6.17, key actors play a significant role, to varying degrees. In the discussion in chapter seven, the analysis will assess how each role influences the extent to which the TTO engages in strategy process. The next section will address the findings from research question three.

6.4 INFLUENCES ON STRATEGIC OUTCOMES OF THE TTO

As evident from the findings of the previous two research questions, the outcome of the strategy process for the TTO is influenced strongly by key stakeholders. The objective of the TTO strategy process is to deliver on the Technology Transfer Strengthening Initiative Metrics such as number of licenses and number of spin-outs. There has been a significant increase in commercialisation activity in Ireland since Enterprise Ireland support began in 2007. The findings of this research question three will explore the strategic outcomes and how outcomes were shaped by TTO strategy process, and context. When discussing strategic outcomes, the findings reflect on the higher
level outcomes of the strategy process such as autonomy over decisions and legitimacy from stakeholders. While the metrics are important, how they are shaped by strategy process and context is more interesting and yields richer data for analysing the strategic outcomes of the process.

6.4.1 Technology Transfer Metrics

Although the technology transfer system in Ireland is relatively young, it produces a large volume of results, according to Enterprise Ireland report ‘Technology Transfer in Ireland’, 2007-2010 as presented in table 6.18.

Table 6.18: Increase in university commercialisation activity since TTSI

<table>
<thead>
<tr>
<th>Metrics</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>Total 2007-2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>License/Option/Assignments</td>
<td>12</td>
<td>28</td>
<td>56</td>
<td>67</td>
<td>100</td>
<td>93</td>
<td>316</td>
</tr>
<tr>
<td>Spin-outs</td>
<td>5</td>
<td>8</td>
<td>13</td>
<td>7</td>
<td>35</td>
<td>31</td>
<td>86</td>
</tr>
<tr>
<td>Invention Disclosures</td>
<td>135</td>
<td>193</td>
<td>271</td>
<td>407</td>
<td>457</td>
<td>431</td>
<td>1566</td>
</tr>
<tr>
<td>Patents Applications</td>
<td>83</td>
<td>107</td>
<td>124</td>
<td>202</td>
<td>148</td>
<td>101</td>
<td>575</td>
</tr>
</tbody>
</table>


6.4.2 Influence of Strategy Process on Outcomes

Activities as part of the strategy formulation process have impacted on the outcomes, specifically engaging in strategic review, recognising hard metrics do not capture value and evolving to apply soft metrics. Each of these components will be examined in further detail.

6.4.2.1 Engaging in Strategic Review

From a stakeholder viewpoint, the leading government agency, Enterprise Ireland engaged in a series of reviews to monitor and control the operation and direction of TTOs that were funded under the TTSI. In doing so, they relied on international experts to review the processes of the office such as Alison
Campbell OBE, from Kings College in London and Brian Kelly from Cornell University. Both of these TTOs are well established and successful entities which denotes how focused Enterprise Ireland were in attaining high quality reviewers to assess the TTO network in Ireland. Feedback from these reviews was positive: “the international experts are telling us we are doing the right thing” (TTO- I- F1). Interesting the older TTOs claim that the metrics change over time as explained by TTO Director of Charlie: “Let me take you back to age of office, the older the office gets the more different types of metrics you can use. Say 0-3 years you are looking at no of ID, no of patents , but then as office gets older, it’s no of licenses, no of spin-outs and as it gets older again you can look at the number of lives saved or no of technologies on the marketplace” (TTO- I- C3).

6.4.2.2 Recognising hard metrics do not capture value

However, as part of the outcomes, the TTO professionals argue that the hard metrics do not capture the value of what the office does. TTO Director of Beta argues: “the tech transfer office is a term which is used to describe a particular function which essentially is that transfer of technology out of the university into a commercial environment. That is quite a narrow definition. The tech transfer here is, and in most places is broader than that” (TTO- I-B1). Also the TTO Director of Echo argues that the current hard metric system that is being used is flawed as “it doesn’t necessary give you a quality of the metrics” (TTO- I- E3). The researcher conducted observation of Case Alpha and it appears the industry outreach division is not a priority as reflected by opinions of TT professionals and also by their location within one of the offices far removed from the core central office of the commercialisation specialists and directors (TTO- O-A). One of the reasons why the metrics are not capturing the value of office as the TT professionals for five of the seven TTOs deem their time commitments to be heavily crippled with administration intensive activity, like helping researchers to writing contracts: “TTOs are incredibly busy and incredibly stretched. The paperwork is huge. There is a burden around the
process for intellectual property, dealing with patent agents” (TTO- I- A2). A TT professional from Beta also highlighted the operational side of the process: “You need a good paper system, the process side is very important but it is very onerous. And there can be an imbalance between the early stage IP protection and keeping the stakeholders happy with less or not enough attention paid on the commercialisation” (TTO- I- B2). Furthermore, another case argued that they did not: “allocate our time very well at the moment. One of the quality review recommendations is that we focus on our core activities and discard non value add activities and I suppose we do have a lot of admin work on the ground” (TTO- I – A3). Reasons behind such static thinking can be attributed to legacy characteristics of when the office was set up and the TTO argue that since evolving from an Industrial Liaison Office, they have been lumbered with many administrative, operational type activities: “we have a lot of legacy contacts stuff that we have to deal with, accounts settled stuff, a lot of stuff that none of us are trained or qualified to do. We have a lot of legal support and its’ not what we are here to do” (TTO- I – A5).

6.4.2.3 Evolving to Soft Metrics

Within the study there was evidence that TTOs were beginning to use softer metrics to an attempt to capture and communicate the value of strategic outcomes to their institutions and other stakeholders. TTO Director of Case Foxtrot seeks customer feedback from the academics. He found that depending on how recent the experience was with the TTO, the more positive the feedback, reflecting the improved professionalism of the TTO: “This motivates the office to keep in touch with the researchers” (TTO- I- F1). The TTO literature has identified a potential problem in the system, with 30% of inventions bypassing the TTO and going out the back door (Markman et al, 2009). Case Foxtrot by engaging in customer feedback has the potential to actively be cognisant of this backdoor activity. The rest of the cases, focusing on hard metrics, will not be as au fait on their customer preferences. This is
another example of passive, reactive type of behaviour from the majority of case TTOs.

6.4.3 Managing Metrics

Two primary activities of managing metrics emerged: Internal driven and external driven

6.4.3.1 Internal Driven

All TTOs discussed their pipeline to manage their outcomes. The TTO professionals in Beta created a graphical depiction of their pipeline of technologies, according to a three year pipeline, thus ensuring efficiency of their operational processes: “Case managers manage pipeline. The case managers work with academics and they manage cradle to grave. We brought in the American model here. Makes sense, particularly when you are starting from the start and you don’t have team of experts. If you go to the likes of Cambridge where they have 30/40 people you could take a different approach or Imperial Innovations, you can break it down but when you are starting with 4/5 you need to manage individual projects” (TTO-I-B3).

6.4.3.2 External Driven

Enterprise Ireland metrics are the main focus for the majority of TTOs strategic outcomes. However, there are different interpretations of a definition of a spin-out. Case Delta describes a spin-out as: “Spin-out is a company that has been incorporated and university has a share. It doesn’t have to have any revenue. That is our point of view” (TTO- I- D1). Case Alpha has another definition, somewhat broader, of: “either where university technologies was licensed to a company or where university staff member started a company, or where we do
entrepreneurial training and started up a company” (TTO- I- A5). On the other hand, Enterprise Ireland has a different interpretation of an enterprise which is defined as a high potential start up. Details are in table 6.18 below.

### Table 6.19: Enterprise Ireland definition of High Potential Start up

<table>
<thead>
<tr>
<th>A High Potential Start-Up (HPSU) is defined as a start-up venture that is:</th>
</tr>
</thead>
<tbody>
<tr>
<td>➢ Introducing a new or innovative product or service to international markets</td>
</tr>
<tr>
<td>➢ Involved in manufacturing or internationally traded services</td>
</tr>
<tr>
<td>➢ Capable of creating 10 jobs in Ireland and realising exports of €1 million within three to four years of starting up</td>
</tr>
<tr>
<td>➢ Less than six years old</td>
</tr>
<tr>
<td>➢ Led by an experienced management team</td>
</tr>
<tr>
<td>➢ Headquartered and controlled in Ireland</td>
</tr>
</tbody>
</table>

This was further recognised by a senior executive from Enterprise Ireland who discussed how they only look for start ups with potential: “Our staff are working with universities on start-ups, or with potential start-ups, we are only interested in those with real potential, not what a university claims to be spin-out. We always look at this from the lens of making economic impact. If a university creates a two person spin out, fine, great, two people are happy, but it is not going to change the world. We want companies that have potential to grow” (TTO-I-S1). However, the TTOs are more inclined to favour the broader definition of a spin-out to increase the volume of spin-outs. For example, TTO director of Alpha explains the benefit of a broader definition: “EI don’t count it unless it has investment but I think it is a good thing that we are doing, we are getting more spin-outs. In the past we were the gatekeepers of spin-outs” (TTO- I- A1).
6.4.3.3 Manipulating Metrics

The activity of manipulating metrics emerged as an issue which shaped strategic outcomes. A commercialisation specialist from Delta explained how the metrics can be skewed: “Last year was my first year. I am in my second year now, you can manipulate the metrics, and you can turn anything into an IDF. For example you can ask people to fill out an IDF” (TTO-I-D3). The reason behind manipulating metrics may be due to unrealistic targets set for TTOs by their universities, which leads to another tension. For example, the university strategic plan of case Beta set specific targets for a deadline of 2012: “through our technology transfer office, we will continue to build on our success in protecting and where feasible, exploiting intellectual property emerging from our research efforts, through patents, license deals and start-up companies where appropriate. We will expand our patent fillings and licenses agreements by four-fold and five-fold respectively by 2012, with spin-out or start-up companies averaging five fold per annum over the period of the strategic plan” (TTO-S-B). However on reflection of international standards it has to be questioned how feasible a target of five spin-outs a year for the TTO is as international best practice such as MIT and Colombia are aiming for one to two a year as their annual target (Source AUTM annual conference 2011, Las Vegas).

6.4.4 Influence of Context on Outcomes

There has been a large level of activity in the TTO since 2006 as documented in chapter five, the context chapter and as seen in metrics in table 6.16. On analysis of the variances in the types of outcomes, there is a noticeable shift from creating licenses to spin-outs. This is reflected by indeed several of the respondents. The TTO director from case Alpha concurred with this change: “I would say 3 or 4 years ago when the TTO started, the TTOs focused on licensing, but last 2 years, there has been policy change on spin-outs. That has fed into our strategy. You will see the numbers in what we did last year: we
will show the changes there” (I- TTO- A5). Also, the TTO Director from Beta explicitly discussed the increase in spin-outs over the duration of the TTO: “I think you could look at main drivers as being metrics...there is definitely a big shift towards campus companies. The TTSI has given us targets and they have to be met. That’s the main thrust of thing” (TTO- I- B1). From the data analysis there are a number of reasons attributed to the change to more spinouts including demand for jobs: value for money; and changing academic mindset.

6.4.4.1 Demand for Jobs

How this change in strategic outcomes came about is attributed predominantly to the influence of one of the TTOs key stakeholders, Enterprise Ireland and also as a result of the changing economic climate. All seven TTO Directors recognised the influence of EI in calling for more job creation: “Enterprise Ireland recognises that job creation is central to our economic recovery and shared prosperity” (Enterprise Ireland Strategic Plan, 2010). The TTO Director of Alpha acknowledged both sources: “it fed in from a number of different sources, the economic climate, then EI wanted job creation, as part of regional development, and if you can create jobs in the region it is brilliant” (TTO-I-A2). A TTO professional from Beta also concurred with EI as the driver of change: “There is a big debate going on about the value of licenses vs. value of spin-out to the region and to Ireland Inc. EI would be start up start up start up. Whereas I say there has to be both” (TTO- I- B2). Another TTO Director, of case Delta was more explicit in naming the driver of change in the strategy outcomes: “EI was pushing us and saying the whole focus of tech transfer has to be spin-outs and creating jobs” ( TTO- I- D1). Furthermore jobs was the order of the day for other TTOs, case Golf and case Foxtrot: “Wider economic context, it is all about jobs” (TTO- I- G1) and “there is pressure to create jobs. There is pressure to sign deals” (TTO- I- F1). Interesting a tension was highlighted within this pressure to create jobs by a TT professional from case Delta: “From EI and the government it’s all about jobs, if you suggested
otherwise, you would almost be looked upon as a traitor or something” (TTO-I-D3).

6.4.4.2 Value for money

Being seen as a value for money entity was also important in acquiring legitimacy from another stakeholder, the public as noted by TTO professional in case Charlie: “there is a requirement on the state, all the agencies now, from SFI, be it government policy really if we are giving you money from the tax payer, from international lenders at this stage, there obviously have to be educational return or research return,” (TTO – I- C1).

6.4.4.3 Changing Mindset of Academics

Case Echo attributed the changing to more spin outs to the changing academic mindset as the TTO gains commitment and acquires legitimacy from the academics: “I guess we are seeing more start-ups, which comes from both the mindset of inventors, look we can set up a company now as opposed to previously they might have thought it would have been quite difficult now, they are going form it because of support from the government” (TTO- I- E1).

6.4.5 Research Question Three: Concluding Thoughts

There is evidence of the majority of TTOs employing hard metrics and some TTOs beginning to use soft metrics to value outcomes and there has been a significant change from focusing on licensing to creating more spin-outs. The TTOs are reacting to their environment, to the government agencies and to the university in the forms of demand for jobs, being seen to be a value for money entity and reacting to the changing mindset of the academics explicitly
addressing an insight into strategy process in TTOs. Table 6.20 presents key findings in relation to research question three. Finally, the next section will conclude the chapter.

Table 6.20: Key findings on how strategic outcomes are shaped in TTO

<table>
<thead>
<tr>
<th>Case</th>
<th>Outcome</th>
<th>Internal/External</th>
<th>Influence on change in outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha</td>
<td>Hard Metrics</td>
<td>Own Pipeline</td>
<td>Demand for Jobs</td>
</tr>
<tr>
<td>Beta</td>
<td>Hard Metrics</td>
<td>EI Metrics</td>
<td>Demand for Jobs</td>
</tr>
<tr>
<td>Charlie</td>
<td>Soft Metrics</td>
<td>Own Pipeline</td>
<td>Value for Money Entity</td>
</tr>
<tr>
<td>Delta</td>
<td>Hard Metrics</td>
<td>EI Metrics</td>
<td>Demand for Jobs</td>
</tr>
<tr>
<td>Echo</td>
<td>Hard Metrics</td>
<td>EI Metrics</td>
<td>Changing Mindset of Academic</td>
</tr>
<tr>
<td>Foxtrot</td>
<td>Hard Metrics</td>
<td>EI Metrics</td>
<td>Demand for Jobs</td>
</tr>
<tr>
<td>Golf</td>
<td>Hard Metrics</td>
<td>EI Metrics</td>
<td>Demand for Jobs</td>
</tr>
</tbody>
</table>

6.5 CONCLUDING COMMENTS

To conclude, having earlier rationalised the reasoning behind the inclusion of the seven university case studies (see chapter four), the research then set out carefully describing each of the seven case studies and outlining the university technology transfer system in order to understand the context in chapter five. These case studies portrayed details of the strategy process in TTOs since the introduction by the government of the Technology Transfer Strengthening Initiative in 2007. As explained at an earlier point in the research, the objective of the research was to examine the extent to which TTO engage in strategy process. In doing this, the research was able to address the antecedents, choices and outcomes of strategy process, as guided by Pettigrew (1992). While acknowledging that strategy is broad and diverse, such was the manner in which the findings were emerging from the case studies, that strategy activities in TTOs could effectively be examined segmented in the three categories. Again, it should be recalled that this is not a timeline of activities and it is recognised that strategy is not a linear activity.
There is an exogenous opportunity for all cases, that being the antecedent of the Technology Transfer Strengthening Initiative. However, in spite of the common exogenous shock the TTOs dealt with it differently. From the presentation of the findings, a pattern is beginning to emerge depicting two different approaches to the extent to which a TTO dealt with the exogenous shock. One category of TTOs were able to take the resources from the TTSI and were in a position to be proactive with this resource acquisition opportunity and deploy it for their own organizational goals, such as alignment to the university, setting their own rules, were left to own devices, and devised strategies such as picking the winners. These are deemed to be Strategy Makers. However, the other category of TTOs were more passive in their response to the resource acquisition from the exogenous shock and there is evidence of them merely following the rules as laid down by the external actors. For example, they focused on creating spin-outs in response to government demands. These are deemed to be Strategy Takers.

In summary, the findings show in this study that the antecedents are the same for all TTOs, however, on analysis of the pattern of activities and choices, leading to strategic outcomes, in other words the strategy process, there is considerable variance between typical cases and outlier cases. So much so that two separate categorizations emerged, namely strategy makers and strategy taker depicting the extent to which the TTOs engage in strategy process. Furthermore, the role of actors emerged as significant to the strategy process in TTOs as they influence the process to varying degrees as reflected in findings. A detailed discussion concerning the significance of those findings in relation to existing literature and the overarching research question will be presented in the following chapter.
CHAPTER SEVEN: DISCUSSION

“Creativity is just creating things. When you ask creative people how they did something they feel a little guilty because they didn’t really do it, they just saw something. It seemed obvious to them after awhile”

--Steve Jobs

7.1 INTRODUCTION

This chapter presents a discussion of the findings outlined in the previous chapter whereby the strategy process of TTOs was analysed and presented. Due to external pressures from stakeholders such as the academic scientist, university management, policy makers and industry entrepreneurs, TTOs are under pressure to rethink strategy and organisation more than ever before. Strategy process literature has been in the spotlight since the early seminal works of Chandler (1962) and Andrews (1972), with Pettigrew (1992) really bringing the literature to the forefront. However strategy processes are relatively unexplored in the TTO context. One needs to questions why is this case? The literature suggests the embryonic nature of the TTO has encouraged more quantitative, economic studies which rely on large data-sets of data to measure the efficiency of the process (Siegel et al, 2007, Markman et al, 2005b). Drawing upon the discussions on strategy process presented in chapter three, it can be argued that strategy process is a significant and worthwhile topic to explore. The chapter will specifically address the primary question of this research agenda:

To what extent do TTOs engage in strategy process?
In order to address this question, the previous chapter outlined findings, which presented TTOs engaging in strategy process as strategy takers or strategy makers. This finding will be further outlined in detail as per a discussion per each of the three sub research questions. Thus, to reiterate, given that this research question is informed by gaps in the literature on TTOs and in the literature on strategy process, it follows that this same literature will be used with the findings to address the question posed. In order to address the overarching research question, the three sub questions will be addressed:

- Research Question One: How do TTOs formulate strategy?
- Research Question Two: How do key actors influence TTO strategy process?
- Research Question Three: How are strategic outcomes of the TTO shaped by TTO strategy process and context?

Each of these will be discussed in the rest of the chapter.

7.2 How do TTOs formulate strategy?

In being guided by the gap in the TTO literature which calls for exploration into the strategic role of the TTO, this objective seeks to explore how TTOs formulate strategy (Sanders and Miller, 2010, Siegel et al, 2007). To capture the detail of this, the structure of the section is divided up into three separate parts. Specifically the antecedents, agenda - setting and strategic artefacts are examined. The first section discussing the antecedents to planning reflects on the findings presented for this process employing relevant literature in discussing the key drivers for planning in the TTO and assessing best practice. The second section, entitled agenda setting discusses a number of revealing commonalities which emerged from each case in regards to their agenda setting processes in particular resource allocation and alignment to the university. The third subsection addresses strategic artefacts and discusses the commonalities and differences which emerged from each case with regards the utilisation of
mission statements. First of all, deliberate and emergent strategies are discussed as they frame the analysis of the findings.

### 7.2.1 Deliberate or Emergent

The findings introduced at the end of chapter six showed that TTOs engage in strategy as strategy makers and strategy takers. This is supported by the dichotomy of deliberate and emergent strategies. Mintzberg (1987) applies the term deliberate to strategies that are first formulated internally, and then implemented, contrasting them to “emergent” processes that form gradually through a learning process, usually in response to external forces. From data analysis the majority of TTOs have an emergent strategy as they respond to external environment demands as they engaged in planning when they responded to the calls of the TTSI. These two types of strategy formation are not mutually exclusive but rather, opposite ends of continuum. Ultimately, according to Mintzberg, reality falls between the two and some of the most effective strategies combine deliberation and control with flexibility and learning. Effective control can take the form of an ‘umbrella strategy’ or a process strategy, which are both “partly deliberate and partly emergent” (Mintzberg 1987: 31).
Table 6.10: Deliberate and Emergent Strategy Formulation in TTOs

<table>
<thead>
<tr>
<th>TTO</th>
<th>Deliberate Strategy Formulation</th>
<th>Emergent Strategy Formulation</th>
<th>Type of Strategy Formulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha</td>
<td>Posed Challenge</td>
<td>Reactive: Dependency on academic IP</td>
<td>Emergent</td>
</tr>
<tr>
<td>Beta</td>
<td>Posed Challenge</td>
<td>Reactive: Dependency on academic IP</td>
<td>Emergent</td>
</tr>
<tr>
<td>Charlie</td>
<td>Planned</td>
<td>Proactive: Strategist engaging in creative thinking</td>
<td>Umbrella</td>
</tr>
<tr>
<td>Delta</td>
<td>Posed Challenge</td>
<td>Reactive: Dependency on academic IP</td>
<td>Emergent</td>
</tr>
<tr>
<td>Echo</td>
<td>Posed Challenge</td>
<td>Reactive: Lack of resources to plan to cater for all IP in college</td>
<td>Emergent</td>
</tr>
<tr>
<td>Foxtrot</td>
<td>Posed Challenge</td>
<td>Reactive: Lack of resources to plan to cater for all IP in college</td>
<td>Emergent</td>
</tr>
<tr>
<td>Golf</td>
<td>Posed Challenge</td>
<td>Reactive: Longevity of the technology transfer IP commercialisation process</td>
<td>Emergent</td>
</tr>
</tbody>
</table>

As the study considers strategy as a pattern of decisions, there is also an implication that strategies can be deliberate and emergent. This allows us to observe how strategies form, on one side driven by the TTSI and imposed on the TTOs, and on the other side, driven by the TTO themselves who have gained autonomy, legitimacy and commitment from their stakeholders. These are two ideal types located in the middle of the continuum: towards the deliberate end, centred on planning, entrepreneurial and ideological strategies, towards the other-emergent-end, one firms unconnected, consensus and imposed strategies (Mintzberg and Waters, 1985). This process is very subtle, as a balance must be found between managing stakeholders as a boundary spanning organisation and pursuing individual strategies for the organisations.

Following this reasoning, Chaffee’s interpretive model focuses on the function of strategy in providing sense to organisational stakeholders and in building legitimacy and reputation (Chaffee, 1985). Thus strategy in TTOs, planned or emergent provides stakeholders with meaning for future operation of the office (Weick, 1979). Consequently in this study the strategy takers are reactive,
while the strategy makers engage in strategic thinking and recognising that they must be more creative with the IP to generate more opportunities. Such strategy taking activities support the findings of the Sharih and Lui (2010:16) that argued: “Technology Transfer specialists who understand the intricacies of patenting and disclosure cannot possibly follow the progress of research and publishing in the spectrum of academic departments on the university campus. Apart from what they learn from the grapevine or through personal relations with the researchers, they must rely on the scientists to come forward- as they are repeatedly urged to do usually poorly attended training sessions- and discuss the commercial potential of their scientific work”. From the analysis of the findings, the moderating force to move from strategy taker to strategy maker depends on the extent to which the TTOs have acquired legitimacy and gained commitment from the stakeholders.

7.2.2 Legitimacy

While it is important to understand the different approaches to strategy process in TTOs, it is even more important to learn of the movements amongst the different approaches, as Sztompka (1991) argues that social reality is not a steady state, but rather a dynamic process, it occurs rather than exists. Analysis of the findings shows that the transition from strategy taker to strategy maker depends on legitimacy. Legitimacy is concerned with meeting the expectations within an organisational field in terms of assumptions, behaviours, and strategies (Pfeffer and Salancik, 1978). Strategy processes in TTOs are influenced by the need for legitimacy through regulation, by responding to TTSI and normative expectations, by delivering on metrics as set out by TTSI. Over time there tends to develop a consensus within an organisational field about strategies that will be successful or acceptable – so strategies themselves become legitimised (Pfeffer and Salancik, 1978). By conforming to such norms, organisations may secure approval, support and public endorsement, thus increasing their legitimacy. Therefore, organisations tend to mimic each other’s strategies. Analysis of the findings of the study show that TTOs are
seeking to confer legitimacy from their stakeholders due to the unique context as they operate as a boundary spanning organisation. The activities of acquiring legitimacy differ between strategy takers and strategy makers. Strategy takers are achieving legitimacy by planning as a strategy for resources acquisition rather than a strategy for resource allocation in order to gain commitment from their stakeholders. Commitment refers to the behaviour binding an individual to others, a state of obligation (Hambrick, et al 1993, Pfeffer and Salancik, 1978). Commitment operates at the individual level while legitimacy derives from external groups and institutions. Findings also suggest there is evidence of coercive isomorphism as while there is some variability in the findings, the majority of cases are deemed strategy takers (DiMaggio and Powell, 1983). By being influenced by external actors and the external environment the TTOs are responding similar ways and developing similar processes, making their organisations extremely similar. Strategy makers acquired legitimacy by demonstrating goal-oriented action and the use of formal systems. The rest of the chapter will analysis the findings of the antecedents, processes and outcomes of both the strategy makers and strategy takers to offer a comprehensive response to the first research question of how do TTOs formulate strategy?

7.2.3 Antecedents

The first part discussing the antecedents to planning reflects on the findings presented for this process employing relevant literature in discussing the key drivers for planning in the TTO and assessing best practice.

7.2.3.1 Key Drivers for Planning

Analysis of the findings reveals that the key driver of the planning process was driven in six cases by government policy. In these cases, the business plans created were highly prescriptive and the planning was a highly directed one as
per the Enterprise Ireland guidelines (included in Appendix B). Furthermore, the TTOs engaged in assessing best practice activities as part of their planning within strategy processes. The TTOs participated in courses and engaged in benchmarking exercises. In summary some began to look externally by researching academic writings from the likes of Mike Wright and Don Siegel. Others attended international conferences like AUTM. However the majority of cases looked to best practice from an internal perspective and attended sessions held by Enterprise Ireland. This is evidence of six of the seven TTOs being internally focused. However the outlier case, case Charlie very much positioned itself as a European TTO.

### 7.2.3.2 Assessing Best Practice

Analysis of the findings reveals that the key driver of the planning process was driven in six cases by government policy. Six of the seven TTOs were internally focused. The outlier being case Charlie, as they had their own plans prior to the TTSI, they are external focused and they positioned themselves as a European TTO which supports Bryson’s (1995) argument that strategic planning can contribute to an organisations self concept of sustainability. Table 7.1 presents an overview of the key outcomes emerging from this discussion on antecedent activities as part of strategy process.

<table>
<thead>
<tr>
<th>Antecedents</th>
<th>Strategy Takers</th>
<th>Strategy Makers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key Drivers for Planning</td>
<td>Driven by funding agency</td>
<td>Own plan</td>
</tr>
<tr>
<td>Assessing Best Practice</td>
<td>National Level</td>
<td>International level</td>
</tr>
</tbody>
</table>

This is further exemplified by six of the seven TTOs response and engagement with TTSI which further illustrates what Delucchi (1997:417) describes as strategic planning as a normative necessity. In other words six of the TTOs in the study played by the rules of the game which conferred legitimacy on their
office which is significant given the embryonic nature of such offices in the Irish university system. Internal pressures for legitimacy are likely to come from stakeholders who want evidence of conformity to norms of managerial professionalism (Mintzberg, 1979). This may be due to the hybrid nature of the TTO role which again reiterates the type of role of matchmaker, and boundary spanner role, that is seeking to gain legitimacy from stakeholders and needs to be comfortable with both communities of practice amongst its stakeholders (Sanders and Miller, 2010, Bramwell and Wolfe, 2008). The focus on planning may be a consequence of the intervention from a government agency as it is deemed that the only real determining factor for technology transfer success is the achievement of hard metrics as determined by government agencies for six of the cases.

7.2.4 Agenda Setting

Agenda setting discusses a number of revealing commonalities which emerged from each case in regards to their agenda setting processes in particular resource allocation and alignment to the university.

7.2.4.1 Appropriating and Allocating Resources

As part of allocating resources, all of the cases emphasised on getting the right skills of the TTO professionals into the offices. There was autonomy amongst the TTO Directors of each case to make a choice on the skills necessary for their team. The key findings are presented in table 7.2 below.

<table>
<thead>
<tr>
<th>Appropriating and Allocating Resources</th>
<th>Strategy Taker</th>
<th>Strategy Maker</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning on the Job</td>
<td>PhD</td>
<td>Industry or TTO experience</td>
</tr>
<tr>
<td>People Skills</td>
<td></td>
<td>People Skills</td>
</tr>
</tbody>
</table>
Of particular interest to this discussion are the requirements for a PhD and people skills. The reasoning behind the PhD was for the TTO professional to have credibility amongst the Principal Investigators. This is further evidence of TTOs seeking to acquire legitimacy from one of their key stakeholders, the academics. Also people skills were required to build a relationship with academics and gain their commitment to the process. The study findings support the work of Swimidas and Velusa, (2009) who found a lack of business skills in TTOs. The authors argued that, when short of staff and budget, TTOs will be reduced to devoting their resources to ensuring patent applications are filed and patents are issued at the expense of marketing of inventions. This was the case in the majority of our cases. Getting the right skills is imperative as argued by O’Shea, Allen, Chevalier and Roche (2005), and Lockett et al (2005) who demonstrate that characteristics of the TTO influence the propensity for scientists to become an entrepreneur.

7.2.4.2 Alignment to University

Alignment to university emerged as significant when engaging in agenda setting processes. The findings confirm results from studies such as Warren et al (2008) who argue the necessity for TTOs to be aligned to the overall strategy of a university. The findings showed that each of the seven university plans had a third pillar section which talked about innovation, third pillar activities, and generating societal and economic return which falls under the remit of the TTO as discussed by Cunningham and Harney (2006) in their observation of the various outcomes of the TTO. As part of alignment, there was variance when examining the alignment of the TTO to their university strategic plan. Table 7.3 presents an overview of the key outcomes emerging from this discussion on agenda setting activities as part of strategy process.
Table 7.3: Agenda setting as part of strategy process in TTOs

<table>
<thead>
<tr>
<th>Agenda Setting</th>
<th>Strategy Taker</th>
<th>Strategy Maker</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allocating Resources</td>
<td>Focus on ‘Getting the right people in the role’ as per Enterprise Ireland guidelines Focus on credibility of office</td>
<td>Focus on core skills</td>
</tr>
<tr>
<td>Alignment to University</td>
<td>Demonstrated partial alignment Demonstrated lack of alignment</td>
<td>Demonstrated alignment</td>
</tr>
</tbody>
</table>

In summary the findings of this study, in relation to the growing position of the TTO, sit well with the central tenets of Warren et al, (2008) which acknowledge if TTOs are to become more of a strategic entity, they need to be aligned to the direction of the university. The recent study by Grimaldi et al, (2011) confirms this also. While the majority of cases are strategy takers, the outliers as strategy takers denote TTOs can play a strategic role. Therefore it is argued that TTOs should to be aligned with the university to be considered strategic actor. Finally, the variability in agenda setting findings confirm Bercowtiz et al (2008) findings who stress the heterogeneity of the TTOs and argue that there cannot be an ideal practice due to differences in contextual histories and structures of the TTOs.

7.2.5 Strategic Artefacts

Organisational mission reflects the beliefs of one individual or a small group who use informal means to control an organisation (Middleton, 1989). As per Pearce and David (1987) typology, there was a lack of comprehensiveness in the mission statements of the TTOs as outlined in table 7.4. None of the cases had the full eight items as outlined in the typology; however there was differentiation between the strategy makers and strategy takers.
Table 7.4: Mission Statement analysis of TTOs

<table>
<thead>
<tr>
<th>Case</th>
<th>Mission Element</th>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3</th>
<th>Case 4</th>
<th>Case 5</th>
<th>Case 6</th>
<th>Case 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>TTO</td>
<td>The specification of target customers and markets</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>The identification of principal products or services</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>The specification of geographic domain</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>The identification of core technologies</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>The expression of commitment to survival, growth, and profitability</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>The specification of key elements in the philosophy</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>The identification of self-concept</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>The identification of desired public image</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Case three had four of the eight items of the typology and can be deemed a strategy maker. However, on the other hand, case six and case seven are strategy takers as they have only one of the items. In regards the role the mission statement plays within the TTO, there is evidence of mission confusion and it appears that the mission statement is limited in gaining commitment and acquiring legitimacy from stakeholders. Further analysis into how the TTOs themselves viewed the role of their mission statements supported the variance in the utilisation of mission statements. As per table 7.4 below, there was variance in the findings, with five of the cases demonstrating evidence of mission confusion or somewhat clear mission. In only two of the cases, case Echo and case Charlie were there a clear role for the mission in the sense that Baetz and Bart (1996) talked about mission as a clear articulation of the long term intent of an organisation. These are the strategy makers. Also the contextual importance of strategy was highlighted by Buckland (2009): “The blandness, similarity and empty contents of mission statements, visions, aspirations across the university sector is making the variation in institutional context, histories, resources, capabilities and by an almost universal search for excellence in things (2009, 531). Based on the evidence and analysis from the study that the strategy takers are guilty of such blandness and one has to question the use of their mission statement as a strategic artefact. Table 7.5 presents a summary of mission analysis as per strategy takers and strategy makers.
Table 7.5: Reflection of Mission Analysis

<table>
<thead>
<tr>
<th>Strategic Artefact</th>
<th>Strategy Taker</th>
<th>Strategy Maker</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mission Analysis</td>
<td>Somewhat Clear Mission</td>
<td>Clear Mission</td>
</tr>
<tr>
<td></td>
<td>Mission Confusion</td>
<td></td>
</tr>
</tbody>
</table>

While, each of the TTOs presented mission statements, expressing their strategic intent by specifying their target customers and identifying principal products, there appears to be misalignment with the mission statements and the commercialisation specialists in the strategy takers cases, the commercialisation specialists were not involved in the creation of the mission statements, resulting in a lack of ownership of the strategy (Morphew and Hartley, 2006). Furthermore, when exploring strategic planning in organisations, mission statements are appreciated as an important indicator of the goals of an organisation, the organisation’s central defining purpose and its raison d’etre (O’Gorman and Doran, 1999, Leuthesser and Kohlie, 1997). Specifically, mission statements are a clear articulation of the internal and external stakeholders of the long term intent of an organisation. However the findings suggest that the mission statements of the TTO were incomprehensive when using the Pearse and David (1982) typology and there were differences in how effective the mission statement was as an articulation to stakeholders of long term intent of the organisation.

7.2.6 Concluding Comments: Research Question One

This section provided an interesting discussion of the findings of research question one. It can be surmised that TTOs as strategy takers and makers engage in different strategy processes in how they formulate strategy. An institution-based view of strategy posits that firms strategically respond to the opportunities and constraints presented by the institutional frameworks (Peng, 2003). The institution-based view argues that both formal and informal institutions are “the rules of the game,” which firms need to conform to remain
legitimacy (Meyer et al., 2008). Legitimacy for a firm also comes from the acceptance of the firm by stakeholders in its environment. Thus, firms need to respond to pressures from their stakeholders and the institutions to gain and remain legitimacy.

**A STRATEGIC CHOICE FRAMEWORK**

At its core, the institution-based view focuses on how institutional conditions impact strategic choices (Peng, 2003). A strategic choice framework on how firms strategically respond to challenges from the institutional environment has been first developed by Oliver (1991). The findings have further extended this framework by adapting it to the realities of the Technology Transfer Office. We argue they are Strategy Makers and Strategy Takers.

**Strategy Takers:** For some TTOs, they reacted to the exogenous shock of the TTSI and the internal pressures to follow government policy, because they needed the approval of their key stakeholders Enterprise Ireland, academics, and university management to be a legitimate actor in the process of technology transfer in their university. They also changed their outcomes, and passively followed the rules because they sought the acceptance of their stakeholders. By following requirements that may be in conflict with the mission of the TTO, there are difficulties for them to adapt and conform (Oliver, 1991). To sum up, analysis of the findings deems this type of strategic choice as “strategy takers.” In this process, TTOs that are strategy takers have failed to convey their responsibility to stakeholders. As long as TTOs remain strategy takers in their strategic choice, they will face the difficulty in maintaining legitimacy in the strategy of the third mission activities in their universities. The findings in relation to the role played by the TTO as strategy takers are akin to the views of Murray (2007) and Markman et al (2009) who draw attention to the significant, and dominant impact TTO have on as a boundary spanning role and questions the significant role they have as a driver of strategy, somewhat similar to the views of Litan et al (2007), who question the legitimacy of the TTO as an organisation supporting the third mission of
the university. Furthermore, the concept put forward by Buckland (2009) that planning is not strategy is supported as six of the seven cases show evidence of planning for show, as Mintzberg (1994) argues. In other words they engage in planning activities because it looks good, rather than being good. Also, the findings support the idea constructed by Stone and Brush (1996), where organisations engage in planning as a strategy for resource acquisition rather than a strategy for resource allocation.

**Strategy Makers:** When TTOs choose strategy in response to pressures from stakeholders, they are ‘strategy makers’. These TTOs have accepted the government intervention, however they have taken responsibility for their actions and decisions. This also helps them to maintain legitimacy in the long term. Overall, this analysis of the findings contributes to the literature by documenting the diverse strategic choice responses to institutional pressures. In order to cope with the pressures from diverse stakeholders, the findings clearly advise that TTOs need to be strategy makers and use a more proactive strategy to avoid possible negative consequences. The findings show that in the planning activities to establish legitimacy the TTOs have moved beyond what Mintzberg calls ‘planning for show’. Furthermore it should be noted that one of the case findings are consistent with Hofer and Schendel (1978) general observation planning can clarify goals and is an essential process for developing specifications for allocating resources.

While there is some difference in the processes of strategy makers and strategy takers, perhaps it is the view of Siegel et al (2008) and more recently Sanders and Miller (2010), which resonates most with the findings here. These authors argue that more is needed to be known about the ‘black box’ of the TTO as they play a complicated role among diverse stakeholders. The findings show that the majority of cases can be deemed ‘strategy takers’. In spite of contextual differences, including different histories of universities, and size and structure of the TTOs, there remains a homogeneity in their practices in the extent to which they engage in strategy process. An explanation of the findings
can be understood by DiMaggio and Powell (1985) theory on coercive isomorphic processes. The authors ask why there is startling homogeneity of organisational forms and practices as they seek to explain homogeneity, not variation. In Hawthorne’s (1968) description, isomorphism is a constraining process that forces one unit in a population to resemble other units that face the same set of environment conditions. Hannon and Freeman (1977) argue that isomorphism occurs because organisational decision makers learn appropriate responses and adjust their behaviour accordingly. This supports Delucchi (1997) notion of playing by the rules of the game. Table 7.6 presents a summary of the contribution to the literature from Research Question One. The second research question explores the linkages between actor influences in addressing the extent to which the TTO engages in strategy processes.

Table 7.6: Summary Of The Contribution To The Strategy Process Literature From Research Question 1

<table>
<thead>
<tr>
<th>Contribution to Strategy Process Theory</th>
<th>Antecedents</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strategy Makers:</strong></td>
<td>React to internal pressure for legitimacy lend to conforming of norms of managerial professionalism as strategy takers engage in planning for show. Internal, operational focus when assessing best practice</td>
</tr>
<tr>
<td><strong>Strategy Takers:</strong></td>
<td>Own plan for co-ordination amongst stakeholders Identify as European TTO when assessing best practice</td>
</tr>
</tbody>
</table>

**Agenda Setting**

| **Strategy Makers:**                   | Adopt a laissez faire approach to resource appropriation and allocation and lack an alignment to university | Planning for resource acquisition rather than allocation as per Stones and Brook (1996) |
| **Strategy Takers:**                   | Focus on Getting the right skills | Adopting a balanced and focused action as per Quinn (1989) |

**Strategic Artefacts**

| **Strategy Makers:**                   | Mission Confusion: Lack of clarity in purpose in mission as per Buckland (2009) | |
| **Strategy Takers:**                   | Mission used to communicate long term intent to stakeholders | Supports Vinzant and Vinzant (1996) and Baetz and Baetz (1996) that missions are the cornerstone of strategic management |
7.3 How do key actors influence TTO strategy process?

In being guided by the gap in the TTO literature in this area, this objective seeks to explore to what extent the TTO strategy process is influenced by key actors. Strategy process is concerned with building relationships with key actors (Freeman, 1984). Strategy process researchers, particularly those who are concerned with emergence (Holt, 2006, Langley, 1999) advocate a strategy process view according to which the world is in a continuous process of becoming. The interest of these strategy process scholars is not so much in capturing micro and macro practices in the traditional sense of process but in the view as process as a radically evolving nature of the world. Their central concept is to think of the world in terms of relationships. This is particularly relevant in the demanding context of a TTO with a number of conflicting stakeholders (Siegel et al, 2003).

7.3.1 Influence of Key Actors

As already outlined, there are a number of actors involved in the TTO strategy process. The characteristics associated with managing multiple stakeholders highlight a dilemma attached to gaining both commitment and legitimacy (Stones and Brookes, 1996). The TTO must meet external standards of legitimacy to acquire resources. Economic recession and shifts in public policy have created increasingly constrained resources and dynamic environments. The difficulty is outlined by Cohen et al (1998) observation of the dilemmas underlying the university president’s role: “When purpose is ambiguous, ordinary theories of decision-making and intelligence becomes problematic. When power is ambiguous, ordinary theories of social order and control become problematic”. Cohen et al (1998) used the term ‘organized anarchy’. Legitimacy can be severely damaged, if not removed by events such as lack of...
perceived performance of the TTO. This addresses the contentious issue of metrics within TTOs to evaluate the success of the TTO. Inertial pressures by constraining influence of key actors, can lead the TTO away from being a key influencer. Organisations are driven to incorporate the practices and procedures defined by prevailing rationalised concepts of organisational work and institutionalised in society. Organisations that do so increase their legitimacy and their survival prospects, independent of the immediate efficacy of the acquired practices and procedures (Meyer and Rowan, 1977). It follows, then, that organisations are affected by their environments according to the ways in which managers or leaders formulate strategies, make decisions, and implement them. This is significant for the TTO. This next section details the influence of each of the actors.

From the analysis the influence of TTO Director as strategist emerged as significant. The TTO Director had little influence in some cases where they viewed themselves as undervalued and pursuing an operational role while other TTO Directors viewed themselves as visionaries of the process, which can be interpreted as strategists in the process (Whittington, 2006). However the lack of strategic thinking for the strategy takers can be interpreted by viewing themselves as undervalued and in an operational capacity, limiting their strategic thinking. This is further supported by a senior management representative from Entreprise Ireland when he outlined the role of the TTO Director: “The Director of TTO is not at the highest level in seniority but they usually are report into VP for research. Typically they are coming into the university; they are interacting at a reasonably high level so their role is to ensure that at their level is understanding the importance of what this office is doing. So at that level they do have a role to ensure that it is brought to the fore, that light is shown on this activity. They are there to shine the light on the activity of the TTO. That it is doing something for the university and for Ireland. It doesn’t harm the reputation of the university”.

Across seven cases, the capability of TTOs to formulate individual organisational strategies is greatly reliant on the accessibility of funds and other resources from government support. What emerged was the strategic
orientation of the TTO professionals in the strategy makers. This was interpreted by viewing themselves as visionaries of the process and viewed the EI as barriers. Also, some strategy makers viewed Enterprise Ireland as pawns whereby they don’t have as much control in the process. Analysis of the findings established that strategy takers interpreted the influence of the university management team to be weak and as such they were labelled as blind mice, depicting having little or no influence. While this was the case for all TTOs in the beginning, for strategy makers, university management, especially the influence of the Vice President of Research has evolved into an Institutional Guardian role. The findings from all of cases showed that the TTOs activities were focused on building an entrepreneurial climate within the universities through a variety of activities. The strategy makers used both formal and informal approaches to build up relationships with the academics, as per Chapple et al (2005) study and over time they saw an increased level of commitment from the academic stakeholder. The strategy takers interpreted industry partners as a second customer to their primary customer of the academic entrepreneurs and made the strategic choice to allocate resources to meet industry needs and build relationships with industry. On the other hand, strategy takers were too consumed with the operational demands of their processes that they did not see industry partners on their radar, or priority list. Strategy takers were more reliant on Enterprise Ireland as supporters and also spent a lot of time in trying to gain commitment from key stakeholders, the academics, the university management team, policy makers at the expense of industry who were not seen as significant to the process from a planning perspective.

7.3.2 How The Key Actors Influence Strategy Process Of The TTO

By undertaking process research the aim was to represent reality by accurate representation and inject order into how we see the world (Sminia, 2009). Ultimately when researchers engage in social science they are going by the intellect. Undertaking such processual research encourages researchers to be
evaluative. Process philosophy offers a way of feeling lost by loosing the reliance on meaning and going back to the senses. Holt (2011) proposes a system of guideline and plotlines to frame strategy process research. In this view, guidelines frame and govern what is going to happen in the sense the role of a strategy. A strategy defines the space in which the TTOs will operate and limit the pattern of action. Within these guidelines, plotlines signify the use the guidelines are used for. For example how TTOs operationalise the strategy. The aim of this part of the research is to understand both the guidelines and plotlines for the TTO in understanding how the key actors influence the TTO strategy process.

7.3.3 Key actors in the National Innovation System

First, the context of the Irish Innovation System is an interesting back-drop to explore the individual actors of a National Innovation System and the influence each of the actors have. Overall, the findings compares two approaches of TTO to strategic choice, strategy takers and strategy makers and using this finding to explain the differences in their process, within the context of the National Innovation Framework. Moreover, a cross case analysis of different actors influence in the seven cases improves our understanding of the factors influencing the strategy process at a meso-level.

Second, the findings highlights the role of the government agency, Enterprise Ireland, not only as a financier for the development of capabilities, but also as a catalyster of change through initiatives such as the Technology Transfer Strengthening Initiative. According to the findings, the government were responsible for introducing an exogenous shock to the TTOs. In other words, the case studies demonstrate that government intervention resulted in the TTOs responding in different ways, as shown in the dichotomy of strategy makers and strategy takers, as per findings. Furthermore, within the strategy takers category, there were significant nuances in the cases.

Third, the findings clearly demonstrate the limits of state policy. While these may be formulated and implemented with specific objectives, the final
outcome will depend on the perceptions and resulting actions of the stakeholders. As discussed, there was evidence of DiMaggio and Powell (1985) theory on coercive isomorphic processes as there is startling homogeneity of organizational forms as the cases learn appropriate responses to the government intervention, such as changing their focus from creation licenses to spin-outs at the request of Enterprise Ireland. This finding is supported by Mowery (2011) study at a national level. He argues countries are emulating each others policies without fully understanding the nuances of the process as they respond to government intervention. Overall, this study offers a greater understanding of strategy process and strategic choice in the context of the National Innovation System.

7.3.4 How NIS actors influenced TTO Strategic Choice

A critical role for TTO Directors is to instil confidence in stakeholders, inspiring them to move in some general direction (Weick, 1987). Therefore how the TTO views themselves emerged as significant to the strategy process is significant. The TTO Director had little influence in some cases where they Strategy takers viewed themselves as undervalued and pursuing an operational role while strategy makers viewed themselves as visionaries of the process, which can be interpreted as strategists in the process (Whittington, 2006). However the lack of strategic thinking for the strategy takers can be interpreted by viewing themselves as undervalued and in an operational capacity, limiting their strategic thinking.

The more dependent the TTO is on the government agency, the less of a position the commercialisation specialists and the TTO Director are in, to implement novel goals and strategies. As long as the TTOs act as an actor that responds to government directed metrics, they will be highly constrained in their ability to formulate strategy for the realisation of idiosyncratic organisational goals and purpose. In five of the cases, the government agency was viewed as a supporter of the process. This may be due to the embryonic
nature of the Irish Technology Transfer system as depicted in chapter five and highlighted by Cunningham and Harney (2006) and Geoghegan and Pontikas (2008). As the Irish innovation system matures, TTO strategies may emerge as universities are looking to satisfy an increased expectation that universities need to be engaged in local economic development and to demonstrate relevance (Bercovitz and Feldman, 2006). However, how much strategic autonomy and capability they develop is still largely determined by the state as is the variety of different kinds of roles, resources and power within the TTO. This is true for the strategy makers in the process who viewed the influence of Enterprise Ireland’s role as a barrier. This is further supported by an interview with a member of an incubation centre on one of the cases. While not the explicit focus of the study, the researcher had the opportunity to meet with a company director of a spin-in of one of the cases and he summarised the challenges of working with universities in Ireland. His story goes as follows: “My PI left and went back to Belgium. He was a really good guy but he has a cut in salary so he left. Think that is happening a lot. Still have a contact in the IT department but it is very relaxed. No one is driving the process. I think I will do IP with the college because it looks good with investors that you have a pipeline of technologies even if they don’t work out but it is hard to get the process going because of all the paperwork you need to fill out for Enterprise Ireland”. In particular, the emergence of TTOs as a strategic actor depends significantly on the role of government. Government makers have been an influential figure outside of Ireland also. For example the Bahy Dole Act is recognised as political endorsement of the commercialisation of university research. However there have been some critics whom question its legacy such as Mowery and Sampat (2006) who argue Bahy Dole was one of a series of changes, not the only influencer of relationships between academics and industry. There appears to be strong barriers to the TTO developing distinctive organisational competences on the basis of their authoritative coordination from the VP of Research in five of the cases. Furthermore the findings from the other two case studies support the notion of the VP of Research as an institutional guardian. These were the strategy makers therefore supporting the TTO scholars who argue support from university management team is critical to the process of technology transfer (Friedman and Silverman, 2003, Siegel et
al, 2005, Markman et al, 2009). The findings from all cases supported the views of many who argue the volume and quality of academic input will determine the success of the TTO process (Thursby and Thursby, 2005, Friedman and Silverman, 2003). From the analysis, industry clearly did not have an influence on the strategy process, indeed it was not on the radar at all for five of the seven cases. This begs the question why is this the case. In the strategy process studies outlined in Chapter Three, customers typically influence the strategic direction of the firm so why is it the case that they have so little influence on the TTO strategy process (Burgleman, 1983, Nutt, 1998) One answer lies in the interview with the leading government agency senior manager, presented in Chapter Five, who clearly states when Enterprise Ireland were funding the set up of the offices as part of the TTSI, they did not fund business development type roles. Thus historically, in the resource appropriation and allocation of resources, a core focus on industry was not established for those TTOs who were dependent on the TTSI. This supports findings from D’Este and Patel (2007) who argue that there are a variety of the factors underlying the variety of interactions with industry and one is having a clear focus on industry.

7.3.5 Concluding Comments: Research Question Two

It can be surmised that TTOs must satisfy a variety of stakeholders who have conflicting objectives. The primary goal of academics, venture capitalists, university management and entrepreneurs may be widely divergent and shift over time (Siegel et al 2003). A critical management task for the TTO therefore is to gain commitment from a diverse set of constituencies where they have a lack of direct control over resource flows, especially funding and legitimacy. Table 7.7 presents an overview of the key outcomes emerging from this discussion.
Table 7.7: Findings per Research Question Two

<table>
<thead>
<tr>
<th>Actor</th>
<th>Strategy Taker</th>
<th>Strategy Maker</th>
</tr>
</thead>
<tbody>
<tr>
<td>TTO</td>
<td>Undervalued</td>
<td>Facilitator</td>
</tr>
<tr>
<td>Enterprise Ireland</td>
<td>Supporter</td>
<td>Barrier</td>
</tr>
<tr>
<td>University management</td>
<td>Blind Mice</td>
<td>Institutional Guardian</td>
</tr>
<tr>
<td>Academics</td>
<td>Powerful</td>
<td>Committed</td>
</tr>
<tr>
<td>Industry</td>
<td>Poor relation</td>
<td>Key Player</td>
</tr>
</tbody>
</table>

Boundary spanning skills play a role in allowing the TTO to gain commitment and acquire legitimacy from the stakeholders. According to Sanders and Miller (2010), the TTO solicits both academics and industry and reframes the norms of academia, performing boundary maintenance and partial accommodation. The authors discuss the TTO soliciting the academics to get involved in the process, but not by promoting incentives as advocated by other empirical studies (Siegel et al, 2003, Thursby and Thursby, 2002) but by promoting the social return of the academic involvement (Litan et al, 2007). The analysis of the findings suggest Charlie had acquired and developed this boundary spanning ability through vast experience working and dealing as well as negotiating with different levels of people, coming from different environments, which means they have gained this ability through ‘learning by doing’. This raises the issue of power and draws up the agency / principal debate. The TTO, from previous empirical studies has been deemed a dual agent of the university management and the academic researcher/ industry (Thursby and Thursby, 2005, Markman et al, 2008). The findings of this study support the role of the TTO as a boundary spanner. However there is variance.
in the strategic role the individual TTOs play. They diversify from strategy makers to strategy takers.

As emerged as significant in the discussion of Research Question Two, outcomes are important to the sustaining legitimacy for the TTO. The third research question explores the strategic outcomes by examining how the TTO metrics are shaped by TTO strategy process and context. This will yield interesting findings on strategic outcomes of the process such as autonomy, legitimacy acquired from stakeholders.
7.4 How are Strategic Outcomes of the TTO shaped by TTO strategy process and context?

In being guided by the gap in the TTO literature in this area, this objective seeks to explore how strategic outcomes of the TTO are shaped by TTO strategy process and context with the objective of giving an insight into strategic outcomes. Empirical studies of metrics of technology transfer are growing as academics seek to measure the impact of university industry technology transfer. For example, Perkmann et al (2011) devised a performance measurement system for university-industry alliances whereby prospective and retrospective, subjective and objective measures are outlined. This discussion will look at the strategic outcomes of the TTOs by assessing the key drivers of changes shaping the TTO metrics. By analysing the strategic outcomes, the study will make a contribution to the growing literature on metrics, on a strategic level.

7.4.1 Strategic Outcomes

There has been a significant increase in activity, in both patents and spinouts as represented by Enterprise Ireland, ‘Business of Research’ report which was outlined in Chapter Five. However, the large volume may represent a low quality of patents, as represented by low citation of patents and low revenues resulting from them. This is the challenge of using the number of patents as a metric (Mowery et al, 2006). The TTOs varied in their strategic approach to crafting successful patents. The strategy takers practiced a ‘more shots on goal approach’ whilst those with a more sophisticated strategy process, the strategy makers focused on picking the winners strategy and making the strategic choice to be alignment with the university strengths. The following section will discuss the drivers of changes of strategic outcomes.
7.4.2 Drivers of Change

There is evidence of TTOs employing hard and soft metrics and there has been a significant change from focusing on licensing to creating more spin-outs. There are a number of reasons for this which can be categorised as strategy process driven and context driven.

7.4.2.1 Strategy Process Driven

The TTOs are reacting to their environment, to the government agencies and to the university in the forms of demand for jobs, being seen to be a value for money entity and reacting to the changing mindset of the academics. The nature of these changes in outcome has a number of implications for the literature. Firstly, with regard to the debate surrounding metrics, the findings confirm a significant role that metrics are changing (Grimaldi et al., 2011). However, while the findings demonstrate that the metrics are changing due to outside influence of demand for jobs, university management pressure to be seen as value for money entity for the university and responding to the changing mindset of the academics. These findings contest the independence of the TTO to generate their own strategy. Likewise they contest the view that TTO are in control of their own strategic processes. This supports the findings of Bercovitz and Feldman (2006). There is evidence of TTOs employing hard and soft metrics and there has been a significant change from focusing on licensing to creating more spin-outs, supporting the findings of Chapple et al., 2005. However, on reflection, there was little evidence of monitoring and control processes to reflect on their strategy formulation efforts. This strongly supports the literature debates concerning Mintzberg’s debates on planning for show (1997). The findings support the concept of planning for resource acquisition rather than resource allocation as per Stones and Brookes (1996) study. Summing up, analysis of the findings show that while the TTSI may have initiated a planning process, there were no significant strategic behaviours
change really within the TTOs as the majority of the TTOs are reacting to their environment, to the government agencies and to the university in the forms of demand for jobs, being seen to be a value for money entity and reacting to the changing mindset of the academics. The question that is being increasingly proposed is what the taxpayer is getting in return for the large publicly funded investment in research. Furthermore, there is the debate that third mission activities are “soiling the Ivory Tower with the grubby fingerprints of industry” (Greenberg, 2007: 341). Additionally, Louis et al (1989) argues that success in the tech transfer market depends not only on the subject matter and quality of an institution but also on its ideological and psychological comfort with the pursuit of commercialisation. And so when engaging in metrics, softer metrics like relationships with academics should be introduced, more recognised/ held in higher regard.

7.4.2.2 Context Driven

In this capacity, the role of TTO is to shape, resource, support and manage the commercialisation of IP such that the university as a loosely coupled system can thrive, deliver and reproduce themselves. For each university and public research institutions, the trend towards commercialisation reflects pressures to maximise the social return on public investment in research and effort to enhance universities’ self sustenance (Markman et al 2009). Also, there is not an emphasis on quality, the metrics used at not emphasising quality, they talk about quantity.

An interesting discussion point from the findings is the question of devising metrics to capture the value of the TTO. There is a growing sentiment that the traditional metrics of licenses and spin-outs are not capturing the value of the TTO (Perkmann and Walsh, 2007). In the university commercialisation space, there are multiple goals that could be used which lead to very different trade-offs from a policy perspective following the philosophy of how you are measured will tilt your behaviour. Some potential metrics adjusting for quality
include industry funding of research, measuring the flow of people such as measuring the recruitment and retention of the entrepreneurial scientist. Furthermore there is a movement towards the open agenda as first outlined by the Kauffman Foundation. A pioneering initiative in this space is the recent initiative by University of Glasgow; Kings College and University of Bristol in their open innovation model. In 2010 the University of Glasgow introduced what they describe as “a radical new model to accelerate the transfer of IP into commercial use. Easy Access IP offers a range of IP free of charge to companies or individuals so that they can exploit the knowledge for the benefit of UK society and the economy.” In March 2011 the UK Intellectual Property Office backed a proposal from the universities of Glasgow, Bristol and King’s College London to develop a consortium of universities into the Easy Access Innovation Partnership.

**7.4.3 Concluding Comments: Research Question Three**

Discussion of the findings of research question three led to some interesting key points, as follows. As there is a variance in the findings, with some TTOs as strategy takers and others playing a more strategic role in strategy makers, it begs the question as to how strategic can the TTO be. However the study findings show the contingent and emergent nature of the activities of the TTO with a number of influencing stakeholders in particular the VP of Research in some cases and the Government Agency in other cases. Therefore in some cases due to contingent and emergent nature of the activities of the TTO, the TTO is inherently unable to deliver strategic outcome and is only in a position to articulate strategic potential. Therefore, analysis of the findings shows that because the TTO does not have full control of all resources in its capacity as a boundary spanner. Taking this into consideration a strategy taker position might be an optimal approach to take.
7.5 Concluding Comments

As per the stated intention at the outset of this chapter, in order to address the primary research question of this study, the discussion above saw relevant literature from the fields of strategy process and technology transfer compared and contrasted with the findings of the research study. To clarify, in ensuring that this discussion was coherently presented, the three sub research questions, which together make up the primary research question, were each addressed separately. Each of these sub research questions uncovered a number of unique and common insights pertaining to the strategy process of the TTO. It should be noted that these key discussion outcomes, when integrated together as the strategy underpinning the TTO activities as outlined in chapter six, represent the study’s response to its principal research question namely: To what extent do TTOs engage in strategy process?
CHAPTER EIGHT: CONCLUSION

“Whatever course you decide upon, there is always someone to tell you that you are wrong. There are always difficulties arising which tempt you to believe that your critics are right. To map out a course of action and follow it to an end requires courage.”

Ralph Waldo Emerson

8.1 INTRODUCTION

The following chapter brings this study to a close. This chapter will present a broad overview of the structure and content of the overall research study presented, before attention is drawn to the study’s key literature gaps and research question, which together represented the motivation of the research agenda. Following on from this an overview of the principal conclusions arising from this research is presented with particular attention to the findings showcasing two strategy processes in TTOs, first introduced in chapter six, then extensively analysed in chapter seven and here provides an illustration of the key contributions of the study. More specifically, the conclusions arising from each of the three sub research questions are integrated together culminating in a comprehensive description of contributions of the study. Moreover, in light of those contributions, the associated implications for practice, and future research agendas are outlined. Finally, before concluding comments for the study are presented, a number of implications arising from the research methodology are presented.

8.2 STUDY OVERVIEW – STRUCTURE AND CONTENT OF THE RESEARCH AGENDA

Having begun with the broad overview of the study, the opening chapters, two and three of this study focused on a number of gaps pertaining to the literature on TTOs and strategy process. Following on from this, details of the research
methodology were outlined in chapter four. More specifically, this chapter rationalised the study’s qualitative research design, and offered details of the study’s primary research instrument, together with a broad overview of data collection and analytical procedures employed, and the key limitations associated with the research. In employing primary and secondary data sources, chapter five, which then followed provided an extensive overview of the strategic context of TTOs, incorporated the external environment, the culture, purpose of TTOs and also presented an introduction to the TTOs. The significance and commonalities across each of these cases were effectively captured and organised to present findings, addressing the extent to which TTOs engage in strategy process, which was outlined in chapter six. Finally, in being guided by and contrasted with relevant TTO and strategy process literature, the study’s discussion chapter, chapter seven, applied the research findings by sub research questions in addressing the primary research question of the study. As outlined above, the present chapter serves to re-emphasise the key contributions and implications arising from the study, and to draw the overall research agenda to a close.

8.3 Research Gaps and Objectives

Rooted in the national innovation systems perspective (Lundvall, 1992), this research argues its support for the view that universities, through their TTOs have an increased role to play in their national economic development. This research is more significant than ever as policy-makers turn to universities as a vehicle for energizing our national economy and society (Forfas, 2004, 2006, OECD, 2006). The evolution of the university’s role in national innovation systems has lately received increasing attention in international academic circles, with emphasis on its role in stimulating and sustaining national and regional economic growth. Universities in leading economies have adopted economic development as a third mission, along with the traditional objectives of teaching and research, directly leading to the inception of a TTO as a facilitator of technology transfer activity in a boundary spanning role (Siegel et
al, 2004, Etzkowitz, 2003c). A number of gaps pertaining to the field of TTO and strategy process were found.

8.3.1 TTO Literature Gaps

In a comprehensive literature review Rothaermel et al, (2007) noted that there is no consensus on what is the role of the TTO, with significant debate having taken place to understand the nature and role of TTO in the triple helix of stakeholders (Sanders and Miller, 2010, Markman et al, 2009, Etzkowitz, 2003c). While the general topic of technology transfer has a distinctive contemporary relevance and importance, the topic would benefit from a clearer and deeper consideration of its theoretical antecedents (Rothaermel et al, 2007). Therefore, the aim of the study was to contribute to the understanding of strategy process in TTOs and to deliver an understanding and appreciation of the competing schools of thought. Rothaermal et al. (2007) in their review of the technology transfer field differentiate between the two schools of thought as, “some argue that a TTOs role includes establishing a link between the university and industry (…), while others suggest that scientists in universities and industry are embedded in the same formal and informal networks thus limiting the TTOs role in facilitating these relationships (…)” (Rothaermal et al., 2007: 58). Such a lack of an overarching theory on the role of the TTO resulted in several calls for a greater understanding of the TTO, and the need to look at the TTO from a strategic perspective (Siegel et al, 2008). TTOs are being asked to play a strategic role (Jones et al, 1999), yet there had been no empirical studies looking at TTOs from a strategic perspective. This study has begun to address this deficiency for the first time.

Secondly, given the relatively limited number of prior studies into the ‘black box’ of the TTO (Sanders and Miller, 2010), the inclusion of strategy process variables enhances the existing TTO literature, constrained by its quantitative, economic modelling research designs to generate causality in the effectiveness of TTOs that contribute little to an understanding of how and why TTOs
behave the way they do and more importantly how they interact with key actors in the technology transfer process.

8.3.2 Strategy Process Literature Gaps

With regard to the level of analysis at which strategy studies have looked at, attention was drawn to explore strategy process within a new institutional setting. However, not much systematic research has focused on the actual activities and actors involved in the creation and development of completely new strategies (Hutzrencheberg and Kleindist, 2006). More specifically, while accepting that the concept of strategy process can be vague and complex to study (Langley, 1989), there is a need to understand in more detail the application of strategy process to a hybrid organisation which acts as a boundary spanner between industry, academic and government entities (Sanders and Miller, 2010).

Furthermore, there have been significant calls from the strategy process literature with the theorists arguing that there is an opportunity to use existing strategy process theories in new settings, to learn more about the seminal theories, and to understand why ‘the classics’ are the classics and so the future strategy process studies should reinforce the concepts of the strategy process studies to date rather than just keep reinventing the wheel by creating new frameworks (Hutzrencheberg and Kleindist, 2006).

The final gap which was uncovered in the literature came about after it was observed that there were increasing calls to study strategy process in the environment of a university (Ferlie, 1992). Moreover, Mintzberg (1979) argued that in a professional bureaucracy such as a university, there is a need to understand what they do and understand the processes of strategy. Table 8.1 presents an overview of the key gaps uncovered in the fields of TTOs, and of strategy process.
To reiterate, following examination of the TTO and the strategy process literature, a significant degree of overlap in some of the core criticisms within both fields came to light. More specifically it came to light that many strategy process studies were lacking the context of the university sector, while the majority of studies on TTOs failed to appropriately encapsulate or serve the subject of strategy (Buckland, 2009; Warren et al, 2008). Consequently, the decision followed to study one within the context of the other. By undertaking such a study it is envisaged that the research findings will firstly enhance our understanding of the strategy process concept, and offer greater insights into how a new boundary spanning organisation engages with strategy process within a specific context. Secondly, it will improve our understanding to the extent that TTOs engage with strategy process, thus contributing to both our theoretical understanding of the TTOs and to the potential development of key principles for TTOs to consider when they are engaging with strategy process.

Finally, it can be recalled that this was a qualitative study which employed case study method. Motivating the decision to undertake such a study was the belief that, in more explicitly investigating the activities, actors and processes of the TTO, we could make great strides in our knowledge and understanding of ‘how’ the TTO operates. Table 8.1 offers an overview of the research gaps identified.
Table 8.1: Overview of Research Gaps Identified

<table>
<thead>
<tr>
<th>TTO- Key Gaps Identified</th>
</tr>
</thead>
<tbody>
<tr>
<td>➢ Significant Calls To Address The Gaps Of The Lack Of Strategy Studies In The TTO (Phan And Siegel, 2006; Siegel Et Al, 2008)</td>
</tr>
<tr>
<td>➢ Understanding Of How And Why Ttos As A Boundary Spanning Organisation Behave The Way They Do (Sanders And Miller, 2010, Rothaermel Et Al, 2007)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Strategy Process- Key Gaps identified</th>
</tr>
</thead>
<tbody>
<tr>
<td>➢ Strategy Process Theories Are Vague And Complex (Langley, 1999)</td>
</tr>
<tr>
<td>➢ University Setting Has Been Neglected From A Strategy Process Perspective. (Buckland, 2009, Ferlie, 1992)</td>
</tr>
<tr>
<td>➢ Not Much Systematic Research Has Focused On The Actual Activities And Actors Involved In The Creation And Development Of Completely New Strategies (Hutzrencheberg And Kleindist, 2006)</td>
</tr>
<tr>
<td>➢ Understand Why ‘The Classics’ Are The Classics (Hutzrencheberg And Kleindist, 2006)</td>
</tr>
<tr>
<td>➢ There Is A Need To Understand In More Detail The Application Of Strategy Process To A Boundary Spanning Organisation ( Sanders And Miller, 2010) And A Professional Bureaucracy ( Mintzberg, 1997)</td>
</tr>
</tbody>
</table>

In pursuing these gaps, the researcher devised both an overarching question to guide the study and related research questions to frame the research agenda and provide structure for the subsequent reporting of research results as indicated in table 8.2.
Table 8.2: Overview of Research Questions

<table>
<thead>
<tr>
<th>Principal Research Question</th>
<th>To what extent do TTOs engage in strategy process?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub Research Question 1</td>
<td>How do TTOs formulate strategy?</td>
</tr>
<tr>
<td>Sub Research Question 2</td>
<td>How do key actors influence TTO strategy process?</td>
</tr>
<tr>
<td>Sub Research Question 3</td>
<td>How are Strategic Outcomes of the TTO shaped by TTO strategy, process and context?</td>
</tr>
</tbody>
</table>

8.4 KEY CONCLUSIONS OF RESEARCH

The review of the literature and subsequent gaps identified provided compelling reason to delve into TTOs and understand the extent to which they engage in strategy process. This section presents the key conclusions emerging from the research as per the three research questions studies.

8.4.1 Key conclusions of the Overarching Research Question

Key conclusions of the overarching research question are in response to Pettigrew (1992) who argues for more process thinking in research on strategic organisation. Due to external pressures from stakeholders such as the academic scientist, university management, policy makers and industry entrepreneurs, TTOs are under pressure to rethink strategy and organisation more than ever before. The intertwining of deliberate and emergent into a realised strategy is crucial to understanding strategy processes, and how actors are involved and how influential external conditions and demands shape the process. Mintzberg applies the term deliberate to strategies that are first formulated internally, and then implemented, contrasting them to “emergent” processes that form gradually through a learning process, usually in response to external forces. As the study considered strategy as a pattern of decisions, it emerged that strategies in TTOs can be deliberate and emergent. Specifically, on one side
strategies are formed by the TTSI and imposed on the TTOs, and on the other side, strategies are formed by the TTO themselves who have gained autonomy, legitimacy and commitment from their stakeholders. Furthermore, the majority of TTOs have an emergent strategy as they respond to external environment demands to engaged in strategy process when they responded to the calls of the TTSI. The outliers engaged in an umbrella strategy, which are both “partly deliberate and partly emergent”, combining deliberation and control with the emergence of flexibility and learning (Mintzberg 1987: 31). This process is very subtle, as a balance must be found between managing stakeholders as a boundary spanning organisation and pursuing individual strategies for the organisations. The subtle dichotomy in strategy process was categorised as strategy makers and strategy taker, depicting the extent to which the TTOs engage in strategy process. The key conclusions of each research question will be outlined as per the strategy maker and strategy taker dichotomy.

8.4.2 Key conclusions of Research Question One

From the analysis of the findings, the study showed that the antecedents for planning were homogenous for all TTOs. However from the analysis of the pattern of activities, leading to strategic outcomes, there was considerable variance between strategy makers and strategy takers.

**Strategy Takers**: The strategy process in these cases is highly descriptive aimed at seeking legitimacy and gaining commitment from the various actors involved in the process. The TTOs reacting to internal pressure for legitimacy lend to conforming of norms of managerial professionalism as strategy takers engage in planning for show (Mintzberg, 1997). Furthermore, they adopt a laissez faire approach to resource appropriation and allocation, lack an alignment to university and have a predominant internal and operational focus when assessing best practice supporting the notion of planning for resource acquisition rather than allocation as per Stones and Brook (1996). There is also a lack of clarity in the purpose in mission as per Buckland (2009).
Furthermore, the findings showed that the TTOs are using strategic planning in the search of legitimacy and meaning by key internal stakeholders in the system, by the evolving managerial tier in the universities and by the bureaucracies of funding agencies (Buckland, 2009). Given the multiple actors and agencies and various stakeholders involved in the technology transfer process, the TTOs must respond to external forces, giving credence to the serendipitous nature of the process. This low degree of strategic capability of TTOs to take action autonomously is supported by Cohen et al (1998) who argue that universities as organised anarchies have little autonomy to generate strategy. Furthermore by conforming to such norms, TTOs are seeking secure approval, support and public endorsement, thus increasing their legitimacy (Pfeffer and Salancik, 1978). Because of this, TTOs tend to mimic each other’s strategies which helps explains why the majority of TTOs in the population are strategy takers. Furthermore, analysis of the findings of the study show that TTOs are seeking to confer legitimacy from their stakeholders due to the unique context as they operate as a boundary spanning organisation. Strategy takers are achieving legitimacy by planning as a strategy for resources acquisition rather than a strategy for resource allocation in order to gain commitment from their stakeholders (Stones and Brookes, 1996).

**Strategy Makers:** This grouping employed elements of their own plan for coordination amongst stakeholders which supports Martin (2008) concept that strategy plans may emerge to new strategies. The concept of a strategic plan to communicate internally and externally, with plans being used not only to promote the efforts of insiders but also to seek the tangible as well as moral support of influential outsiders (Mintzberg, 1994) is supported by strategy takers. Furthermore, they identify with European TTO when assessing best practice which supports Bryson (1995) notion of planning for contribution to organisations self concept of sustainability. They focus on getting the right resource appropriation and allocation, thus adopting a balanced and focused action as per Quinn (1989). Also, mission statements are used to communicate long term intent to stakeholders which supports Vinzant and Vinzant (1996) and Baetz and Baetz (1996) that missions are the cornerstone of strategic management. In other words, strategy taking is the means by which TTOs can
become strategic actors. They provide useful descriptions of structures and systems that lead to improved organisational performance.

While it is important to understand the different approaches to strategy process in TTOs, it is even more important to learn of the movements amongst the different approaches, as Sztompka (1991) argues that social reality is not a steady state, but rather a dynamic process, it occurs rather than exists. Analysis of the findings shows that the transition from strategy taker to strategy maker depends on legitimacy. Legitimacy is concerned with meeting the expectations within an organisational field in terms of assumptions, behaviours, and strategies (Pfeffer and Salancik, 1978). The next section will address the key conclusions of Research Question Two.

8.4.3 Key conclusions of Research Question Two

The definition of strategy as a pattern of coherent actions produced by a combination of deliberate and emergent strategies entails of multi actor dimension. In this sense, strategy can be seen as the product of convergence of several actors on common actions at the organisational level. This convergence shouldn’t be regarded as a series of intentional actions by one or two actors, but more as a complex process through which strategy is realised thanks to actors’ alignment in producing organisational actions (Mintzberg, and Waters, 1985).

As indicated in the literature, the TTOs play the role of boundary spanner and as such interact with a multitude of different stakeholders (Siegel et al 2003). During the course of the data collection and analysis of this research agenda, it emerged that the actors were significant to the strategy process. The key actors who emerged in the analysis as significant to the technology transfer process in the Irish University TTOs are TTOs themselves, university management, academics, policy makers and industry (Siegel et al 2004). Analysis of findings
shows the actors who influence the TTO to be internal and external. This supports Freeman (1983) and his account of the multiple stakeholders in the firm. From an internal perspective the VP of Research emerged as the key player. Externally, the actor who was powerful in terms of administrative systems and decision processes was Entreprise Ireland. Specifically the influence of the roles will be outlined as per strategy makers and strategy takers.

**Strategy Takers:** External actor of the Government Agency, Entreprise Ireland is a key influencing role. Internal actors such as academics and university management have less of an influencing role, however it was noted that the role of the VP of Research is growing in influence. These findings show the emergent nature of the activities of the TTO due to the influence of the government agency in strategy takers has led them to be reactive in nature. Therefore, it may be argued that the TTO is inherently unable to deliver on their strategic outcome and is only in a position to articulate strategic potential. Therefore, analysis of the findings shows that the TTO does not have full control of all resources in its capacity as a boundary spanner. Taking this into consideration a strategy taker position might be an optimal approach to take.

**Strategy Makers:** Internal actor of the VP of Research is a key influencing role. Also, academic actors have an influencing role due to the TTO having gained their commitment and built a culture of entrepreneurship. External actors such as Enterprise Ireland have less of an influencing role. These findings show planned and emergent nature of the activities of the TTO has led the TTO to have more autonomy, understood as the ability of TTOs to devise their own strategies and implement them without stakeholder intervention. If the TTO has acquired legitimacy and gained commitment from their stakeholders leading them to have autonomy on the strategic direction of the TTO, then taking this into consideration, a strategy maker position might be an optimal approach to take.
8.4.4 Key conclusions of Research Question Three

Strategic outcomes of this study was interpreted as the praxis of the process which details the day to day activities and stakeholder relationships with institutional, organisational and societal contexts is a way of conceptualising the strategic outcomes of the process. Significantly Pettigrew (1992) argues one of the key merits of strategy process research: “strategy process research is capable of generating sound knowledge not only of processes and outcomes but also of why and how outcomes are differentially shaped by processes” (Pettigrew, 1992: 11). While metrics of performance were determined by Enterprise Ireland, their own metric and from manipulation of metrics, the study was concerned with the strategic outcomes which were interpreted as the praxis of the process. Specifically the praxis is concerned with the strategic activities shaping the metrics. A summary of responces are highlighted below.

**Strategy Takers:** Responded to the external demands of Enterprise Ireland who were calling for jobs reflecting once more the strong influence of the external actors for strategy takers.

**Strategy Makers:** Responded to the changing mindset of the academic reflecting a strong culture of entrepreneurship which has been build by the strategy makers and also more autonomy in the process to respond to internal stakeholders.

8.5 Contribution of Research

An overview of the principal contributions arising from this research is presented. More specifically, the contributions arising from each of the three sub research questions are integrated together culminating in a comprehensive
description of the significant contributions to the TTO literature, TTO practice and strategy process literature.

8.5.1 Contribution of Research to TTO theory

The first and foremost significant findings to the TTO theory is the findings, where strategy takers and strategy makers represent the extent to which TTOs engage in strategy process as per antecedents, processes and outcomes. The findings merges core perspectives from multiple disciplines, strategy process and technology transfer, in ways that produce something greater than the simple sum of the discipline based ideas, as argued by Hutzschenreuter and Kleindienst (2006) in their recommendations for high quality research in strategy. The findings show in this study that the antecedents are the same for all TTOs, the analysis of the pattern of activities, leading to strategic outcomes, in other words the strategy process, shows considerable variance between typical cases and outlier cases. So much so that two separate categorisations emerged, namely strategy makers and strategy takers depicting the extent to which the TTOs engage in strategy process. Furthermore, the role of actors and the strategic outcomes contributed to the findings.

Secondly, the findings of the varying influence of key actors contribute to the role of the TTO as a boundary spanner. Boundary spanning skills play a role in allowing the TTO to gain commitment and acquire legitimacy from the stakeholders. This contributes to research by Sanders and Miller (2010), who argue the TTO solicits both academics and industry and reframes the norms of academia, performing boundary maintenance and partial accommodation. The findings of this study show boundary spanning skills were developed through vast experience working and dealing as well as negotiating with different levels of people, coming from different environments, which means they have gained this ability through ‘learning by doing’.
Thirdly, the findings of this study, in relation to the strategy process of the TTO, sit well with the central tenets of Warren et al, (2008) which acknowledge if TTOs are to become more of a strategic entity, they need to be aligned to the direction of the university. The recent study by Grimaldi et al, (2011) confirms this also. While the majority of cases are strategy takers, the outliers as strategy takers denote TTOs can play a strategic role. Therefore it is argued that TTOs should to be aligned with the university to be considered strategic actor. Finally, the variability in agenda setting findings confirm Bercowtiz et al (2008) findings who stress the heterogeneity of the TTOs and argue that there cannot be an ideal practice due to differences in contextual histories and structures of the TTOs. The findings ultimately address the calls from the TTO literature appealing for research into what the TTO actually does, addressing the ‘Black Box’ inside the TTO (Sanders and Miller, 2010). Furthermore, the study contributes to the call by Rothaermal et al (2007) in their comprehensive review of the TTO literature to establish a research agenda requesting more processual studies of TTOs. In summary, the study contributes alternative theoretical perspectives to help TTO scholars and practitioners understand the complexities and contribution of a TTO.

8.5.2 Contribution of Research to TTO practice

Firstly, the study was validated by using the full population of seven Irish university TTOs in the study and so the findings produced are of interest to the TTO community. Furthermore as well as primary interview data, the findings were enhanced by other activities such as AUTM, and Technology Transfer Society to discuss the findings of the research with leaders in the academic and practitioner fields; participating in discussions on Spin-in, an international linked in group dedicated to addressing TTO issues debates. Given the in-depth approach to the findings, the researcher is confident that the findings are salient to the TTO practitioner.
Secondly, with regard to understanding how TTOs can engage in strategy process, the findings of this research will serve to help the TTOs as there is an appreciation from the study that the relationship between universities and industry remains one characterised by ideological differences. Given the unique role TTOs play as a hybrid boundary spanning organisation, how these institutions engage with strategy process is a central ingredient to the practice of TTOs. Specifically, the lack of alignment of TTOs to the university, the defunct role of the mission statement as a strategic artefact represent a ‘muddling through’ process for the TTOs as they attempt to deliver strategic outcomes for the university without a clear agenda or support from the university in the cases of strategy takers (Lindblom, 1959). Thus the findings of the study offers an appreciation of the challenges of the TTO environment and by also by offering guiding principles that the TTO can use to overcome the challenges and adopt strategy processes in their organisations to become strategy makers.

8.5.3 Contribution of Research to Strategy Process theory

First of all, the study introduced the concept of strategy process to a new setting of TTO. In terms of strategy processes, the findings paid particular attention towards the importance of strategy formulation, role of actors and outcomes as per Pettigrew’s (1992) recommendation for strategy process research. Specifically, analysis of the findings show that TTOs can be strategy makers where they have acquired legitimacy and gained commitment from stakeholders, where they are aligned to the university in their planning processes and where they have autonomy in their strategic outcomes (Stones and Brookes, 1996).

Secondly, in relation to the role of the mission statement, there was a clear role for the mission in the sense that Baetz and Bart (1996) talked about mission as a clear articulation of the long term intent of an organisation for the strategy makers. However in the case of strategy takers, the mission statement
supported the notion put forward by Buckland (2009): “The blandness, similarity and empty contents of mission statements, visions, aspirations across the university sector is making the variation in institutional context, histories, resources, capabilities and by an almost universal search for excellence in things (2009, 531).

Thirdly, by addressing the strategic outcomes of TTOs the findings explored how and why variations in context and process shape variability in the observed performance strategic outcomes across a comparative investigation of the full sample of TTOs. The ability to link outcomes with precursor actions and decisions is essential to strategy process research as without it, process research is of little value to practitioners (Pettigrew, 1992). Therefore, in order to understand the strategy process more fully, the study focused on patterns of decisions and actions that accumulate over time into a strategy and results in strategic outcomes. Table 8.3 presents the originality of the research by summarising the contribution of the study. The next section will address the methodological implications and future research agenda proposals.
Table 8.3 Originality of the research as presented by the contribution of the study

<table>
<thead>
<tr>
<th>Area</th>
<th>Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>TTO Theory</td>
<td>➢ The role of the TTO as a boundary spanner characterised by variances in influencing roles of key actors</td>
</tr>
<tr>
<td></td>
<td>➢ Confirmation of the heterogeneity of the TTOs and argue that there cannot be an ideal practice due to differences complexities of process and the role of actors in the TTO (Bercowitz et al, 2001)</td>
</tr>
<tr>
<td></td>
<td>➢ Addressing the ‘Black Box’ inside the TTO (Sanders and Miller, 2010). Furthermore, the study contributes to the call by Rothaermal et al (2007) for more process studies</td>
</tr>
<tr>
<td>TTO Practice</td>
<td>➢ In depth practical findings salient to the TTO practitioner.</td>
</tr>
<tr>
<td>Strategy Process Theory</td>
<td>➢ Addressing the strategic outcomes of TTOs the findings explored how and why variations in context and process shape variability in the observed performance strategic outcomes across a comparative investigation of the full sample of TTOs</td>
</tr>
<tr>
<td></td>
<td>➢ Accounted the what, how and why of the links between antecedents, processes and outcomes as per Pettigrew (1992) guiding influence</td>
</tr>
<tr>
<td></td>
<td>➢ Explored strategy process in a ‘professional bureaucracy’ (Mintzberg, 1997) and a boundary spanning organisation thus contributing to conducting strategy process in different contexts to understand why the ‘classics and the classics’ as per Hutzrencheberg and Kleindist, 2006 recommendation</td>
</tr>
</tbody>
</table>
8.6 Implications for Research Methodologies and Future Research Agenda

The following section outlines implications for research methodologies and future research agenda.

8.6.1 Implications for Research Methodology

In light of the findings that have emerged from this research agenda, a number of methodological implications have arisen specifically relating to engaging in strategy process research which are documented within the following subsection.

8.6.1.1 Challenge of Process Research

When thinking processually, the aim is to make static concepts dynamic, employing techniques such as converting nouns into verbs (Langley, 1999). For example this study was not concerned with strategy content per say but on strategizing, how TTOs do strategy and how they engage in strategy. The aim also was to study the phenomena as close to real time as possible to capture the process as it happens. The study achieved this by examining the TTOs in the data collection period of 18 months. There was also an appreciation when designing this research that context is part of the phenomena in a process of endogenising everything. The researcher recognised that context is not outside the phenomena but co-evolves with it and through it. Therefore the researcher decided to interview key stakeholders to the process along with TTO professionals.

Also, in regards outcomes, following theoretical underpinnings of process theory, the research treated an outcome as merely a temporary halt on the way
to somewhere else in the constant pattern of strategy process. For example, the research looked at the changing outcomes and treated outcomes as inputs to action. For example, the researcher looked at performance as the process of performing and changing from licenses to spin-outs and questions the influencers behind this process. The challenge is to research processes, without drowning in them. One way to do this is to tell stories from multiple viewpoints (Langley, 1999). Taking this into account, a feasible research method to employ is ethnography. The researcher recognises that asking people what happened is not as good as living through the process with the participants.

However the researcher counteracted this by engaging in non participant observation, using multiple stories from policy makers, attending industry days, engaging in LinkedIn discussions with leaders in the field, and attending the leading practitioner conference in the technology transfer space, Association of University Technology Managers annual meeting. Another challenge with conducting process research lies in the interpretation of what is a process. There are many different types of processes and more significantly there are many different interpretations of what is a process. However, it is important to define at the beginning of the study the interpretation of process that the study is taking. This study interprets strategy process as ‘not just the sequence of events or telling the story, but to identify patterns in the process across carefully selected case studies’ (Pettigrew, 1992: 8). The study then proceeded to code and analyse the data along this interpretation of process encapsulating the antecedents, process and outcomes to define the most interesting findings about the phenomena and in doing to ‘capture reality in flight’ (Pettigrew, 1992: 15).

Process research allows scholars to work with people and voice their directly felt experience. As a process researcher, gaps in the analysis must be tolerated as there will not be complete scenes in models of findings (Langley, 1999). However, while process research is indeed difficult, the researcher found the
process to be fulfilling as she tried to convince the reader why her interpretation of how TTOs engage in strategy process is an interesting contribution to the field of strategy process and technology transfer.

8.6.2 Future Research Agenda

The findings of this study indicate how TTOs engage in strategy process as strategy makers and strategy takers. Strategy takers engage in planning process to acquire legitimacy and gain commitment from stakeholders as a normative activity, they are strongly influenced by actors in the process, in particular relating to their strategic outcomes. On the other hand, strategy makers have moved beyond planning to gain commitment and acquire legitimacy for their success as generated an identity on campus amongst the actors in the process. They engage in planning to plan for the future, have more of a presence amongst actors in the process and have more control over their outcomes. It is anticipated that the findings and approach used here will spur other researchers to further elaborate, this study which will be show how TTOs engage in strategy process over a longer period of time, in different international contexts, ultimately seeking to explore how contextual factors play a role in the capability of the TTO to be a strategic influencer in the commercialisation of university technology transfer process.

Also, in an Irish context a future research idea may be to undertake a replica study of this study in eighteen to twenty four months time and in doing so explore the extent to which the TTOs have embraced strategy processes to become more of strategy makers than takers. This would be an opportunity for TTO scholars to learn how effective the analysis of this study was in capturing the strategy processes of the TTO.

Furthermore, this research would benefit a further micro detail study incorporating a more micro focus such as a strategy as practice lens. Strategy-
as-Practice focuses on what actors do rather than what an organisation has (Johnson et al., 2003, Whittington, 2006). Strategy-as-Practice research thus raises the question how, if at all, human action in organisation is structured and how strategy making is implicated in ongoing and organised practices (Chia, 2004, Chia and MacKay, 2007). In other words, it’s all about the people and the practices, not organisational intentions. According to strategy-as-practice theory, these elements represent an entry into the study of strategizing and implementation activities that differ from the many traditional top-down approaches (Johnson et al, 2003). In other words, strategy-as-practice approaches seek to relate micro-phenomena to the wider social contexts in which they are embedded, thus providing a much-needed social responsibility aspect to planning and implementation and indeed would be an interesting area of analysis to apply to the TTOs.

Finally, considering universities are unclear about their third mission objectives and have unrealistic expectations of how to manage this activity, new research into business models can be suggested as a final area worthy of further research. The processes and management activities in TTO are increasingly important for both practitioners and policy makers. Above all, given the celerity of TTO growth there is a need for longitudinal analysis of these business models. From this research study there is strong evidence of variability in TTO strategy processes in two of the cases (Charlie and Echo). These are very different cases, in terms of size, age and institutional characteristics. This raises a multitude of interesting research questions around more micro level concepts that might explain such variance, such as culture, leadership styles of TTO Director, and the impact of academic entrepreneur incentives on university industry engagement. Research into such factors could usefully add to the body of knowledge about the changing contexts of university industry relationships and the factors likely to be important for strengthening the productivity of such relationships, incorporating hard and soft measures of output.
This research laid down explicit objectives, outlined in chapter one, which were to explore the extent to which the TTO engaged in strategy process. The theoretical and empirical rationale was outlined in chapters two and three by presenting the core debates in both the technology transfer literature and strategy process literature. A reflection of suitable research methods was presented in chapters four. A strategic positioning of the contextual factors of the technology transfer system relevant to the Irish context was given in chapter five. The strategy process of the individual TTOs was outlined in chapter six, and the discussion of the implications of these findings in chapters seven, concluding in this chapter eight.

In drawing this research agenda to a close, this chapter has served to offer a general overview and reminder of the structure and content of the study, and to re-emphasise a number of key points pertaining to the overall research agenda. More specifically, attention was again drawn to the complimentary gaps identified in the TTO and strategy process literature, before the key objectives, principal question and research methods of the study was reiterated. Following on from this, an overview of the key conclusions emerging from both the study’s findings and subsequent discussions were presented. Together, these concluding points served to offer a comprehensive response to the principal research question of this study. As originally anticipated, the study includes a number of unique theoretical contributions and implications for TTO practice that warrant further attention.

With regard to understanding how TTOs can engage in strategy process, the findings of this research culminated in guiding principles to guide TTO practitioners. In terms of strategy processes, the guiding principles paid particular attention towards the importance to antecedents, processes and outcomes of strategy process. While some of the processes by TTOs varied, broadly speaking the contributions offered did have enough similarities in
order to group the similarities. In terms of a direct theoretical contribution, whilst a definitive or overarching TTO strategy theory has yet to be established in this field, this study has suggested that TTOs undertaking strategy processes will inevitable involve planning amongst a group of conflicting stakeholders followed by implementation and changing outcomes, heavily influenced by context of the university and national government direction. Finally in terms of contributing to the research on the TTO strategy process, this study has been particularly fruitful. In approaching the subject of the TTO from the perspective of strategy, the findings of this study suggest that the TTO can be considered a strategic actor. More specifically, it is the view of this research that delving into planning and actors in the technology transfer university technology transfer process has uncovered rich details pertaining to strategy formulation underpinning the field’s present understanding of TTOs


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Massachusetts: National Bureau Of Economic Research. 52 Emerging Landscape


APPENDIX A: ACADEMY OF MANAGEMENT 2011
REVIEWER COMMENTS

Paper Title: Strategy Formulation in Technology Transfer Offices
(#15762; status: Accept)

Comment from Reviewer 1

“TTOs perform a vital link role in today's higher education institutions, bridging the intellectual property generated with the real world. This research is useful as it highlights the lacunae in TTO design and implementation that may prove useful in making the TTO model more effective”.

Comment from Reviewer 2

“Importance and generalizability of the core concept: The concept of strategy formulation in academia and specifically in TTOs is considerably important for both academic and industry sides and is also a general one as well”. “Internal consistency: In the article, previous studies on the same concept are taken as a base for the study and in order to develop these further, data from full sample of Irish universities is collected, thus it can be concluded that this data set is naturally representative and valid. The methodology of interviewing is relevant and appropriate in this study and is applied correctly. The research questions are clearly set and the findings are stated rationally. Therefore, the study can be considered as having both reliability and validity.”

“Crafting: The structuring and the flow of the article is unproblematic and logical, the transitions and the subsequence between sections are rational and relevant. There are also very little grammatical errors and footnote or reference list problems, which together indicate that the authors have spent considerable effort to prepare a diligent article in terms of technical writing requirements.”

Comment from Reviewer 3

“This is an interesting paper that has application to research universities in other countries as well as to the larger research issue of shared goals within any organization’s strategy formulation. The current economic crisis for public universities has made the issue of how universities can partner with
corporations in technology transfer even more important to the financial health of those universities”.

“The logic behind the study is compelling. The power/interest grid is an appropriate research matrix since TTOs differ in size, age, and importance, from one university to another. The case study method allows for the in-depth data collection that could produce a model for the future strategy formulation.”

“The paper is organized such that the data from the interviews is used to show alignment or nonalignment around the key forces and roles. Quotations are used successfully to demonstrate the differences from one case to another. The mission statement analysis is a method that is easily transferable to other universities and organisations”.

“The paper is clearly developed and written. The research is clearly explained both in its current importance and in its use of methods for considering variables such as method of funding and maturity. “

“The paper will spur interest in evaluating the effectiveness of TTOs in research universities in other countries. One possibility might be evaluating the strategic alignment of those universities who have effective TTOs, as measured by those elements mentioned from the sources on p. 3”

Reviewer 4

“Thank you for your submission to the 2011 AOM annual meeting. I found the topic you selected to be an interesting one and appreciate the time and effort that went in to preparing this submission. On a structural note, I would suggest dividing the paper into two, by hiving off the parts related to stakeholders as key actors in formulating TTO strategy and by being more explicit in defining your central research question.”
APPENDIX B: CALL FOR PROPOSALS TO STRENGTHEN TECHNOLOGY TRANSFER OFFICES IN HIGHER EDUCATION INSTITUTIONS

May 2006

Invitation for Proposals on

Strengthening Technology Transfer Offices in Higher Education Institutions

1. Overview

Over recent years the State has committed very significant investment into Higher Education R&D through the Higher Education Authority, Enterprise Ireland and Science Foundation Ireland. This investment will have a major impact on the development of the skill base needed to drive the economy forward. It also has the potential to make a more direct economic impact through the commercialisation of research results that have real market potential. In order to maximise the economic benefit from this investment, it is of critical importance that investment in the resources dedicated to the technology transfer (TT) process is increased commensurately. The whole issue of technology transfer must become the expected “3rd stream” of legitimate activity for researchers across the system and the Higher Education Institutes (HEI) themselves. This will require a radical change in systems, procedures, culture and skills.

The technology transfer system should not be seen in isolation, but as an integral part of the research environment. It should be emphasised at the outset that TT strategies must be in line with and fully integrated into, the institutions development and strategic plans and reflect a high level of institutional support.

The objective of this invitation for proposals is to increase the level and quality of intellectual property (IP) transferred from research in Higher Education Institutions and to facilitate the development of high quality and effective systems and policies to
ensure that the IP is identified, protected and transferred, where possible, into companies in Ireland. This will be achieved by the provision, by competitive tender, of support for human resources with expertise and experience, particularly industrial experience, in technology transfer, licensing and relevant aspects of business development and their associated costs.

The present call is open to single institutions or to collaborations between institutions. In order to be eligible applicants must have a significant flow of research funds, and demonstrate that the addition of resources will lead to a radical enhancement of the IP protection, transfer of technology and technology commercialisation arising from research. It is intended that there be further calls early in 2007 and also 2008. It is acceptable for colleges to apply in subsequent rounds for further resources if they can demonstrate significant progress and show how additional funding will address the central objective of this call. The calls in 2007 and 2008 will both close at the end of the first quarter and further details will be made available at least three months before.

In the present context, Technology Transfer is taken to mean the formal transfer of rights to use and commercialise discoveries and innovations resulting from scientific research to another party. Commercialisation brings wide-ranging benefits to the economy as a whole:

- To the institution, Technology Transfer gives the academic community the opportunity to have a positive impact on the marketplace and enjoy financial reward. As well as an economic role, TT can enrich training, provide a basis to develop and deepen industrial linkages and collaborations and increase an institutions’ profile;
- To the industrial community, technology transfer gives the private, for-profit sector the means to tap the very significant world of new discovery found in the academic laboratory, a process that should also have a positive influence on research strategies within institutions;
- To the economy as a whole, it is seen that investment in high quality research can bring tangible benefits above and beyond the supply of quality graduates and post graduates.

Industry dealing with the academic research system expects to be treated with professionalism and while there will inevitably be a level of “healthy” tension between the partners as in any deal making, the company should expect clarity to the approach that the college is taking. Equally the college should be in a position to make all best efforts to see the technology generated from publicly funded research exploited to the benefit of the Irish economy.
2. The Model for the Future

A working group comprising representatives of the Department of Enterprise, Trade and Employment and the Department of Education and Science was established to review issues of Technology Transfer in the light of the investment in research infrastructure that has taken place and that is likely to be part of future national plans. A recommendation emerging from that Group was that Technology Transfer Offices in research performing institutions should be strengthened to form the backbone of the national commercialisation infrastructure. The Group also felt that a measured approach should be taken to building resources in line with the growing level of IP being generated. While it was concluded that each institution should have its own resources, it was also felt that there is a need for them to have access to further specialist expertise and networks to support them in their work.

While each college will have its own strategy and approach, it is broadly envisaged that TTOs would be staffed by individuals with experience, particularly industrial experience, in Technology Transfer and specific domain knowledge.

In the context of delivering, where possible, exploitation of technology emerging from research in the Irish economy the responsibilities of the HEI include the following:

1. Monitor on-going research within the college to identify IP with commercial value, including the assessment of the likely value of the technology arising;
2. Establish and operate the processes involved in the protection and exploitation of IP;
3. Negotiate with industry and make deals in a consistent, clear manner. This would include an openness to working with companies with portfolios of IP to add value to the benefit both of the HEI and the company;
4. Ensure appropriate policies and systems are in place to capture and manage IP
5. Be pro-active in educating all research personnel on IP and related issues
6. Develop campus company development programmes to increase the quantity and quality of spin off enterprises, including support for spin-out company and High Potential Start-up (HPSU) formation
7. Facilitate and support identification of management teams for start-ups and HPSUs
8. Manage and support collaborative linkages with industry
9. Work closely with the Enterprise Ireland team, including at organised events to highlight the expertise and the available technology opportunities of the University.
10. Filter and re-direct enquiries to Enterprise Ireland from external organisations, individuals or companies, which cannot be undertaken by the research groups of that HEI but which may be appropriate for another HEI.
It is expected that recipients of funding will be required to produce an annual TT report, outlining progress on agreed targets.

The college TT offices must take advantage of their location on campus to promote improved relations with the laboratory staff (including incentive programs and royalty sharing policies), to ensure all relevant technologies within the laboratories are captured in the TT process, as well as promoting interdisciplinary communication (both within the institute and inter-institute). The campus TT office is the frontline for disclosures, IP identification, protection and prosecutions, particularly since the recent codes of practice reinforce the position of institutions in owning the intellectual property arising from their researcher’s activities. These offices also need to enforce all other relevant institutional policies such as Good Laboratory Practice notebooks, publication, confidentiality, licences, collaborative agreements and policies regarding spin-out companies.

Enterprise Ireland expects successful applicant colleges to demonstrate tangible commitment to technology transfer and to put significant effort into the rapid creation of a flexible and effective TT system. A significant criterion in the assessment of proposals will relate to the contribution made by the HEI itself to financing the TT Office.

*A critical success factor will be the location of the technology transfer offices at senior level within the management structure of the college, reflecting the strategic importance of the activity to the work of the HEI.*

There are strong established relationships between TT Offices and Enterprise Ireland in this area, and EI will continue to maintain this unique position. It is envisaged that TTOs will continue to work in partnership with EI in the promotion and commercialisation of funded research and resultant technologies. EI’s role will be to support the rapid development of the technology transfer function in the colleges, to be a source of very specialist skills and to operate cross colleges to bring added value to their efforts. It will use its position to capitalise on its close relationships to the industrial, service and international sectors to add significant value and leverage to the TT offices. It will work in very active collaboration with the college TT offices particularly to promote economic development in Ireland.
In addition to the provision of financial support for applications-driven research through the Commercialisation Fund and financial support for IP protection through the Patent Fund, Enterprise Ireland’s role will also:

1. Provide specialist TT support to all HEIs, in identification, management and exploitation of IP;
2. Support individual emerging start-ups by providing advice, help with obtaining first reference sites and investment funding where appropriate;
3. Link inventions emerging from different universities where bundling of technologies adds significantly to their value;
4. Fund and manage the involvement of private sector specialist service providers where relevant
5. Facilitate the networking of local TTOs to ensure sharing of best practice;
6. Fund and manage initiatives to support continuous professional development of TT staff in TTOs;
7. Facilitate where appropriate consistency and quality in the roll out of TT awareness programmes across HEIs;
8. Stimulate demand by companies (in particular SMEs) for such expertise and commercial opportunities.
9. Support linkages to international organisations involved in technology transfer and knowledge management.

3. Funding

Given the need for significant change, new funding must be seen in the context of each institution putting forward radical and comprehensive plans. Such plans may be rolled out on a staggered basis reflecting the growing demand for TT services and a record of achievement of targets set out in the plan.

Funding decisions will be based competitively on an assessment of a clearly defined strategy, which should be supported by statements of relevant policies. The strategy should cover the following areas:

- How the commercialisation strategy fits in with the overall development strategy of the institution;
- The proposed management structure to be put in place or expanded in line with the achievement of metrics and the request for funding;
- Phasing of staff increases as TT develops and IP increases;
- Clarity on the resources that the institute has already committed to this area and the contribution that it intends to make in the future;
- Metrics of impact, including phased deliverables over the period to 2013;
- The existence and quality of policies and procedures that underpin the commercialisation strategy;
- How the research institution expects to work with Enterprise Ireland in expanding its activity.
The strategy should be coherent with the National Codes of Practice developed to cover the management of Intellectual Property generated from publicly funded research and also that generated with joint industry funding.

Resources allocated will relate to targets set out by institutions in relation to disclosures, licences, spin-offs and movements to industry. A total fund of up to €30m is available to support the present and future calls, reflecting a significant commitment to the development of technology transfer offices on the part of Enterprise Ireland.

It is expected that as the level of effective technology transfer increases, the funding received by HEIs from successful exploitation will also increase. Given that this revenue will be a direct result of the funding provided under this call it will be important for colleges to indicate clearly how this revenue will be deployed. Enterprise Ireland will expect such revenue to be used to support activities consistent with the objectives of this call.

**Hospital Based Researchers**

A significant level of research is carried on within the hospitals affiliated to HE institutions. It is reasonable to assume that there exists a commercial potential to be realised from medically driven research, just as from other disciplines. It is accepted that the development of policies and systems to encourage and manage spin off technology, coherent with the overall approach of the university, requires support. HE institutions and their affiliated hospitals are encouraged to develop joint proposals which ensure effective and active technology transfer out of the research base into industry in Ireland.

**4. Eligible Costs**

In a number of instances, Enterprise Ireland has located its own staff on campus to support the technology transfer function. With the funding for extra dedicated resources under this call, the role of these individuals will change so that they will focus on supporting the exploitation phase of publicly funded research, including working with the researchers undertaking commercialisation projects supported by EI, with a view to maximising the economic impact in Ireland of this research.

Costs supported by the fund will include:
Recruitment and employment of new additional staff of the HEI with appropriate technical expertise and experience of technology transfer (it will be expected that the applicant institution would have already made a commitment to the creation of a senior management position of Director of the Technology Transfer Office). It is critical that these staff should have experience of TT within an industrial context;

- Development of procedures software;
- Training costs for staff of TT offices;
- Essential administrative support;

Where funding from the SFI Overhead Investment Plan has been used to support TT activities, it is expected that this would be phased out over time.

The objectives of this call are to facilitate the creation of a strong and professional technology transfer function in HEIs with significant research activity, where better economic return could be insured through better systems, procedures and, particularly, expertise. Accordingly, new staff costs are the primary eligible costs specified. However, where a case can be made that the objectives of the call can be met through other approaches, such as the use of specialist service providers, related costs will be eligible. It will be a matter for individual HEIs to consider the most appropriate and flexible response.

The phasing of funding will be in line with the rate of development of a critical mass of expertise as the level of activity increases and as agreed metrics are achieved. Equally, the continuation of funding will be contingent on the achievement of agreed metrics. It is envisaged that patent funding costs would continue to be supported under the EI Patent Fund as at present.

5. Proposal Review Criteria

Each proposal will be evaluated ex-ante on the basis:

- The quality and clarity of the commercialisation strategy and its synergy with the overall institutional development strategy
- How it will bring about a radical enhancement of the Technology Transfer process in the institution, including training / awareness initiatives for staff and post graduates;
- The expected scale of impact in terms of patents, licences, disclosures and campus companies;
• How the proposal will address the need for cultural change across the research environment, including in particular the issue of educating researchers early in their career, so that they bring with them a familiarity with commercialisation as they progress through their careers;
• Value for money;
• The demonstrated commitment of the college at the highest levels to implementing the changes proposed;
• The direct financial contribution the HEI will make in terms of cost sharing;
• The clarity of the management structure proposed;
• The track record of the institution in the commercialisation of research outputs to date;
• The clarity of the procedures and processes proposed to identify and capture intellectual property of value arising from research.

The allocation of funding will be determined primarily by the cost of the resources required balanced with the commitment by the college to clear metrics, such as numbers of patents and, particularly, licences agreed and the financial contribution towards cost sharing. The level of staff requested should be consistent with past performance of the college in commercialisation and reflect levels of research funding received.

In terms of ex-post evaluation, impact rather than output will be crucial. For this reason, the following set of primary and secondary metrics are provided as a basis against which success will be measured:

**Primary**

• Technology transfer licences;
• Collaborative R&D agreements;
• Researchers moving to industry as a result of technology transfer agreements;
• Number of disclosures;
• Number of spin-offs.

**Secondary**

• Number of patents filed, number granted;
• Number of researchers involved in patent programmes for the first time;

The views will be sought of researchers within colleges to assess the changing culture and framework of support for TT. Views will also be sought from companies that have engaged with colleges to determine the effectiveness of the investment made under this programme.
A formal ex-post evaluation is expected to take place 2 years after the awarding of finance and further reviews will take place at regular periods thereafter.

6. Evaluation and Review Process

It is intended that an evaluation panel will be created to advise Enterprise Ireland on selection, including experts in commercialisation from overseas. The panel will review the applications provided. Applicants may be asked to make a short presentation to the panel to discuss plans and to answer questions as they arise.

As mentioned above, it is intended that a formal review of progress will be made two years after the approval of funding. At this stage it will be open to HEIs to apply for further supplementary support based on the experience of the achievements seen at that time and the developing need for further resources.

Enterprise Ireland will organise information sessions as appropriate to set out the details of the call, answer questions and be available for consultation.

Proposal Contents

Ten hard copies of the proposal and an emailed copy (to aisling.muldowney@enterprise-ireland.com) must be received by Enterprise Ireland at the address below by 5:00 p.m. on 28th July 2006, and should include the following information:

1. A signed original EI proposal cover sheet signed by an authorised officer of the colleges such as the Vice President responsible for Research, Technology Transfer or equivalent;

2. A 200 word abstract setting out in summary the resources requested and the associated metrics / deliverables expected;

3. A statement of the costs involved including the level of support envisaged by the applicant organisation;
4. A statement of the Commercialisation Strategy of the applicant college, with a clear description of how this strategy will fit within the overall institutional development strategy;

5. The Proposed management structure of the enhanced Technology Transfer Office outlining:
   a. the staff required and the profile of their skills and experience;
   b. the timeline for recruitment over the proposed period of support
   c. the reporting relationships within the Office and in the HEI

6. A work plan setting out:
   a. the proposed activities of the additional staff to be employed,
   b. what activities will be undertaken to put in place significantly enhanced support for researchers,
   c. what is proposed in terms of training or up-skilling of researchers to make them more aware of intellectual property, commercialisation etc.,

7. The existing and additional resources required, to include:
   a. list of staff already engaged in technology transfer or those sanctioned for recruitment;
   b. profile and function of existing and requested staff
   c. justification for additional staff in the context of the level of research already being undertaken
   d. the types of metrics that will be associated with the additional posts

8. The CV of the senior functional person who will have responsibility for the Technology Transfer activity;

9. Outline of proposed budget. It is expected that the continuing operational costs of the additional staff will be borne by the HEI. The following costs will be supported under this call:

   a. details of the costs associated with the recruitment and employment of additional TT staff;
   b. costs associated with essential administrative staff
   c. costs associated with purchase / development of procedures software;
   d. training costs for staff, including travel etc;
   e. other costs (please specify);
   f. proposed use of revenue arising from enhanced TT activity in the future

10. Metrics of Performance. The proposed metrics in terms of the impact of the investment to be made under this call, numbers of licences, patents, disclosures etc. and how these metrics will be measured.
Appendix I – Cover Page

Enterprise Ireland will not release any information received as part of this application except as may be required by law, including the Freedom of Information Act 1997 (as amended from time to time). In the event of an FoI request, the client will be given reasonable advance notice in order to contest such disclosure.

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<thead>
<tr>
<th>Name of Research Institution</th>
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<tbody>
<tr>
<td>Address:</td>
<td>Fax no.:</td>
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<tr>
<td>Contact Name:</td>
<td>Title:</td>
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<td>E-mail address:</td>
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**Summary of Proposal**
DECLARATION AND SIGNATURE

I wish to apply to the competitive fund supporting the strengthening of technology transfer offices.

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<tr>
<th>Signed on behalf of the Research Institute:</th>
<th>Date:</th>
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<tr>
<td>Name and position:</td>
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251
Summary Financial Tables
(see notes below)

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<th>2006 (€)</th>
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<th>2011 (€)</th>
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<td>Additional TT staff</td>
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<td>Training Costs associated with the staff</td>
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<tr>
<td>Administrative Staff costs</td>
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<th>2006 (€)</th>
<th>2007 (€)</th>
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<td><strong>Other Costs (specify)</strong></td>
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<td><strong>College Contribution</strong></td>
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<td><strong>Total Requested Funding</strong></td>
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**Notes:** please provide individual staff costs, working title or level, full-time or number of days/week or month. Detail training costs by type and by staff member.
APPENDIX C: CURRENT TRENDS FROM INTERNATIONAL TTOS

Evidence gathered at AUTM Annual Meeting in 2011 from a panel debate of TTO directors from MIT, Columbia, NYU, Oklahoma.

Question of Metrics

- Money is not the right metric
- Does business think we are a good place to do business?
- “Silence from faculty is top measure”
- No of faculty inventions -> Does faculty see us as doing a good job
- How many repeat VCs?
- What companies were made from TTO help?
- 2/3 great start-ups a year (Yale)
- No of start-ups who have started to get meetings with VC/investor?
- Question is how to you define a start-up

Strategic Choice

- Create as many licences as possible, thereby building up momentum \(\rightarrow\) more shots on goal approach
- More Niche \(\rightarrow\) Cross pollination of ideas of students, faculty and industry
- Purposeful seeking of relationships
- Most exciting opportunity are the joint ideas of medical and engineering school
- Most interesting connections are coming through the TTO

Identity/legitimacy of TTO on campus

- Structurally, TTO sits under the department of strategic planning and economic development

Create academic entrepreneurial ecosystem

- Power of stories, Success breeds success
- Alumni as mentors
- Role-Models become increasingly important, power of influence
- TTO and Business Schools
APPENDIX D: DIRECTOR OF TECHNOLOGY TRANSFER AND INNOVATION JOB SPECIFICATION

TTO has a world-class reputation for research, with an annual research budget in excess of €55m. The Technology Transfer Office (TTO) at the University is responsible for the management and commercialisation of the resulting intellectual property (IP) portfolio of the university via licensing and creation of start-ups, the establishment and development of value creating relationships with industry, entrepreneurs and the financing community and the development of a culture of innovation and entrepreneurship at the University. The TTO has long been recognised as a best-in-class organisation, leading national metrics in areas such as invention disclosures, number of licenses and number of spin-out companies established.

The Director of Technology Transfer and Innovation provides leadership in crafting and executing the university’s innovation and commercialisation strategy with the support of technology transfer professionals. This appointment is of strategic importance to the university and requires an individual with the ability to combine the leadership and strategic capabilities that are necessary to support the technology transfer, commercialisation and innovation activities of a high performing and established research environment. The role requires an individual with forward-looking vision supporting the university’s mission to contribute to the revitalisation of the Irish economy by seeking to support the translation of research outputs into innovative products, processes and services.

Applications are invited from suitably qualified candidates for the post of Director of Technology Transfer and Innovation. The appointee will have:

- A minimum of five years relevant experience at a senior strategic management level, to include business development and commercialisation.
- A track record of developing and implementing strategic initiatives in a busy or complex environment. Excellent leadership skills, with a proven ability to impart vision within an organisation and to lead and manage a high performing team.
- First class communication, presentation, negotiation and influencing skills.
- Energy and ability to deliver results with and through others.
- A degree in a relevant area of science, technology and/or business. A postgraduate qualification (preferably at PhD level) is highly desirable.
- Strong industry knowledge, contacts, network and relationship management experience.
- Experience structuring, problem solving and completing complex business transactions.
## APPENDIX E: SUMMARY OF SEMINAL AUTHORS IN STRATEGY PROCESS DEBATE

| Origins of the Content/Process divide and basics of managerial decision making | Alfred D. Chandler, 1962 *Strategy and Structure*; Chapters in the History of the Industrial Enterprise  
Kenneth A. Andrews, 1971 *The Concepts of Corporate Strategy*  
Herbert A. Simon, 1957, *Administrative Behaviour: A study of decision making*  
Cyert and March, 1963 *A Behavioural Theory of the Firm* |
|---|---|
| The Emergent Vs Deliberate Debate | Henry Mintzberg, 1978, *Patterns in Strategy formulation*  
Henry Mintzberg, 1990 *The Design School: Reconsidering the Basic Premise of Strategic Management*  
Igor Ansoff, 1991, Critique of H Mintzberg’s ‘The Design School: Reconsidering the Basic Premise of Strategic Management’  
Henry Mintzberg, 1991 *Learning 1, Planning 0; Reply to Igor Ansoff*  
Richard Pascale 1984, *Perspectives on Strategy; The real story behind Honda’s Success.*  
Graham T. Allison 1969 *Conceptual Models and the Cuban Missile Crisis* |
Robert Burgelman, 1991 *Intraorganisational Ecology of Strategy Making and* |
<table>
<thead>
<tr>
<th>Topic</th>
<th>References</th>
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<tbody>
<tr>
<td></td>
<td>Robert Burgleman: 2002 Strategy is destiny: How strategy making shapes companies’ future</td>
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<td></td>
<td>Bower and Gilbert, 2005</td>
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<tr>
<td></td>
<td>Noda and Bower, 1996 Strategy making as Integrated processes of Resource Allocation,</td>
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<td></td>
<td>Eisenhardt and Bourgeois, 1988 Politics of Strategic Decision Making in High–Velocity Environments: Towards a min-range theory”</td>
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<tr>
<td>The Process of process research</td>
<td>Kathleen Eisenhardt 1989, Building Theories from Case Study Research, Academy of Management Review</td>
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<td></td>
<td>Andrew M Pettigrew, 1992 The Character and Significance of Strategy Process research</td>
</tr>
<tr>
<td></td>
<td>Andrew Van de Ven, 1992 Suggestions for studying strategy process: A research note</td>
</tr>
</tbody>
</table>
## APPENDIX F: INTERVIEW QUESTIONS

<table>
<thead>
<tr>
<th>Presence of formal strategic plans?</th>
<th>Planned or Emergent strategy formulation?</th>
<th>Role of different stakeholders in strategy formulation</th>
<th>Evidence of strategic formulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q: Have you a strategic plan in place? How did you develop it?</td>
<td>Q: Do you do forecasting into what is in the pipeline? What timeline do you use?</td>
<td>Q: Are there corporate or legal nuances specific to TTO which affect in what way you formulate strategy?</td>
<td>Q: How are choices about strategic direction made?</td>
</tr>
<tr>
<td>Q: Please describe any formal processes that you have for developing your TTO's strategy</td>
<td>Q: Does your strategic plan apply equal weighting to licensing and spin-outs?</td>
<td>Q: Is your IP policy set as part of an overall university policy?</td>
<td>Q: What strategic tools do you employ?</td>
</tr>
<tr>
<td>Q: Do you employ informal processes?</td>
<td>Q: To what extent does the TTO have control to adapt these technology transfer activities?</td>
<td>Q: To what extent does the TTO have control to adapt these technology transfer activities?</td>
<td>Q: Can you show me evidence of strategic planning since 2006</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of processes undertaken in strategy implementation</th>
<th>Communication Processes in strategy implementation</th>
<th>Resource Allocation</th>
<th>Strategy Executors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q: What are the strategic issues that are significant for the TTO at the present time?</td>
<td>Q: How is strategy communicated to TTO officers and stakeholders?</td>
<td>Q: How are resources allocated in the TTO?</td>
<td></td>
</tr>
<tr>
<td>Q: Why did you decide to direct the strategy in a particular way/ manage resources in a particular way?</td>
<td>Q: Were there conflicting strategic priorities among stakeholders?</td>
<td>Q: Why organise the structure of TTO in that way? What is the rationale for the organisation structure?</td>
<td></td>
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<tr>
<td>Q: How has your strategic focus changed over time since the inception of the TTO? What is the reason for this change?</td>
<td>Q: How were the conflicts handled?</td>
<td>Q: Do you strategically collaborate with other TTOs? Reasons for this?</td>
<td></td>
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<tr>
<td>Q: What are the strategic opportunities for the TTO?</td>
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<table>
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<tr>
<th>Impediments to strategy implementation</th>
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<tbody>
<tr>
<td>Q: What are the barriers to strategy at this time?</td>
<td>Q: Tell me about an unsuccessful implementation of strategy?</td>
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<tr>
<td>Q: What, in your opinion, was the reason for this?</td>
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<table>
<thead>
<tr>
<th>Outcomes of strategy process</th>
<th>Final question</th>
<th>Observation of Strategy Process</th>
</tr>
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<tbody>
<tr>
<td>Q: Describe the metrics used by TTO</td>
<td>Q: Is there anything else you would like to tell me or ask me?</td>
<td>Q: Would you give me the opportunity to see what you do on a daily basis...shadowing opportunity</td>
</tr>
<tr>
<td>Q: How suitable do you think the metrics are for valuing the success of the TTO field in general and for your institution?</td>
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<td>Q: Can you recommend people I can talk to: academics? Members of Industry that you are working with?</td>
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<tr>
<td>Q: What do you foresee as the key strategic challenges and opportunities for technology transfer in the future?</td>
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APPENDIX G: ENTERPRISE IRELAND REVIEW

An evaluation was conducted in 2010. Since the units had only been in active operation for a little over two years, the evaluation emphasized organisational and developmental aspects rather than productivity and results, similar to the motivations of this study.

Table G.1: Summary of Key Recommendations from Stakeholder Review

<table>
<thead>
<tr>
<th>Area</th>
<th>Key Recommendations</th>
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| Management Responsibility/ Authority of the Office | • Recommendations were made in some cases regarding strengthening the linkages of the TTO into the institutional management system.                        
  • Recommendations were made in relation to the benefits of having external industry representatives on advisory committees or having a panel of ‘mentors’ available.   
  • While it was good to see the TT functions positioned centrally in the Institutions’ strategic plans and at the right levels in the institutional structure, Panels recommended in most cases that TTOs needed to secure greater levels of practical and financial support from their Institutions for future sustainability of the office. |
| Intellectual Property Policy               | • Strong recommendations were made in most cases that greater clarity was needed on the Institutions’ Conflict of Interest and Conflict of Commitment Policies and that they should also develop associated conflict management plans and processes.  
  • The Panels recommended that IP Policies should be reviewed every few years (e.g. every 2-3 years).  
  • The Panels recommended that the TTOs should negotiate internally to secure some % of royalty revenues to support the TT function. |
| Operations, Processes and Procedures       | • Recommendations were made to encourage and ensure the professional approach of the TTOs is continued and also applied to interactions with the industrial community.  
  • Panels recommended that TTOs should develop a set of criteria to ensure that a licence will only be transferred to individuals with the necessary business and experiential acumen to give the enterprise/technology the best chance of commercial success. |
| Indicators and Reporting/ Metrics          | • Recommendations were made to broaden the range of metrics and to publish them more widely both internally and externally.  
  • The Panels generally recommended that the TTOs need to increase their use of metrics to report successes and to increase visibility and awareness at departmental and institutional level as well as externally.  
  • In particular, TTOs need to track and report PCT filings as a real measure of patenting activity rather than initial filings, and over time should be looking to track products on the market based on their Institutions’ technologies as a measure of impact.  
  • TTOs were encouraged to explore more opportunities to use copyright, trademarks as well as patents as ways to exploit IP assets. |
| Level of Service: Researchers, Industry, External Agencies | • All TTOs were recommended to continue or to commence ‘customer satisfaction’ surveys and to extend it to their industrial clients.  
  • The TTOs were recommended to continue and increase their activities and efforts with their local business community to develop good networks for needs such as business mentoring system for start-ups and spin-outs, local VC and/or angel network particularly outside Dublin, and to make better use of |
| **Communications and Promotions** | • The Panels recommended that with relatively minor levels of adjustments to the content and means of communications, TTOs could significantly improve their visibility and impact.  
• TTOs were encouraged to explore how they could work and pool resources with other TTOs for events, trade fairs, to market technologies together in the most efficient and cost effective way. |
| **Resources and Staffing** | • Panels recommended TTOs to consider the resources around them - e.g. the student population from a variety of disciplines could be tapped into by developing a TT Internship Programme. This mechanism has been used successfully abroad with interns in marketing, legal and other disciplines bringing useful resources to the office at low cost. Templates of how this is set up and works have been supplied by panel members.  
• Recommendations were made for the TTO staff to continue attending relevant trade shows/events and to use every opportunity to get out and build their networks of contacts.  
• TTOs were encouraged to explore with their colleagues in other offices how they could work together to make better use of the resources they have e.g. joint marketing efforts, doing joint tenders for certain services |
APPENDIX H: CORRESPONDENCE TO INTERVIEWEE REQUESTING PARTICIPATION

Dear,

I am currently undertaking doctoral research in the area of strategy and technology transfer at the Centre for Innovation AND Structural Change, in NUI Galway, which is funded under the Programme in Third Level Institutions Cycle 4.

My research specifically looks at university - industry relations from the perspective of the Technology Transfer Office (TTO) and seeks to build on the work of my doctoral supervisor's research on technology transfer, Dr. James Cunningham, Director, Centre for Innovation and Structural Change. My research seeks to understand the day to day activities of the TTO and how they formulate and implement strategy over a period of time. In doing this, I will be hoping to gain insights which will help TTO officers, stakeholders and policy makers involved in the university industry technology transfer process.

As you are one of the key actors in the technology transfer initiative in Irish universities, I would welcome the opportunity to speak with you as part of this research project and elicit your perspectives on some of the key strategic issues relevant in the university industry technology transfer process. The information will be treated in the strictest confidence and your participation in this study is very important to the success of the research project. All findings from the project will be made available to participants.

James and I are hopeful that the research will yield rich observations that will prove useful to technology transfer offices, senior research managers and the various stakeholders involved in public research.

Should you have any further questions on the project, please do not hesitate to contact me directly on 087-2643545 or email at ciara.m.fitzgerald@nuigalway.ie. Alternatively you can contact Dr. James Cunningham.

At your convenience, can you let me know if you are interested in participating in my research project and we can arrange a meeting.

Looking forward to hearing from you and many thanks in advance.

Yours sincerely,

Ciara

Ciara Fitzgerald
Doctoral Researcher
Centre for Innovation and Structural Change
J.E. Cairnes School of Business AND Economics
College of Business, Public Policy and Law
National University of Ireland, Galway
Galway
Ireland

http://www.nuigalway.ie/cisc/people/cfitzgerald.html