An Empirical Analysis into the Underlying Components Impacting Upon Business Incubation Performance of Malaysian ICT Incubators

A thesis submitted in fulfilment of the requirements for the degree of Doctor of Philosophy

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April 2012
Statement of Authorship

I certify that except where due acknowledgement has been made, the work is that of the author alone; the work has not been submitted previously, in whole or in part, to qualify for any other academic award; the content of the thesis is the result of work which has been carried out since the official commencement date of the approved research program; and, any editorial work, paid or unpaid, carried out by a third party is acknowledged.

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Fararishah Abdul Khalid

20 April 2012
Acknowledgements

Alhamdulillah for all His blessings that made this journey possible. Completing this thesis is one of the major achievements of my life, and there are many who should be acknowledged for the role that they have played.

First, it is with immense gratitude that I acknowledge the invaluable supervision of my principal supervisor, Associate Professor David Gilbert. He has been dedicated in guiding me with unwavering support throughout this academic journey. His immense knowledge, optimism, patience, and encouragement have been my source of motivation throughout this journey. I am truly honoured and humbled to have had such a dedicated supervisor.

I acknowledge my second supervisor Dr Afreen Huq who offered significant advice on conducting qualitative research. It has been a pleasure to work with her and she is deserving of recognition for her efforts.

I express my sincere thanks to the RMIT School of Mathematical and Geo-Spatial Science for the statistical analysis aspect of this thesis, and the School of Management for their financial scholarship support which made the pursuit of this higher degree possible. I thank Universiti Teknikal Malaysia Melaka (UTeM) and the Malaysian Ministry of Higher Education (MOHE) for the opportunity to bring an aspiration to reality.

I thank the President of the National Business Incubation Association (NINA), Andrew Wong for his support and I acknowledge the participation of all six incubator managers and 118 incubatees in this study.

Finally, I would like to thank my friends whose acquaintance I cherish.
Dedication

This thesis would have remained a dream had it not been for my husband Amin, who believed that I would one day pursue a doctorate. His unwavering love and support over the course of my research and during my final months of writing have kept me motivated to accomplish this momentous juncture in my life.

To my children Nazim and Aishah, who grew in parallel with this thesis; and Husayn and Sara, who were born mid-way in the PhD journey - they have been a great inspiration and have given me the greatest satisfaction in completing this journey.

This thesis is also dedicated to my parents and parents-in-law for their love, support, and prayers.
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<th>Acronym</th>
<th>Full Form</th>
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<tr>
<td>AABI</td>
<td>Asian Association of Business Incubation</td>
</tr>
<tr>
<td>ANZABI</td>
<td>Australia New Zealand Association of Business Incubators</td>
</tr>
<tr>
<td>BIIA</td>
<td>Business Innovation and Incubation Australia</td>
</tr>
<tr>
<td>BITS</td>
<td>Building on Information Technology Strengths</td>
</tr>
<tr>
<td>CFA</td>
<td>Confirmatory Factor Analysis</td>
</tr>
<tr>
<td>CSES</td>
<td>Centre for Strategy and Evaluation Services</td>
</tr>
<tr>
<td>EPU</td>
<td>Economic Planning Unit</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and Communications Technology</td>
</tr>
<tr>
<td>IHL</td>
<td>Institute of Higher Learning</td>
</tr>
<tr>
<td>IPO</td>
<td>Initial Public Offer</td>
</tr>
<tr>
<td>KOBIA</td>
<td>Korean Business Incubation Association</td>
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<tr>
<td>MAVCAP</td>
<td>Malaysian Venture Capital Management Berhad</td>
</tr>
<tr>
<td>MDeC</td>
<td>Multimedia Development Corporation</td>
</tr>
<tr>
<td>MICTH</td>
<td>Melaka ICT Holdings</td>
</tr>
<tr>
<td>MLR</td>
<td>Multinomial Logistic Regression</td>
</tr>
<tr>
<td>MOSTI</td>
<td>Ministry of Science, Technology and Innovation</td>
</tr>
<tr>
<td>MSC</td>
<td>Multimedia Super Corridor</td>
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<tr>
<td>MTDC</td>
<td>Malaysian Technology Development Corporation</td>
</tr>
<tr>
<td>NBIA</td>
<td>National Business Incubation Association</td>
</tr>
<tr>
<td>NCB</td>
<td>National Computer Board</td>
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<tr>
<td>NINA</td>
<td>National Incubation Network Association</td>
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<tr>
<td>NTBF</td>
<td>New Technology-Based Firm</td>
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<tr>
<td>OECD</td>
<td>Organization for Economic Co-Operation and Development</td>
</tr>
<tr>
<td>PCA</td>
<td>Principal Component Analysis</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>Research and Development</td>
</tr>
<tr>
<td>SIRIM</td>
<td>Standard and Industrial Research Institute of Malaysia</td>
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<tr>
<td>SME</td>
<td>Small and Medium Sized Enterprises</td>
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<td>UKBI</td>
<td>United Kingdom Business Incubators</td>
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ABSTRACT

This thesis examines the influence of Selection Performance, Monitoring and Business Assistance Intensity, Resource Allocation, and Professional Management Services on business incubation performance. This study extends current research (Hackett & Dilts, 2008) by investigating an additional construct which examines targeted areas of professional management services including marketing and promotion (Rice, 1993; Lalkaka, 1997; Scaramuzzi, 2002), strategic management (Agarwal, 2002; Wiggins & Gibson, 2003; O’Neal, 2005), financial management (Lalkaka & Abetti, 1999; Beng Hui, Fernandez & Sio, 2011), and staff and personnel management (Read & Rowe, 2003; Studdard, 2006; Hallam & DeVora, 2009). The literature suggests that limited academic research on incubation development in Malaysia has been undertaken and information regarding business incubation in Malaysia is primarily descriptive providing a limited view of the incubation system. The need for an investigation of the incubation system’s impact, effectiveness, and sustainability has been revealed in the recently announced Tenth Malaysia Plan 2011-2015 (Malaysia Plan, 2011).

The present thesis adopts a mixed-methods approach, incorporating quantitative and qualitative studies. A total of 118 incubatees from all 15 ICT incubators in Malaysia participated in the quantitative study. Items for the questionnaire were derived from a previously conducted study by Hackett and Dilts (2004a, 2008) and prior incubation research. A framework consisting of four independent variables and one dependent variable with four possible outcomes of incubatee performance was developed. An iterative procedure was utilised, consisting of exploratory factor analysis (EFA) and multinominal logistic regression (MLR). The latter statistical technique enabled the researcher to test relationships between the underlying components extracted from the EFA and business incubation performance.

Findings reveal that Selection Performance, Monitoring and Business Assistance Intensity, Resource Allocation, and Professional Management Services are all statistically significant in predicting business incubation performance with significance level all below the .05 level. The strongest predictor came from the interaction of all
four constructs. Further analysis elaborates the prediction capabilities of each extracted component from the EFA on specific categories of business incubation performance.

The qualitative study involves case studies developed from interviews with six ICT incubator managers guided by an interview protocol. Two approaches in presenting the qualitative data were adopted: within-case analysis and cross-case analysis. The within-case analysis presents a thorough review of each ICT incubator, while the purpose of the cross-case analysis is to derive conclusions from a set of cases.

The results of the quantitative and qualitative studies provide useful insights that confirm and in some cases question earlier understandings about the underlying factors impacting on business incubation performance. The findings revealed that implementation of all four constructs from the conceptual framework is essential resulting in positive impacts on business incubation performance.

The significant influence of Selection Performance in enhancing business incubation performance is a key finding of this thesis. ICT incubators would do well to note the nature of the results in regard to Monitoring and Business Assistance Intensity where providing incubatees with comprehensive business assistance is warranted. Additionally, ICT incubators need to be at par with benchmarked incubation practices that aid in the sophistication of technology, e.g. technology labs and networking with technology experts. This facilitates diversity of knowledge and knowledge spill-overs amongst incubatees along with interaction with external key players which could be key towards the products and services being successful. Incubatees’ performance may improve if appropriate resources were made available and easily accessible. The significance of targeted Professional Management Services should be taken into account as results show that incubatees value the services yet the level of implementation of the services generally tended to be poor. Findings from this study provide a clearer understanding of the ICT incubation practices in Malaysia and offer several implications for research, policymakers, and practitioners. The research presents methodological and theoretical contributions to the study of business incubation and a model from which ICT incubation process can be referred to by incubator managers and incubation community in general.
Publications, Conference Presentations, and Awards of the Candidate Originating from the Present Thesis

**Refereed Journal Article**


**Refereed Conference Papers**


**Award**

Runner-up in the School of Management Three Minute Thesis Competition 2010 (presented on 22 July, 2010).
CHAPTER 1

INTRODUCTION

The global shift from labour-intensive economies to knowledge economies has resulted in developing countries like Malaysia changing their strategic priorities to accommodate rapid global change (Ariff & Abu Bakar, 2003; Ramasamy, Chakrabarty & Cheah, 2003; Chong, 2006). The knowledge economies provide fertile ground for the information and communications technology (ICT) sector to bloom. In this sector, small and medium sized enterprises (SMEs) are seen as potential drivers of the Malaysian economy in terms of their capabilities for creating employment, and their contributions to gross domestic product (GDP) and exports. The dynamic nature of SMEs is acknowledged in the literature (Saleh & Ndubisi, 2006a; Hilmi & Ramayah, 2008; Ahmad & Seet, 2009; Che Senik, 2010), where they are seen as the backbone of an economy and as a large contributor to GDP in many developing countries (Saleh & Ndubisi, 2006b; Tang & Llerena, 2007).

As a major source of income—especially in creating employment and being breeding grounds for entrepreneurs, SMEs’ development initiatives, particularly in the ICT industry have become the main agenda for some developing countries (Kotelnikov, 2007), including Malaysia. With the objective to support the development of SMEs, the business incubation movement was initiated in Malaysia in the late 1980s. The substantial investment made by the Malaysian Government to date has seen the formation of 106 incubators nationwide (InfoDev, 2009, 2010; Wong, 2010). Of these, 15 are ICT-focused while the rest are mixed-types of incubators such as advanced engineering, agro-bio, university, indigenous, manufacturing, and handicraft incubators (Mohd Saffar, 2008). Key findings from the literature suggest that a substantial majority (77.4%) of the incubators are still trapped in the first and second-generation incubator models (Mohd Saffar, 2007; InfoDev, 2010). These are characterised by the traditional landlord-tenant model, office space, and shared office services.

Research examining the incubation process and how it influences the performance of incubatees and incubators is scarce (Peters, Rice & Sundararajan, 2004), despite concerted calls for further research (Hackett & Dilts, 2004b). This study addresses this
gap and provides clarity regarding the underlying components impacting upon ICT incubation performance in Malaysia.

1.1 Research Objectives

This thesis sets out to achieve two primary objectives. The first is to examine the business incubation process in ICT incubators in Malaysia and, second, to investigate the impacts of underlying components in the business incubation process on business incubation performance.

The objectives are important from research, policymaking, and practitioner perspectives. Knowledge with regard to how business incubation process impacts on business incubation performance is fragmented. From a research perspective, the research design of the study is unique, as it examines the business incubation process and its impact on business incubation performance by engaging responses from both incubator managers and incubatees. The constructs used in this study have a strong empirical basis developed by scholars such as Tyebjee and Bruno (1984), Hall and Hofer (1993), and Hackett and Dilts (2004a, 2008). Providing another dimension for measuring business incubation process, the research design examines targeted professional management areas which have received little attention in the incubation literature. These include ‘Strategic Management’, ‘Staff and Personnel Management’, ‘Marketing and Promotion Management’, and ‘Financial Management’ of incubatees. Policymakers and incubator managers will benefit from the identification of the underlying components and their impacts on business incubation performance to better formulate and implement practical, strategic, and operational approaches to guide the incubatees in becoming more productive, more competitive, and better performing.

The incubator-incubation literature suggests that a more developed understanding of the underlying processes of incubation and the types and timing of interventions may be critical for achieving accelerated incubatee growth (Lawrence, Adkins, Batts, Grimes, Sherman & Tornatzky, 1997; Khavul, Brush, Kalish & Lerner, 1998; Reid & Garnsey, 1998). Patton, Warren, and Bream (2009) interpret this as the need for incubators to deliver more intangible types of assistance, including the diagnosis of business needs, support for business planning, introductions to peer group networks, and the deployment of professional networks, mentors, and funding agents, rather than merely providing basic physical infrastructure.
The study of business incubation in Malaysia detailed in this thesis assists in extending knowledge and practice of business incubation process, policies, and small business management. It provides a foundation on which learning and development programs for the incubators may be provided. In particular, this research explores the incubation process with a focus on incubatee selection criteria, business assistance, incubator resources, and professional management services and their impact on business incubation performance. Current knowledge and practice regarding business incubation management in ICT incubators in Malaysia will be enhanced as a result of this study, and findings will add to the extant body of incubation literature.

Despite the considerable quantity of literature on business incubators’ performance (Feeser & Willard, 1989; Allen & McCluskey, 1990; Sherman, 1999; Bigliardi, Dormio, Nosella & Petroni, 2005), there is little systematic research and empirical study on the relationships between factors in the incubation process and the performance of business incubation programs (Sun, Ni & Leung, 2007). In particular, Bhabra-Remedios and Cornelius (2003) suggest there is a gap in incubation research where it has not gone beyond looking at how many jobs are being generated and how many incubatees have graduated from the incubator. While these figures are crucial in order to have a detailed picture of the impact of incubator programs on incubatee development, it is important to move beyond this and investigate the factors that enhance the positive impacts of business incubation. Sun, Ni, and Leung (2007) add that there are various incubation models in existence, and examining critical success factors of incubation model and how these factors impact on performance is worthy of study. Thus, the study of business incubation process factors and their impacts on business incubation performance is relevant, especially in the Malaysian context, particularly because of the significant commitment of the government to promote the growth of ICT-based firms.

A model or framework that can be used as a tool to guide policymakers’ decisions and for those involved in the business incubator community is developed from this research. At a practical level, this study provides important implications for incubator managers, incubator stakeholders, and potential as well as current incubatees.

1.2 Justification for the Research

The literature suggests that limited academic research on incubation development in Malaysia has been undertaken. Information regarding business incubation in Malaysia
is, to date, primarily descriptive, originating from consultant survey reports and government white papers, and provides a rather narrow perspective on the incubation system. This research provides a response to the sentiments of the Government of Malaysia (Malaysia Plan, 2006; InfoDev, 2010), concerning incubator operators, and incubatees who could benefit from improved knowledge and practices concerning the incubation process and management.

The research provides a basis for understanding the current scenario of the Malaysian ICT incubation system and proposes recommendations for the betterment of incubation management in terms of knowledge and best practices. The outcomes of this research are significant for current and future entrepreneurship research, especially in the area of business incubation, as it provides empirical analysis of the components that influence ICT business incubation performance in Malaysia. Findings from this research allow understanding of better incubation management practices leading to possible generation of more ICT start-ups by the incubators.

1.3 Methodology

A mixed-methods approach is adopted in this study employing the concurrent triangulation design (Creswell, Clark, Gutmann & Hanson, 2003). The scope of this research is confined to ICT incubators in Malaysia. The reason for limiting the incubator type to ICT incubators is to ensure that this research is undertaken in a focused and systematic manner. Lichtenstein (1992) posits that for the purpose of performance evaluation of incubators, comparison should be made amongst the same type of incubators.

Fieldwork undertaken in this research resulted in 118 useable survey responses, with a response rate of 65.5% from ICT incubatees. Principal component analysis (PCA) was conducted to identify underlying components in the business incubation process. Following this, multinomial logistic regression (MLR) was used to test relationships between the underlying components and business incubation performance. The use of MLR was appropriate due to the categorical nature of the dependent variable.

Given the exploratory nature of the research in trying to determine the relationships between the underlying constructs and business incubation performance, Zikmund (1997) suggests the use of qualitative research, which may come in the form of
investigating secondary data, conducting experience surveys, scrutinising case studies, or utilising a pilot study. More importantly, the relationships between Selection Performance, Monitoring and Business Assistance Intensity, Resource Allocation, Professional Management Services, and business incubation performance are seen as a research area which has not been adequately addressed thus far (Hackett & Dilts, 2004b). This provides the rationale for the qualitative study approach of this thesis to enhance the quantitative study.

Six case studies were developed to complement the quantitative analysis, exploring in some depth the nature of the components established by the PCA and MLR analysis. This provides a reliable research framework for further investigation into the business incubation process and performance, with the quantitative study used to inform the qualitative study. Case study method of research was adopted in analyzing the qualitative data which were presented using within-case analysis and cross-case analysis. The objective of a mixed-methods approach is to understand the context of the incubation system from the perspective of both incubator managers and incubatees. This produces a robust multidimensional perspective on an uncertain and fragmented phenomenon.

The following section offers an outline of the thesis followed by discussion of the key limitations of the research.

1.4 Organisation of the Thesis

The next chapter provides an overview of the business incubation literature, covering its role as an economic development tool, its historical and on-going developments, key definitions of terms used widely in the thesis, and descriptions of different types of incubators. The essence of Chapter 2 is highlighted in a discussion of the Malaysian incubation development and its link to the growth of SMEs.

Chapter 3 presents the gaps in the extant incubation literature; theoretical conceptualisations of the business incubation framework underlying this thesis; and an extensive review of variables used in the theoretical framework investigated. In introducing the research problem, the status of the ICT incubators in Malaysia is critically analysed, highlighting issues and constraints surrounding the incubation industry. The research questions developed for this thesis are:
Research Question 1:

*To what extent do Selection Performance, Monitoring and Business Assistance Intensity, Resource Allocation, and Professional Management Services impact on the business incubation performance of ICT incubators in Malaysia?*

Research Question 2:

*How do Selection Performance, Monitoring and Business Assistance Intensity, Resource Allocation, and Professional Management Services impact on the business incubation performance of ICT incubators in Malaysia?*

**Chapter 4** introduces the research methodology and the justification for its adoption. The chapter is divided into two sections. Study I examines the quantitative methodology used, while Study II presents the qualitative component of the methodology and the rationale for its use.

**Chapter 5** presents data analysis and results from the quantitative study.

**Chapter 6** presents data analysis for the qualitative study and discusses further the findings by triangulating data from quantitative and qualitative studies around the research propositions and research questions.

**Chapter 7** concludes the thesis and discusses the contributions that the study makes, limitations of the study, and the conclusions drawn from the research.

### 1.5 Limitations and Key Assumptions

Several limitations and key assumptions regarding this research require identification and these are as follows:

- This research is limited to a specific type of incubators, i.e. ICT incubators, and the implications from this study may not be generalisable to other types of business incubators.
- The small sample size prevents the use of confirmatory factor analysis (CFA) techniques which may provide more robust findings and validation of the
framework developed in this thesis.

- The study is germane to the Malaysian context; therefore, the implications of research may not be generalisable to incubators in other countries.

Chapter 1 detailed the background of the research task, outlined two research objectives, justified the research methodology, and provided an outline of the thesis and discussion on its key assumptions and limitations. Having established a platform for the research task, discussion and analysis now proceeds to a review of the extant literature regarding the development of business incubation, its types, and its role in SME development in Malaysia.
2.1 Introduction

This chapter begins with a consideration of past work on incubators and incubation, as this is the domain within which this research is based. The first part of this chapter provides an introduction to the field of business incubation through examining examples of its use and its impact as an economic development tool. This is followed by a description of historic and recent developments in business incubation. Definitions for commonly used terms in the business incubation community including ‘incubator’, ‘incubatee’ and ‘incubation’ are presented. A description of different types of incubators and their characteristics is then presented. Subsequently, the development of business incubation in developed and developing countries is examined. The chapter then narrows its scope to the business incubation phenomenon in Malaysia, beginning with a discussion regarding the importance of SMEs in Malaysia, evolution of incubator generational typology, and the role of incubators in enhancing economic growth.

2.2 An overview of business incubation

The history of business incubators began in the 1950s in Batavia, New York, when the first incubator was set up to help a new company sustain itself during its infancy (NBIA, 2006). Frank Mancuso, who is known as the “father of business incubators” was quoted as telling the story of how the first incubator originated (Kmetz, 2000). According to Kmetz, a small town in New York had experienced significant job losses due to the relocation of many manufacturing industries to the south and west coast of the country. A chicken incubator that once hosted several poultry growers was left vacant and Mr. Mancuso, who was then the mayor, decided to turn the vacant building into a place where entrepreneurs could start up their businesses. Entrepreneurs were charged a minimal rental and were provided with shared phone services. This was the basic idea that formed the foundation of business incubation which still holds in many modern incubator models.

The number of incubators in the United States grew from 12 in the 1980s to 950 at the end of 2002, creating approximately 19,000 sustainable companies and creating more
than 245,000 jobs by the end of 2006 (NBIA, 2006). The reason for this significant increase was the realisation that commonly used economic development strategies that emphasised industry attraction and expansions of large corporations was not dependent on location, economic infrastructure, or business conditions of the day.

With the incubation phenomenon propagating steadily in the United States, the National Business Incubation Association (NBIA) was established in 1985 to share incubation practices and policies with the network of incubators worldwide. The intended purpose of the association was to provide training and tools for the newly developed incubators, and assistance during their early stages of establishment. It is a platform where issues pertaining to incubation management are discussed and shared. The NBIA actively studies and develops best practices in incubation management for the benefit of incubators around the world. The NBIA membership has risen to approximately 1900 members worldwide. Members consist of developed and developing countries that are mutually attracted to establish better incubation practices.

Malaysia has been a member of NBIA since 1998 and established the National Incubator Network Association (NINA) in 2004 to provide knowledge sharing on incubation or business acceleration among all incubators in Malaysia. Its establishment aims at forging collaborative efforts among incubators to their mutual benefit. NINA’s collaboration with a designated technopreneurship agency, Multimedia Development Corporation–Technopreneur Development Flagship (MDeC-TDF) division has facilitated in developing technopreneurs and the growth of ICT SMEs into world-class companies (NINA, 2011).

Various organisations have been formed to assist and develop unified, best-practice incubation around the world. Besides the NBIA, the United Kingdom Business Incubation (UKBI) was established in 1998, while the Asian Association of Business Incubation (AABI) was formed in 2002. As with the NBIA, the role of AABI is primarily to promote business-incubation activities through the facilitation of information exchange among Asian incubators, incubator tenants, and related organisations, with an ultimate goal of contributing to increased economic activity in Asia (AABI, 2008). Likewise, the UKBI mission is to impart vital knowledge and best practices across the incubation community to encourage the development of high-quality business incubation in the United Kingdom. In the 10 years since 1998, UKBI
has successfully built the United Kingdom’s significant business incubation infrastructure, incorporating key stakeholders such as the UK government and regional development agencies. The UKBI reported approximately 250 business incubators established by 2002; this had risen from 25 incubators in 1997. The UKBI has been noted as an exemplar for other incubation associations, through showcasing a conducive environment for assisted business growth in universities, science parks, research and development laboratories, commercial clusters, and social regeneration projects (UKBI, 1998). Its role has now matured and it continues to maintain the national network hub for information-exchange purposes, further advancing a diverse knowledge-driven community.

In Australia, Business Innovation and Incubation Australia (BIIA) functions in the same way as AABI and UKBI. The roles played by BIIA include setting best-practice standards for the business-incubator industry, providing the incubation community with advice on feasibility studies, business planning and networking, developing and maintaining a database of potential consultants qualified for positions at the incubator, and supporting its community with upcoming promotion, information, and external funding (BIIA, 2008).

The incubation and small-business literature has acknowledged business incubation not only as a business-creation tool, but as a business accelerator that leads to other economic and social impacts (Barrow, 2001; Carayannis & vonZedtwitz, 2005). SMEs growth can be accelerated with the possible alleviation of the typical teething problems that fledgling companies face, such as lack of resources, lack of management and entrepreneurial skills, and lack of capital (Papulova & Mokros, 2007). Likewise, incubators are known for their role in assisting new business start-ups, hence the name ‘business-creation tool’. The assistance, as is elaborated in the following sections, comes in the form of physical infrastructure and business and administrative services.

Economic impacts of incubation have been examined in past research. These include job creation (Semih & Erol, 2004), increased sales, profitability, and enterprise growth (Voisey, Gornall, Jones & Thomas, 2006). Job creation at incubators has often been discussed in line with the multiplier effect in much of the economics literature (Markley & McNamara, 1995; Adegbite, 2001). Contradictory views regarding incubators’ ability to create jobs have been expressed, claiming that not all incubators are successful at
creating employment (Lewis, 2001), and that many different types of incubators have yet to prove their effectiveness in creating jobs. Researchers such as Allen and Rahman (1985) and Campbell (1989) agree that although incubators’ ability to create jobs may in many cases be minimal, their effects are not totally insignificant. Additionally, some cite the social impacts of incubation which include networking opportunities (McAdam & Marlow, 2007b), improved client business skills, increased client knowledge, and growth in the expertise of staff (Abduh, D'Souza & Burley, 2011).

The following section provides definitions of key terminologies used throughout this thesis.

2.3 Definitions

2.3.1 Incubator

The word incubator has been defined in many ways by researchers, as is evident in the extant literature. The reason for the varied definitions of the term is largely due to the diversity of incubator types, their sponsors, and their purposes (Allen & Rahman, 1985). In support of this view, Voisey et al. (2006) stated that the continuous growth in business incubation and the ongoing diversification of configurations have led to increased difficulty in defining business incubators precisely.

One of the earliest studies on business incubators was conducted by Allen and Rahman, who described an incubator as “a facility that aids the early-stage growth of companies by providing rental space, shared office services, and business consulting assistance” (1985, p. 12). It is not surprising that the description of office space and shared services was often embedded in incubator definitions in earlier incubation studies. One such study was by Allen and McCluskey who defined a business incubator as “a facility that provides affordable space, shared office services, and business development assistance in an environment conducive to new venture creation, survival, and early stage growth” (1990, p. 61). Markley and McNamara defined incubators as “locally based institutions that encourage and support new business development” (1995, p. 1).

In line with building business networks being an added advantage of business incubation, a review of the literature revealed that some incubator definitions adopt the word ‘network’ (Bollingtoft & Ulhoi, 2005). Bhabra-Remedios and Cornelius observed
that Rice and Matthews (1995) defined incubators as “business assistance programs providing the entrepreneur with advice and counsel as well as providing network access to other people and resources, as needed” (2003, p. 6). This suggested that network access was a service offered in incubators in the 1990s, at a time when the Internet was newly introduced.

Besides the general term incubator, synonymous labels for business incubators have been found in extant literature and are used interchangeably. For example, these include technology parks (Phillips, 2003; Shalaby, 2007); science parks (Monck, Porter, Quintas, Storey & Wynarczyk, 1988); business innovation centres (Campbell, 1989); networked incubators (Bollingtoft & Ulhoi, 2005); technopoles (Castells & Hall, 1994); and technology clusters (CSES, 2002; Lindelof and Lofsten, 2002; Schwartz, 2008). Similarly, the BIIA (2008) referred to incubators as enterprise centres; nursery estates; shared workspaces; and managed workspace venture units. However, there is evidence that technology parks and science parks are usually designed for more mature firms, while incubators are reserved for fledgling companies (Bergek & Norrman, 2008).

For the purpose of understanding the value and context of this study, the definition of incubator provided by the NBIA is adopted, as it has been widely used in past incubation research. The NBIA defines incubator in their website (www.nbia.org) as:

“An economic development tool designed to accelerate the growth and success of entrepreneurial companies through an array of business support resources and services.

This definition is adopted over some alternative definitions presented earlier, as it gives a concise meaning to the word and thus to the study.

2.3.2 Incubatee

‘Incubatee’ is a term widely used in the incubation literature to refer to the start-up companies housed in the incubators. Hamdani (2006, p. 11) used the term “tenants” to refer to “residents of business incubators”, which signifies the landlord role played by the incubator management in earlier set-ups of incubators. Chinsomboon (2000, p. 30) defined incubatees as “partners, clients, ventures, investments, start-ups, and members”. Alternatively, incubatees have been referred to as “portfolios, clients, or tenant
companies” (Hackett & Dilts, 2004a, p. 1). For the purpose of standardisation, this thesis adopts the term incubatee to refer to tenant companies in the incubators.

2.3.3 Incubation

The term ‘incubation’ is commonly found in the literature, and it is used interchangeably with the term incubator. Brooks (1986) who focused on community building and development provided the following definition:

“Incubation is a process through which an attitude of encouragement and support for start-up companies is fostered within the community” (1986, p. 24).

This definition is rather broad, and it provides little information on the incubation process involved in assisting the incubatees. Since then, researchers have reflected some form of nurturing or assistance provided to new entrepreneurs in their definitions of incubation, and have departed from the simple provision of a shared office space (Allen & McCluskey, 1990; Barrow, 2001). Some of these definitions include the provision of management assistance (Smilor & Gill, 1986), networking, knowledge exchange, or access to business networks (Hansen, Chesbrough, Nohria & Sull, 2000; Wiggins & Gibson, 2003; Bollingtoft & Ulhoi, 2005; Becker & Gassmann, 2006).

A comprehensive definition of incubation that emphasises the process and outcomes of business incubation is provided on the NBIA website (www.nbia.org):

“Business incubation programs accelerate the successful development of entrepreneurial companies through an array of business support resources and services, developed or orchestrated by incubator management and offered both in the incubator and through its networks of contacts. The goal is to produce successful firms that will leave the program financially viable and freestanding. The incubator graduates have the potential to create jobs and wealth, revitalize neighborhoods, commercialize new technologies and strengthen local and national economies. An incubator must provide management guidance, technical assistance and consulting tailored to young, growing companies. Incubators usually provide clients access to appropriate rental space and flexible leases, shared equipment, technology
This assumes that incubators are successful in developing entrepreneurial companies, although there is limited literature endorsing the sustainability of incubatees after their graduation. This last definition is adopted as the working definition for this study.

2.4 Incubator types

As mentioned in the previous section, the difficulty in defining business incubators precisely resulted from the varying configurations of business incubators. Nonetheless, incubation studies have delineated the different types of incubators that exist and have examined issues pertaining to specific incubator types.

The literature suggests there are generally three types of incubator sponsors: public, private, and university or academic (Lalkaka, 2001; Bhabra-Remedios & Cornelius, 2003; Aernoudt, 2004). Allen and McCluskey (1990, p. 64) postulated four types of incubators: for-profit property development incubators, non-profit development corporation incubators, academic incubators, and business development for-profit seed-capital incubators. Nyrop (1986) had earlier categorised incubators based on their sponsorship and found public, private, university, and hybrid as the main categories.

The main reason for the diverse types of sponsorships was said to be due to the different motivations of sponsors (of the incubators), hence leading to disparate sets of objectives for the incubators (Colombo & Delmastro, 2002). The purpose or objective of the incubators is one of the reasons for the variation in incubator types, as reported by BIIA (2008), where some incubators are targeted to develop manufacturing firms, while some are devoted to developing firms in other industries such as agriculture (Cameron, 2007), arts and craft (Colombo & Delmastro, 2002), ICT (Koh, Koh & Tschang, 2005; Kotelnikov, 2007), and biotechnology (Zucker, Darby & Armstrong, 2002; Siegel, 2006).

The implication of having different types of incubators is, it hinders the ability to measure the performance of business incubators (Lewis, 2001) on a standard criterion, hence there is a need to develop performance measurement on a case-by-case basis. While university incubators tend to focus on commercialising research and development (R&D) outputs (Rothaermel & Thursby, 2005), for-profit incubators put much emphasis...
on maximising the return on investment (ROI) through the sale or lease of incubator premises (Frenkel, Shefer & Miller, 2008). Alternatively, public or government-funded incubators tend to focus on job creation, competitiveness, and promotion of SMEs (Abetti, 2004; Frenkel, Shefer & Miller, 2008).

2.4.1 Government incubators

Incubators in some parts of the world have been noted as predominantly government-funded and supported (Chandra, He & Fealy, 2007). Public or government-supported incubators are known for their non-profit nature and have an objective to assist entrepreneurs in cushioning the impact of set-up and operational costs during the early stages. Shalaby (2007) outlined that the target goals of public incubators are for investment, employment, and social focus. McAdam and Marlow (2007a) assert that government incubators seek to encourage indigenous growth. Lalkaka (2001) and Feng-Ling et al. (2004) highlighted the advantages of the government’s initial support for incubators in some specific conditions, which include helping to overcome market constraints by improving access to information, reducing market failures, and promoting innovation and entrepreneurship. This advantage was evident in a study conducted by Abetti (2004) on government-supported incubators in Helsinki where it was found that government-funded incubators indeed benefited from the incentives given to them, and they have proven to be a viable method to accelerate economic growth and entrepreneurship.

Government incubators outnumber other types of incubators. In the United States, government incubators represent 24% of the entire incubator population in the country, followed by academic incubators (20%), and private incubators (18%) (Lalkaka & Abetti, 1999). Other types of incubators consist of unsponsored incubators (18%), venture capital incubators (8%), and others (12%) (Lalkaka, 2001). By contrast, in Malaysia the number of government-sponsored incubators has been reported as 91.5% (InfoDev, 2010), and only 8.5% are private incubators. Over-reliance on government funding and sponsorship has been viewed as a main weakness of the Malaysian incubators (Mohd Saffar, 2007; InfoDev, 2010), where in some instances there are incubators that inculcate civil-service attitudes, instead of entrepreneurial encouragement. This is not the case in China, however, as strong government intervention is a major determinant of its large incubation system (Costa-David, Malan
& Lalkaka, 2002). The incubators receive major subsidies—in land and buildings, low-cost loans, and some ongoing operating subsidies. The entrepreneurial culture is evident in these incubators, as despite receiving government financial support, the incubatees help to raise revenue for the incubators (Costa-David, Malan & Lalkaka, 2002). A predominant role that the government plays is in channelling resources to accord with the government’s mandate of (high) technology-led economic growth (Chandra, He & Fealy, 2007).

2.4.2 Private incubators

Private or for-profit incubators differ from government incubators in terms of their main objectives. Unlike the government or public incubators, which focus more on supporting community development (Becker & Gassmann, 2006), private incubators are geared toward gaining a return on the investments in the incubatees. Becker and Gassmann (2006) stated that for-profit incubators’ main purpose is to gain financial returns for the stakeholders, and to “achieve positive gains through service fees and equity stakes in new ventures” (Becker & Gassmann, 2006, p. 472). Private incubators have been characterised as being generally more willing to accept any incubatee that pays rent (Allen & McCluskey, 1990), as well as being less likely to ask incubatees to leave the incubator despite having completed their incubation period. This indicates that the motives of for-profit incubators are purely economic, with incubators quickly launching new ventures and taking in return a proportion of equity in the new venture as fees (Chinsomboon, 2000; Hansen et al., 2000).

A review of the literature revealed that the number of private incubators is growing in different parts of the world. CSES (2002) reported that incubators from the United States, Canada, the United Kingdom, and China showed rapid growth among for-profit incubators. Although the numbers now approach a match with the number of public incubators in more developed nations, this is not the case in developing countries.

There have been findings which indicate that the involvement of the private sector in the incubation industry as rarely visible at the set-up stage (Feng-Ling et al., 2004). This is due to their reluctance in having to face the high risk of setting up new businesses (Chinsomboon, 2000; Grimaldi & Grandi, 2005). This trend is common in Europe, but reportedly is not in the United States, where private incubators are more dominant than the public incubators. In terms of source of income, private incubators
mostly rely on the fees imposed on services provided to the incubatees, as well as a proportion of the incubatees’ profits (Smith, 2001; Shalaby, 2007).

2.4.3 University or academic incubators

Entrepreneurial activities in universities have been more pronounced with the existence of university or academic incubators. A number of studies examined the roles of incubators in promoting technology transfer (Koudri, 2002; Siegel, 2006), commercialising research outputs (Mian, 1997; Smith, 2001; Kilcrease, 2004), and assisting economic development (Markman, Phan, Balkin & Gianiodis, 2005; Todorovic & Suntornpithug, 2006). Roberts (1991) added that university-linked incubators provide support for business-plan development and the spotting of entrepreneurial talent. Academic incubators in the United Kingdom, for example, play a significant role in promoting entrepreneurship through a number of innovative activities of local firms originating in university research (Kirby, 1990).

Studies that have focused on university-linked incubators showed significant interest in the usefulness of certain university resources such as the laboratories, equipment, technology-transfer programs, the image that the university carries, and its faculty, as well as student employment possibilities (Mian, 1997). McAdam & Marlow (2007a) advocated that university incubators initially emerged in proximity to universities, with the objective to promote technology transfer and the commercialisation of innovative and novel research. This view is shared by Rothaermel and Thursby (2005) who confirmed in their study the role of university linkages in incubator-firms’ failure or graduation, stating that firms that located closer to universities showed significant growth compared to those that did not. Knowledge flow—in the form of licensing from universities, backward citation, patents, and publications from the university—to incubators has been investigated and it has a proven impact on incubatee performance (Rothaermel & Thursby, 2005).

2.4.4 Hybrid

The hybrid incubator, otherwise known as ‘public-private partnership (PPP) incubators’ is characterised by cooperation between government bodies from either federal, state or city, and university and (or) the private sector (Allen & McCluskey, 1990). Hybrid incubators have been referred to as incubators sponsored by a coalition of sponsors
(Philips, 2002), and incubators with combinations of sponsors (Nyrop, 1986). The
incubators have been found not to provide variation in the types of services provided to
their clients, despite the differing objectives of the sponsors (Allen & McCluskey,
1990). This cooperation is commonly initiated by a government agency by provision of
financial support, and it is sustained through support from the private sector when the
program is seen as a potential business opportunity (Lalkaka, 2001).

In Malaysia, there has been very little evidence of this kind of incubators due to the
initial process of the incubator movement where the incubators were not well integrated
with the mainstream SME development programs. Incubators back then were initially
placed under the responsibility of the Ministry of Science Technology and Innovation
(MOSTI) and Economic Planning Unit (EPU). However, assertive attempts in
coordinating incubator movements and SME development policies have been noted
since the Ninth Malaysian Plan (2006-2010), and even more so in the Tenth Malaysian
Plan (2011-2016) to bridge the existing gap.

2.5 Roles of business incubators

The roles of business incubators have been discussed in early business incubation
literature (Cooper, 1985; Lalkaka, 2003; Peters, Rice & Sundararajan, 2004; Shalaby,
2007). A majority of these studies aimed at identifying the roles that incubators played
as an economic development tool. One of the most commonly mentioned roles of an
incubator is as an effective job creator: it opens up new employment opportunities at
both incubator and incubatees’ firms. Other prominent roles of business incubators
include facilitating and enabling the development of SMEs (Adegbite, 2001; Bayhan,
2006; Jusoh, 2006), transfer of technology and the commercialisation of research
outputs (Autio & Klofsten, 1998; Siegel, 2006; Doyle & Hammond, 2008) as in the
case of university-linked incubators. Many researchers have commented that these roles
lead to more studies being conducted on the effectiveness of business incubators as a
driver for the economy (Carayannis & vonZedtwitz, 2005).

Job creation has proven to be a significant outcome of business incubation. North
American incubators have created more than 250,000 jobs (Lawrence et al., 1997;
Peters, Rice & Sundararajan, 2004), while Sahlgren (2005) stated that European
incubators are generating around 30,000 new jobs per annum. In Brazil, 3 million jobs
have been created by incubators (Scaramuzzi, 2002). Shalaby (2007) explains that,
theoretically, new businesses increase job creation and job retention and they automatically improve local economic bases by transforming underutilised property into productive centres. Economic impact analysis done at the Rutgers Camden Business Incubator showed that almost all of the jobs created at the City of Camden would not have existed without the incubator. Despite that, incubation capability in job creation has been examined and questioned. Udell (1990) pointed out that incubators only appear to make significant micro or local level contributions in inner-city areas, while imposing opposite impacts in rural areas, where a significant number of jobs could be lost to the city.

A second prominent role of business incubators is in promoting the growth of SMEs. Cooper (1985) stated that business incubators have significantly improved the survival and growth prospects of new start-ups, besides being able to reduce overhead costs through the sharing of facilities. This view is shared by Peters et al. (2004) who stated that the sole purpose of business incubators, as recognised in various incubation studies, is to nurture and promote the growth of SMEs and ultimately to encourage their entrepreneurial activities to flourish. Klok (2001) confirmed this by referring to a preliminary study conducted in the United States which suggested that incubators have been a successful tool at growing companies with high survival rates at a relatively low cost. BIIA (2008) added that incubators help to increase the survival rates of new businesses, as newly launched companies have a tendency to fail (Hamdani, 2006) mainly because of management and technology-related issues (Udell, 1990). In addressing this propensity, Udell (1990) argued that management and technical assistance are necessary to increase the survival and success rates of incubatees.

Business incubators are known to manage technology transfer, especially in university-linked incubators. For example, there has been a significant increase in technology transfer in North American university incubators in the form of patenting and licensing. According to the Association of University Technology Managers (AUTM), university revenues from licensing have increased by over 315%, from USD 220 million in 1991 to USD 698 million in 1997 (Phan & Siegel, 2006). Technology transfer is a primary activity in university-linked incubators and private incubators resulting in many high-tech entrepreneurial start-ups (Abetti, 2004). Additionally, transfer of technology has been used as a measure of success in many incubators and technology parks in
university settings (Markman et al., 2005). Despite putting technology transfer as the main goal of establishing university incubators, a study undertaken by Phillips (2002) showed there has not been a high occurrence of technology transfer in incubators. The results reaffirm calls for future research studying the problems that hinder the technology-transfer process (Philips, 2002; Markman et al., 2005).

**Characteristics of business incubators**

Standard features and characteristics of incubators are widely discussed in the literature (Atherton & Hannon, 2006) which generally describes the common facilities offered at incubators as including office space for rental (Martin, 1997; McAdam, Galbraith, McAdam & Humphreys, 2006), meeting rooms (Martin, 1997; Read & Rowe, 2003; Vaidyanathan, 2008), and usage of standard office facilities such as fax machines and the internet (Vaidyanathan, 2008). These facilities, often included as part of the incubation facilities, have enabled incubatees to reduce costs and save time to start their businesses (Lichtenstein, 1992; Tornatzky, Batts, McCrea, Lewis & Quittman, 1996; vonZedtwitz & Grimaldi, 2006). Other important services may include an enhancement of the visibility and credibility of incubatees’ businesses through the use of an incubator postal address, and from positive word of mouth from business people in the incubators’ networks and contacts (Smilor & Gill, 1986; Culp, 1996; Martin, 1997). The uniqueness of business incubation is that it offers a system that controls and links resources, with the objectives of facilitating new venture development for incubatees while containing the cost of their potential failure (Hackett & Dilts, 2004a), a much-needed support for new entrepreneurs.

Typical services offered at incubators and the sources of competitive advantage to the incubatees are shown in Table 2.1, which originates from a study by vonZedtwitz and Grimaldi (2006). The services have been classified in five distinct categories consisting of physical infrastructure, office support, access to capital, process support, and networking. These services provide a source of competitive advantage to the incubatees—as shown in the same table—from provision of affordable rent, reception services, funding, training, and opportunities for linkages to relevant people in the industry.
Table 2.1: Service category and type, and sources of competitive advantage

<table>
<thead>
<tr>
<th>Service category</th>
<th>Services</th>
<th>Sources of competitive advantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical infrastructure</td>
<td>Office space, desk, PC, telephone amenities</td>
<td>Favourable rent/lease terms; volume discount; shared use</td>
</tr>
<tr>
<td>Office support</td>
<td>PC &amp; equipment support; secretary &amp; mail; security</td>
<td>IT support &amp; lease; reception services; safety &amp; protection</td>
</tr>
<tr>
<td>Access to capital</td>
<td>Direct investment; access to VCs; pseudo salaries</td>
<td>Own incubation fund; milestone instalments; road-shows</td>
</tr>
<tr>
<td>Process support</td>
<td>Coaching, mentoring; consulting &amp; legal</td>
<td>Preferred client agreements; start-up training; business planning</td>
</tr>
<tr>
<td>Networking</td>
<td>Key employees; customers, suppliers; collaborators</td>
<td>“Rolodex”; internal matchmaking; travel support</td>
</tr>
</tbody>
</table>

Source: vonZedtwitz & Grimaldi (2006)

An alternative perspective however might question whether these are indeed sources of competitive advantage. For example, Colombo and Delmastro (2002) argued that compared to off-incubator firms, incubatees have only a slightly greater advantage in terms of innovative activity and access to capital. They added that the differences are small and statistically insignificant at conventional levels. Supporting this view is Grigorian (2010) who found that non-incubated firms perceived infrastructure, business support services, and mediation services in incubators to be of moderate importance. Atkins (2001) discards the generally accepted conviction that business incubators are inexpensive places for rent, stating that incubatees’ growth is dependent on mentoring and ‘handholding’. Comparisons on the survival of incubated and non-incubated firms showed that the former fail 10% sooner than the latter do (Amezcua, 2010). These findings imply that business incubation may in some cases leave adverse effects in incubatees in terms of not having a stronger set of routines, competencies, and organisational structures to enable them to compete in the external environment. The protective environment, which is almost cocoon-like, appears to inhibit incubatees from developing the appropriate attributes to succeed in the external environment.

In addition to the standard facilities, business advisory services (Abduh, D’Souza, Quazi & Burley, 2007), training or educational services such as short courses, seminars, or workshops (Nyrop, 1986; Abduh, D’Souza & Burley, 2011) are characteristics of business incubation. These services are aimed to equip incubatees with skills such as business-plan writing, marketing (Wiggins & Gibson, 2003; Colbert, 2007), and financial management, which are often absent or poorly developed in new entrepreneurs. Incubators act as a broker in obtaining capital for the incubatees by negotiating with potential investors (Tornatzky et al., 1996; Wiggins & Gibson, 2003).
Additionally, networking opportunities have been investigated as an important incubator characteristic (Chinsomboon, 2000; Lalkaka, 2001; Colombo & Delmastro, 2002; Bernasconi, Harris & Moensted, 2006; Abduh et al., 2007) which has an inspirational, helpful effect for the incubatees (Lambing & Kuehl, 2003). Studies by Martin (1997) and Semih and Erol (2004) reveal that business incubation benefits to incubatees include provision of networks of advice and support, access to professional office and ICT, availability of meeting rooms, a credible business address (Trewartha & Breen, 2011), and opportunities to form collaborative new ventures with other tenants.

Besides providing services to the incubatees, incubators develop and apply a set of selection criteria to choose potential incubatees (CSES, 2002). Selection of incubatees is reported to be of significance; some studies examined the critical role of incubatee selection in influencing the success of incubators (Hall & Hofer, 1993; Aerts, Matthyssens & Vandenbempt, 2007). The basis for having selection criteria is to increase incubatee and incubator success (Merrifield, 1987) and critical to incubator managers' or directors' attempts to accomplish their key objectives (Hall & Hofer, 1993). Additionally, it has been noted to accommodate the limitations that most incubators have in terms of space (Martin, 1997), in trying to meet the high number of applicants, as well as to create specialised types of incubators. A result of early screening of incubatees has been seen in the evolution of several types of incubators such as high-technology incubators, and in some cases, demographic-specific businesses like women-owned or minority-owned businesses (Lambing & Kuehl, 2003). The practice of selecting incubatees helps in reducing possible entrepreneurial failures which reflect poorly on the credibility of incubators (Hackett, 2004). Selection criteria used in many incubators are elaborated further in Chapter 3.

Similarly, an exit policy is a key characteristic of an incubator (Hackett & Dilts, 2004b) in gauging whether or not a business is ‘fit’ to survive on its own. Abetti (2004) explained that exit follow-up and feedback is one of the best practices of Finland’s incubators, where tenants who are deemed prepared for the ‘outside world’ are treated in a business-to-business manner and are asked to give feedback on their experience at the incubator to improve its operations for future tenants. The concept of exit policy exists to prepare incubatees to be independent entities once they have served their incubation period. As is discussed in a later part of the thesis, a stay at the incubator
beyond the agreed duration may sometimes result in tenants being asked to pay rent as an inducement for them to move out of the incubators voluntarily (Adegbite, 2001). Having an exit policy ensures that the incubators will continuously host new businesses and will ensure that the impacts of incubation are felt by the wider community (Bernasconi, Harris & Moensted, 2006; Schwartz, 2008).

2.6 Business incubation in developed countries

Positive outcomes in developed countries are testimony that business incubation is a worthy economic development tool, especially in creating employment opportunities and assisting fledgling businesses. Countries like the United States, the United Kingdom, Australia, and Japan have established successful incubation programs across all types of incubators, and have produced a significant number of SMEs and technology transfers (Aernoudt, 2004).

The United States is known as the pioneer in the business-incubation industry, having established the first business incubator in the world. The number of incubators in North America has reached 1500 (NBIA, 2006). Significant impacts have been felt from the American incubation programs. One of the impacts is the increase in employment growth, where roughly 500,000 jobs have been created by North American incubators since 1980 (Linder, 2003). In 2001 alone, North American incubators helped 35,000 start-up companies provide full-time jobs for nearly 82,000 workers and generated annual earnings of more than USD 7 billion. NBIA (2002) reported that 84% of incubator graduates remain in their communities and continue to provide a return to investors.

The business incubation industry in the United Kingdom is comparatively young (UKBI, 2003), but there are indicators which suggest that signs of maturity are surfacing. For example, the incubators are slowly becoming more sector-specific or community-specific. The sectors are made up of high-tech industries, creative industries, knowledge-based businesses, bioscience and (or) biotechnologies, advanced manufacturing, and energy. The number of incubators in the United Kingdom reached 300 in 2008, and supporting more than 12,000 businesses (NESTA, 2011). A majority of incubators in the United Kingdom are not-for-profit incubators (70%), which, as previously delineated, focus on providing the basic needs of incubatees and early-stage businesses. These needs conventionally include office space, shared administration, and
business-support services.

Australia on the other hand has a relatively long-established incubation industry with 17 incubators in operation by 1989 (Bhabra-Remedios & Cornelius, 2003). The incubators had both direct and indirect connections with academic institutions, for example, at the University of Wollongong and RMIT University, which were the first two universities to have incubators located on their campus (Bhabra-Remedios & Cornelius, 2003). The Commonwealth Government invested AUD 78 million in 1999 for the development of incubators specialising in ICT (Bhabra-Remedios & Cornelius, 2003). The work on building the ICT strength of the country happened at an opportune time, as the rest of the world was focusing on enhancing their ICT strength. The Building on Information Technology Strengths (BITS) program as it was called was responsible for the long-term success rate of newly formed ICT-related businesses. In 2003, the Australia New Zealand Association of Business Incubators (ANZABI) reported more than 60 business incubators in Australia, with a majority of them being part of state or local economic-development initiatives. Australia has over 80 business incubators nationwide that are actively creating jobs and developing local economies.

Japan started its incubator program in 1988 and has more than 140 science parks and 40 incubators (Lalkaka, 2001). Centres such as the Softnomics Center and the Japan Incubator Research Society, focused on the introduction of the concepts behind business incubators and the circumstances surrounding them in the United States and other countries. In 1999, the Japan Association of New Business Incubation Organisations (JANBO) was formed. The purpose of this government-sponsored organisation is to link the “core support institutions and others through seminars, information, training courses, and international exchanges” (Lalkaka, 2001, p. 18). Japan’s vision for the year 2010 was to develop 300 new incubators and to train 500 professional managers, whilst creating 150,000 new jobs (Lalkaka, 2001). The visions as noted by Yuan (2011) and Mutambi (2011) were partially met, as only 200 incubators were established.

Germany, another incubation advocate from the developed countries, saw its first incubator established by the University of Berlin in 1983, with the aim to transfer research findings to industry (Aernoudt, 2004). It has since been reported to have had 300 incubators in 2001 and produced over 3000 SMEs, which yields a ratio of 1 incubator to 11 SMEs (Costa-David, Malan & Lalkaka, 2002). The smooth ground for
establishment of technological and business incubators was mainly due to structural changes and globalisation. Germany’s first incubators were mainly established to promote the creation of new jobs, to encourage potential entrepreneurship (Frenkel, Shefer & Miller, 2008), and to develop innovative start-ups (Hamdani, 2006).

2.7 Business incubation in developing countries

Several studies investigated business incubation in developing countries (Lalkaka, 1997; Klok, 2001; Scaramuzzi, 2002). According to Lalkaka (2003), more than half of the world’s incubators are now in developing countries, with almost 2000 incubators established by 2003. East Asia alone accounts for more than 700 of these incubators (Lalkaka, 1997). China apparently has the largest incubator program among the developing countries and the third largest in the world after the United States and Germany (Lalkaka, 2000), with more than 130 technological incubators in operation and 7693 incubatees since 1987. Between 2002 and 2006, the number of incubatees increased from 20,993 to 41,434, which is almost a 50% increase. It is noted as being a result of strong government support in the incubation programs (Zhang & Sonobe, 2011). Feng-Ling et al. (2004) reported China’s incubation success in terms of employment with nearly to 270,000 jobs created. The Chinese business incubation programs owe their success to a number of factors, including drawing on foreign experience, from the United States especially in best practices in incubation (Feng-Ling et al., 2004).

A majority of incubators in China are government-owned, ensuring strong support especially in terms of initial funding. Chinese incubators have diversified into a number of types: general technology and specialised technology business incubators, university-related S&T parks, incubators for returned overseas scholars (IROS), international business incubators (IBI), incubators set up by state-owned enterprises (SOE incubators), and general-purpose business incubators (Feng-Ling et al., 2004). As a result of diversification, a range of businesses can obtain tailored services and support from their respective incubators, allowing for extensive growth of SMEs in China. For example, the specialised technology business incubators pay more attention to design and use of the incubation space and services with expertise orientation, and more industry-specific in terms of technology field, marketing, information, and training (Feng-Ling et al., 2004).
India has invested considerably in business incubators, especially in technology-based incubators (Scaramuzzi, 2002). The success of the Software Technology Parks (STPs) in the 1990s served as the impetus for the central and state governments to support the launching of several more biotech parks in India (Vaidyanathan, 2008). By 2001, India had 18 STPs and 15 Science and Technology Entrepreneurs Parks (STEPs)—which are similar to technology incubators in some aspects—and 24 technology business incubators (Lalkaka, 2001; Bulsara, Gandhi & Porey, 2009). The software companies located in the STPs exported software worth USD 4 billion during the period 2000–2001 (Lakshminarayanan, 2004).

Researchers in the incubation field studied the incubation phenomenon in Korea (Kim, Lee & Ames, 2005; Kim & Ames, 2006; Sung, 2007). Reports on business incubation studies in Korea show similar encouraging experiences as in developed countries (CSES, 2002). Since 1993, about 300 incubators have been established, most of them government-sponsored. At present, with over 3000 incubatees and 1200 graduates, these incubators have created over 21,000 jobs, most of which are either Internet or software-related, equipment and instruments, and biotechnology (Lalkaka, 2001).

Despite these successes, shortcomings in Korean incubators have been reported. Lalkaka (2001), in particular, pointed out many problems faced by Korean incubators. The list includes “shortage of trained managers, inadequately developed operating systems, poor support services for tenants, poor specialisation based on regional characteristics, and heavy reliance on state subsidies” (Lalkaka, 2001, p. 21). The finding of these problems is consistent with Klok (2001) who presented several additional difficulties in developing countries’ incubators, including finding people with the right qualifications to staff incubators, less favourable business environments, lack of financial resources, and lack of venture capital and angel investors.

The literature suggests that limited academic research on incubation development in Malaysia has been undertaken. Information regarding business incubation has been primarily descriptive, originating from consultants’ survey reports and government white papers; and provides a rather narrow view of the system. This is supported by the Tenth Malaysia Plan which states that the impact, effectiveness, and sustainability of incubators has been inconsistent (Malaysia Plan, 2006).
The Government of Malaysia has stressed the importance of business incubation in economic development, where numerous initiatives have been undertaken in view of this. For example, through the PPP approach, the government co-invests with the private sector in high-growth and strategic sectors through government funding agencies such as the Malaysian Venture Capital Management Berhad (MAVCAP), the Malaysian Technology Development Corporation (MTDC), and Ekuiti Nasional Berhad (EKUINAS). The need to shift present incubators toward the third-generation incubator model is mentioned in the Tenth Malaysian Plan, thus suggesting the relevance of the research area of this thesis.

Until now, previous discussion on business incubation in developed and developing countries highlighted the positive role of business incubators in assisting the development and growth of new businesses. The growth in the number of incubators established, employment creation, and exports all reflect the optimistic outcomes of business incubation.

Despite the noted flaws of certain business incubation set-ups, such as shortages of trained managers, and poor support for tenants, the overall confidence in business incubation is noted as a worthwhile economic development tool. In view of this, Section 2.8 provides a critical evaluation of the SME industry in Malaysia, and an examination of the role of incubators in assisting the growth of the ICT SME industry.

### 2.8 The importance of SMEs in Malaysia

#### 2.8.1 Definitions of SMEs

The literature includes various definitions of SMEs developed and used in different countries. Zimmerer and Scarborough and (1994) agree there is no universal definition of SMEs. While other forms of measurement including assets and shareholders are used to define SMEs, common characteristics adopted are the number of employees and total sales revenue. In Malaysia, the SMEs are defined by the number of full-time employees and annual sales turnover (SMIDEC, 2006).

SMEs in Malaysia are divided into two categories: manufacturing and services; each has its own definition. SMEs in the manufacturing sector which consists of manufacturing-related services and agro-based industries, are defined as enterprises
with full-time employees not exceeding 150 and annual sales turnover not exceeding RM25 million (AUD 8 million) (SMIDEC, 2006). SMIDEC (2006) defines SMEs in the service sector as enterprises with full-time employees not exceeding 50 and annual sales turnover not exceeding RM 5 million (AUD 1.67 million).

The definition of SMEs in services is of particular significance to this study, as it comprises the ICT industry, which is the industry being examined. SMIDEC (2006) further defines three categories of SMEs including micro, small, and medium, as shown in Table 2.2.

Table 2.2: Definitions of SMEs in Malaysia

<table>
<thead>
<tr>
<th>Category</th>
<th>Micro</th>
<th>Small</th>
<th>Medium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing; manufacturing-related services; Agro-based industries</td>
<td>Sales turnover of less than RM 250,000 or full-time employees less than 5</td>
<td>Sales turnover between RM 250,000 and RM 10 million or full-time employees between 5 and 50</td>
<td>Sales turnover between RM 10 million and RM 25 million or full-time employees between 51-150</td>
</tr>
<tr>
<td>Service, Primary Agriculture and Information and Communications Technology (ICT)</td>
<td>Sales turnover of less than RM 200,000 or full-time employees less than 5</td>
<td>Sales turnover between RM 200,000 and RM 1 million or full-time employees between 5 and 19</td>
<td>Sales turnover between RM 1 million and RM 5 million or full-time employees between 20 and 50</td>
</tr>
</tbody>
</table>

Source: SMIDEC (2006)

These definitions are applied by all government ministries and agencies involved in SME development, as well as by the financial institutions (SMIDEC, 2006). In spite of the clarity that these definitions attempt to achieve, agencies have used inconsistent definitions to categorise SMEs at the operational level (Saleh & Ndubisi, 2006b).

2.8.2 The role of SMEs in the economy

The dynamic nature of SMEs has been acknowledged in the economics and business literature (Saleh & Ndubisi, 2006a; Hilmi & Ramayah, 2008; Ahmad & Seet, 2009; Che Senik, 2010). Similarly, researchers (Saleh & Ndubisi, 2006b; Tang & Llerena, 2007) recognised the significance of SMEs in many developing countries as the backbone of the economy, and as a large contributor to GDP. The Organisation for Economic Cooperation and Development (OECD) shares a similar view and added that SMEs are a “key source of economic growth, dynamism, and flexibility in advanced industrialized countries as well as in emerging, and developing economies” (2006, p. 1). Essentially, SMEs are the major source of income in developing countries, especially in providing employment and breeding grounds for entrepreneurs (Kotelnikov, 2007). In Table 2.3, it
is shown that SMEs comprise over 95% of enterprises in some countries in the Asia–Pacific region, signifying the important role of SMEs to national economies.

Table 2.3: Sample of SMEs in Asia Pacific region

<table>
<thead>
<tr>
<th>Country</th>
<th>SMEs as a percentage of all enterprises</th>
<th>SME employee as a percentage of the total employed population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hong Kong</td>
<td>98.0</td>
<td>60.0</td>
</tr>
<tr>
<td>Japan</td>
<td>98.9</td>
<td>69.2</td>
</tr>
<tr>
<td>Malaysia</td>
<td>96.1</td>
<td>45.0 (manufacturing)</td>
</tr>
<tr>
<td>Philippines</td>
<td>99.6</td>
<td>70.0</td>
</tr>
<tr>
<td>Republic of Korea</td>
<td>99.8</td>
<td>86.7</td>
</tr>
<tr>
<td>Singapore</td>
<td>99.7</td>
<td>57.0</td>
</tr>
<tr>
<td>Taiwan</td>
<td>97.7</td>
<td>68.8</td>
</tr>
<tr>
<td>Thailand</td>
<td>99.7</td>
<td>60.0</td>
</tr>
</tbody>
</table>

Source: Kotelnikov (2007)

Besides contributing to employment creation and the generation of income, SMEs have contributed in other ways to national wealth building, such as commercialising university research and development (Smith, 2001). The model for commercialisation of R&D through SMEs is evident in successful entrepreneurial high-tech clusters such as in the Silicon Valley (Avnimelech, Schwartz & Bar-El, 2006). Alternatively, SMEs assist in upgrading the lifestyle of disadvantaged groups, such as single mothers, by providing them with sources of income (Kotelnikov, 2007). In the next section, the importance of SMEs in the Malaysian economy is discussed.

**2.8.2.1 The significance of SMEs in the Malaysian economy**

Recent literature reported that SMEs constitute 99.2% of total business establishments in Malaysia, which is 518,996 SMEs in total (Che Senik, 2010). Of the total number of SMEs, 86.5% are in the services sector. Figure 2.1 illustrates the significant role of SMEs in the Malaysian economy in terms of their contribution to GDP, employment, and exports from both the manufacturing and services sectors for the year 2005, and their targeted contribution in 2010 (SMIDEC, 2009). Compared to a more recent report (Council, 2010) however, it is noted that the contribution for 2009 was lower than expected, where the contribution to GDP, employment, and exports were 31.2%, 56%, and 19% respectively. The stagnant contribution of SMEs over the last few years compels examination of current SME development efforts.
The services sector dominates the manufacturing sector in terms of the number of SMEs. In 2006, the number of SMEs from the services sector represented more than 85% of established SMEs (SMIDEC, 2006) and they subsequently showed an overall productivity growth of 3.3% in the 2008 MSC Malaysia Impact Survey (MDeC, 2009). The growth was mainly reflected in productivity gains in the transport, trade, and finance subsectors, which are supported by infrastructure upgrades and maintenance. The survey was conducted to gauge the impact of MSC Malaysia, a project developed to lead the growth of the ICT industry and to provide a test-bed for the global ICT industry. Details regarding MSC Malaysia are presented later in the chapter.

2.8.2.2 Gross domestic product

SMEs’ contribution to GDP has been largely acknowledged in the literature. Based on the data compiled by the Department of Statistics of Malaysia, SMEs’ contribution to economic growth was 29% between 2000 and 2004, and 32% in 2005 (Mohd Aris, 2007). The services sector in particular is seen as a dominant sector in the Malaysian economy having contributed 41.8% to GDP in 1960, 48.4% in 2000, and 56.8% in 2003 (Abas, 2005). Figure 2.2 illustrates SMEs’ contribution to GDP for the period 2005–2010 in various sectors including services, construction, mining, and manufacturing. The figure indicates that GDP contributions from various sectors continued to be significant from 2007 to the end of 2009. Although there is a slight downward trend in contribution by the services sector in the first quarter of 2009, its overall contribution to GDP still appears to outperform other sectors. In the services sector, SME contribution to GDP increased by 2.8% from 2005 to 2009 (Council, 2010). This evidence suggests the strength of the sector and its pivotal role in the Malaysian economy. Despite that,
the GDP contribution from SMEs is still somewhat low compared to SMEs’ contributions to GDP in more developed Asian countries such as Japan and China, where they contribute 55.3% and 60% respectively (Mohd Aris, 2007).

![SMEs’ contribution to GDP for the period 2005–2010 in various sectors](image)

**Figure 2.2: SMEs’ contribution to GDP for the period 2005–2010 in various sectors (Ariff, 2010)**

### 2.8.2.3 Employment

SMEs contribute significantly to the economy in terms of employment. Various studies (Ahmad & Seet, 2009; SMIDEC, 2009; Che Senik, 2010) conducted on SMEs in Malaysia have shown that SMEs’ contribution to employment accounts for a large portion of total employment in the country. In 2003, Saleh and Ndubisi (2006a), asserted that SMEs created 375,840 jobs, which accounted for about 39% of total employment in Malaysia. Two years later, employment generated by SMEs was approximately 3 million jobs, which is 65.1% of total employment. Of this, the services sector employed the largest number with 2.2 million workers (Mohd Aris, 2007). The significant increase in employment generation in the SME sector mirrors the country’s continued strategies in creating jobs in emerging technologies such as biotechnology, nanotechnology, photonics, ICT, and advanced manufacturing.
2.8.2.4 Export

The SMEs’ contribution in terms of exports has not been as prominent as in employment and GDP. Mohan (2007) asserted that SMEs in Malaysia are only exporting 26% of their total output because of the many new challenges that Malaysian SMEs face, both domestically as well as globally. The domestic market is being challenged by the inflow of more competitive products from new emerging economies and other neighbouring countries (Mohan, 2007). Sin (2010) stated that some of the challenges facing Malaysian SMEs include intensified global competition, shortage of skills for the new business environment, and a general lack of knowledge and information. In addition, their low percentage in overall exports is influenced by their extensive orientation toward the domestic market (Sin, 2010). Realising the need to compete with the global market, the government has embarked on strategies to enhance the global competitiveness of SMEs. These strategies are embedded in the MSC Malaysia initiative, which is a project aimed to promote the growth of the ICT industry. This initiative is elaborated on in later sections.

2.8.3 The significance of ICT SMEs in the Malaysian economy

This section acknowledges the significance of ICT SMEs in the economy. The ICT industry is a growing industry in Malaysia and has been strongly supported by the government (Ghazi, 2006). The contributions of SMEs within the ICT industry can be seen in six clusters: Application Software (AS), Mobility Embedded Software & Hardware (MeSH), Shared Services and Outsourcing (SSO), Creative Multimedia Companies, Internet-based Business (IBB), and Institutes of Higher Learning (IHL) and Incubators.

Table 2.4 illustrates the number of ICT companies in the respective clusters. The number of ICT companies at present totals 2,173. This represents only 0.42% of the total SMEs in the services sector. This raises an important concern about SME development efforts, as the representation of ICT companies is still very low vis-à-vis the country’s aim to move toward the K-economy. In particular, the number of ICT companies generated from IHL and incubators is the lowest, suggesting that an investigation of better management and the process of company creation in this cluster are of importance.
Table 2.4: Number of ICT companies from various clusters

<table>
<thead>
<tr>
<th>Cluster</th>
<th>ICT companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Software (AS)</td>
<td>963</td>
</tr>
<tr>
<td>Mobility, Embedded Software and Hardware (MeSH)</td>
<td>440</td>
</tr>
<tr>
<td>Shared Services &amp; Outsourcing (SSO)</td>
<td>164</td>
</tr>
<tr>
<td>Creative Multimedia Companies</td>
<td>235</td>
</tr>
<tr>
<td>Internet-based Business (IBB)</td>
<td>282</td>
</tr>
<tr>
<td>Institutes of Higher Learning (IHL) and Incubators</td>
<td>89</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td><strong>2,173</strong></td>
</tr>
</tbody>
</table>

Source: MDeC (2009)

In terms of contribution to GDP by the ICT industry, Figure 2.3 indicates that the overall ICT industry showed a minimal increase of 2.11% between 2003 and 2007. Contribution by the MSC Malaysia is noted at even a lower percentage of 0.6% within the same period. These figures suggest that efforts within the MSC Malaysia movement may not be utilised at optimum capacity and there may be areas that need to be improved with regards to better strategies for ICT SME development.

![Figure 2.3: Contribution to GDP by the ICT industry (2003-2007) (MDeC, 2009)](image)

As with other SMEs, ICT SMEs contribute to the creation of employment. Figure 2.4 illustrates the number of jobs created in the ICT industry in Malaysia from 2003 to 2007. The growth in job creation within ICT is largely due to the number of companies
that sprouted during this period. The figure shows that the number of jobs created in the
this industry grew significantly from just over 20,000 jobs created in 2003 to almost
80,000 in 2007. The growth in employment creation is complementary to the growth in
the employment of knowledge workers. From the 80,000 workers—who are 19.22% of
the total ICT workforce—52,744 are Malaysian knowledge workers, while 5,852 are
foreign knowledge workers; this indicates the recent demand for more knowledge
workers. The multiplier effects of ICT SME growth have caused significant effects on
job creation (Koh, Koh & Tschang, 2005). In terms of exporting, the contribution of
ICT SMEs is still low compared to local sales, by a ratio of 1:2.

Figure 2.4: Job creation by the ICT industry, 2003–2007 (MDeC, 2009)

The Multimedia Development Corporation (MDeC) is the governing body that works
closely with various parties and government agencies to ensure an enabling
environment for both local and global ICT companies. MDeC (2009) reported that total
local sales outperformed export sales throughout 2003–2004. Reasons for the low
percentage growth in export sales are due to unconducive market conditions faced by all
SMEs.

The ICT industry in Malaysia is still in its infancy, and it has yet to make marked
contributions on par with other developing countries in terms of GDP contribution,
employment, and exports. The significance and contribution of the ICT SMEs to the
Malaysian economy could be enhanced with the right implementation of developmental programs such as MSC Malaysia. The next section discusses Malaysia’s transformation to a knowledge economy and its efforts to materialise Vision 2020, a long-term plan to drive Malaysia towards developed-economy status (InfoDev, 2009).

2.8.3.1 Malaysia’s shift towards K-economy

The global shift from labour-intensive economies to knowledge economies has witnessed developing countries like Malaysia changing their priorities to accommodate rapid global change (Hassan, 2002; Ramasamy, Chakrabarty & Cheah, 2003; Chong, 2006). Kotelnikov (2007, p. 4) described the knowledge economy (K-economy) to which many of the countries have transitioned as “an economic growth dependent on a country’s ability to create, accumulate and disseminate knowledge”. According to Kotelnikov (2007), these countries recognised the power of computers and the Internet as catalysts for the knowledge economy, which enables the possibility to codify knowledge into digital format to be transmitted anywhere in the world. Likewise, Khota and Pretorius (2008) add that the focus on knowledge as a critical source of competitive advantage has explicit implications for innovative new products and services.

The K-economy has been defined in several ways within the knowledge-management literature. The OECD defined K-economies as “economies which are directly based on the production, distribution and use of knowledge and information” (2006, p. 7). This definition reflects the current transformation that many countries are undergoing involving high-technology investments, high-technology industries, more highly skilled labour and associated productivity gains. MDeC (2007) defined the K-economy as one which thrives directly from production, distribution, and utilisation of knowledge and information. In Malaysia, SMEs that satisfy any of the following descriptions would be qualified as a K-based firm:

- SMEs including consultancy firms with more than 20% of their staff being knowledge workers (with at least tertiary or professional education);
- SMEs that directly use ICT and technology in business processes or for product improvements;
- SMEs that adopt innovation and R&D in business processes or for product improvements;
- SMEs that provide systematic training in technical skills to their employees.
Kotelnikov (2007) asserts the ICT industry plays a critical role in competing in the knowledge economy. This has driven many nations to align their strategic plans in promoting the growth of ICT SMEs through SME development programs and initiatives. In the United Kingdom for example, technology-based businesses were presumed to be a medium in which to promote a ‘knowledge-based’ economy that would be competitive in the global market (Hannon, 2003). As a result, the government sought the use of technology-based incubators to realise that vision. In Malaysia, the conversion to a knowledge-based and innovation-driven economy is seen as necessary, particularly through ICT SMEs in order to achieve a sustained competitive advantage (Hilmi & Ramayah, 2008). According to the OECD (2006), high-technology SMEs are key contributors to innovation, performance, and economic growth. This is in accordance with Ramasamy et al. (2003), who stated that technology and innovation are necessary to generate a critical mass of innovative SMEs.

2.8.3.2 MSC Malaysia

Based on the previous discussion regarding the importance of SMEs and the growing importance of ICT SMEs to the Malaysian economy, it is likely that SMEs’ contributions will continue to increase in significance. To maintain momentum, continued growth of the SME sector is at the top of the government’s priorities (Malaysia Plan, 2006). MSC Malaysia, a project developed primarily to spearhead the growth of the ICT industry in the country and to provide a test-bed for the global ICT industry was launched in 1996. Physically, it covers an area of more than 750 square kilometres extending south from Malaysia’s capital city and business hub, Kuala Lumpur. MSC Malaysia provides an ideal environment in which companies may harness the full potential of ICT and multimedia technologies.

In facilitating the development and promotion of MSC Malaysia as a key growth driver of the economy, MDeC has been tasked to advise the Malaysian government on ICT legislation and policies, as well as setting benchmark standards for ICT and multimedia operations. To date, MSC Malaysia has attracted participation from more than 2000 local and multinational technology companies involved in various ICT sectors which represent major activities within the Malaysian ICT industry (MDeC, 2009). MSC Malaysia’s value-added contribution to Malaysia’s economy was 1.2% of the Gross Domestic Output of Malaysia in 2007. The findings of the survey suggest that MSC
Malaysia achieved favourable, yet minimal, impacts on Malaysia’s economy, especially in employment creation from the IHL and incubators where only 15,122 jobs were created in 2007 (19% of all employment created).

2.8.4 Challenges of SMEs in Malaysia

A robust SME development plan is necessary to promote SME growth and to overcome the potential obstacles facing these SMEs. Not surprisingly, the Global Competitiveness Report 2009–2010 confirmed there are sufficient indicators which show that Malaysia lags behind other countries in innovation and entrepreneurial spirit. The innovation index ranks innovation performance by the number of patents granted to the people of different countries by the patent offices of the United States, the European Union, and Japan. These indicators were identified based on the innovation index and patent (IP) applications filed from Malaysia. Although the number of IPs filed has significantly improved since 2003, as shown in Figure 2.5, Malaysia is still regarded as having minimal innovation capability.

![Figure 2.5: Intellectual property growth outlook (MDeC, 2009)](image)

In addition to the lag in innovation based on narrow criteria, the literature suggests that Malaysia evidently falls into the category of countries where it is complicated to do business. The World Bank (2008) ranked Malaysia as 23rd in the world for ease of doing business, and 88th for starting a business in 2010. In terms of a global competitiveness index, Malaysia was ranked 24th in the 2009–2010 report, making this a slightly lower rank than in the previous year’s report (21st).
The ranking of ease of doing business is based on a number of categories such as the number of procedures involved in starting a business, the time (in days) taken to start a business, the cost incurred (percentage of income per capita), and the minimum capital required to start a business. A high ranking on the index of the ease of doing business means that the environment is conducive to starting and operating a business. In terms of starting a business in Malaysia, it is reported that one would need to take nine steps, in 11 days, with 11.9% of income per capita for the cost, and no minimum capital. The nine procedures involve submissions of various administrative forms to various agencies, stamping of company documents, making a company seal, followed by registrations with various organisations. This suggests that the regulatory environment in Malaysia is not conducive to the operation of business, particularly with regard to permits and property registrations (World Bank, 2008).

Another significant fact about the Malaysian business scene is the failure rate which is at a high of 60% of businesses (InfoDev, 2009). Reiss (2006) adds that the failure rate of small businesses in their first five years is more than 50%. Saleh and Ndubisi (2006b) associate the challenges in doing business in Malaysia with a range of obstacles. These hindrances include low levels of technological capabilities, limited skilled human and capital resources (Zavatta, 2008), low levels of technology and ICT penetration, low levels of R&D, a substantial orientation towards domestic markets, a high level of international competition, a high level of bureaucracy in government agencies, and a lack of internal sources of funds. Others such as Kiggundu (2002) and Longenecker, Simonetti and Sharkey (1999) assert that small businesses fail because business owners lack competence, and key personnel in the organisations lack the abilities and skills to run a business. Similarly, Sin (2010) highlighted the challenges that Malaysian SMEs face, which include difficulty in obtaining funds, the lack of human capital, a high level of international competition, lack of access to better technology, and the high level of bureaucracy in government agencies.

Other studies have noted the challenges faced by SMEs in Malaysia. APEC (1994) indicated that these relate to obtaining loans, a lack of proper coordination among the country’s SME development agencies, an inability of SMEs to participate in the mainstream of industrial development, underutilisation of available technical assistance and other incentives, and a lack of skilled and talented workers. Additionally, Ting
(2004) recognised human resource constraints, lack of access to finance, inability to adopt technology, and lack of information on potential markets as the key challenges facing Malaysian SMEs.

The literature suggests that although the ICT industry in Malaysia has made economic contributions, there appears to be a lot more room for improvement. The capability of the industry has yet to mature, given its recent debut compared to other developing countries. With effective implementation of economic drivers such as business incubation, the industry could raise to be at par with other developing countries in terms of its contribution to GDP, employment, and exports. This research tries to address the need for enhancing the ICT industry, specifically in developing more ICT SMEs from the business-incubation perspective.

**SME development plans for the ICT industry**

The issues that have been identified are evident in the ICT sector and indicate a critical area for investigation. In addition to the challenges faced by SMEs in general, some of the challenges faced by ICT SMEs include changing innovation dynamics such as shorter product life cycles, as well as placing their products in the global market. These challenges are being addressed in a concerted effort by MSC Malaysia and MDeC. Specifically, the country’s current progressive financial plan—also known as the Ninth Malaysia Plan (2006–2010)—has indicated that the strengthening of the ICT field will be the country’s main agenda. Under this plan, major strategies in economic activities in the ICT field and in the development of SMEs are outlined in various SME development programs. According to SMIDEC (2006), several potential areas for the participation and growth of SMEs in the ICT industry have been identified. These areas include customised software development, consultancy in e-commerce, and consultancy in security. Consequently, an increased number of highly skilled workers are expected to support the growth of the ICT industry, as well as bolstering general economic efficiency.

In recognition of this, the government has prioritised the development of ICT SMEs as an important national agenda and it formed the National SME Development Council (NSDC) in 2004 to provide guidelines, policy directions, and plans for a cohesive and comprehensive SME sector. This council consolidates 15 Ministries and more than 60 government agencies to pool resources towards a shared goal of developing resilient
and competitive SMEs reaching global standards, and towards achieving sustainable and balanced economic growth with high standards of living (MDeC, 2007). Likewise, this council aims to increase ICT SMEs’ contributions to the economy by specifically targeting and strengthening the infrastructure for SME development, through capacity-building of domestic SMEs and enhanced access to finance by SMEs. The government’s effort is evident in formulating and establishing a cohesive policy, and a regulatory and institutional framework as described in the National SME Development Blueprint of 2006. The blueprint outlines a one-year action plan to promote the development of SMEs, which consists of objectives and targets for SME development, key strategies, programs, and financial commitments, including Ministries and agencies which are involved in implementing these programs.

Since 2006, various programs involving financial commitment of AUD 1.2 billion have been identified and executed to implement the acceleration of SME generation (SMIDEC, 2006). These programs aim to strengthen the enabling infrastructure to support SME development, capacity, and the capability-building of SMEs, as well as enhancing SMEs’ access to funding. The programs are undertaken by SMIDEC (rebranded as SME Corp. Malaysia from May 2009), the agency chosen to assume the role of the central coordinating agency to spearhead SME development. SME Corp. Malaysia is tasked with foreseeing issues related to policies, support, and infrastructure of SME development in the manufacturing and services sectors, and the development of SME programs. The programs are aimed to upgrade the products and processes of SMEs, enhance their productivity, provide knowledge and skills, assist requirements of certification, acquisition of technology, and the commercialisation of research and development (SMIDEC, 2006). These programs were identified to be carried out in six categories:

1. Capacity-building and human resource development;
2. Technology development;
3. Market access;
4. Advisory services;
5. Promotion and outreach; and
6. SME industrial sites and Incubator centres.
This research focuses on the last point; however by doing so, many aspects of the preceding five categories and focus areas are of importance too in examining the underlying factors impacting on ICT incubators. It is interesting to note that the implementation of the incubation programs in many ways addresses the first five categories.

This study focuses on how incubators provide the needed assistance to new businesses in their early stages. In the next section, the role of the incubators in promoting the growth and development of ICT SMEs is discussed.

2.9 Incubator as economic development tool

The Malaysian government’s AUD 9 million MSC Malaysia initiative was announced to serve as the backbone for the country’s information superhighway (Wong, 2003). Having expended AUD 12.6 million for the commercialisation of technology through technology development and incubator programs in the Eighth Malaysia Plan, the government has increased allocation for the development of incubators in the Ninth Malaysia Plan to AUD 72 million. This includes developing more ICT incubators and the expansion of SME industrial parks (Malaysia Plan, 2006). An example of such incubators would be the MSC-status incubators which focus on commercialisation and technologically driven activities. MSC status is the recognition given by the government through the MDeC to companies and incubators that undertake ICT activities in the MSC. The status enables companies and incubators to enjoy a set of incentives and benefits outlined by the government’s Bill of Guarantees. As a result of the MSC Malaysia initiative, 2,173 ICT companies have been given MSC accreditation (MDeC, 2009).

As discussed in earlier sections, SMEs have contributed to the country’s GDP, employment, and exports. In recognition of this, the government has laid out plans that would enable the creation and development of SMEs, particularly SMEs in the ICT industry. The Malaysian government has taken the step of establishing incubation centres to develop a pool of SME start-ups in a shorter time. The incubators were developed to promote the growth of entrepreneurship in the manufacturing, services, and agriculture sectors; hence, there is the present diversity in types of incubators. The ICT incubators are specifically aimed to capture and cluster technopreneurs nationwide, as well as to create and nurture a critical mass of technopreneurs, SMEs, and start-up
companies in the ICT and biotechnology industries (SMIDEC, 2006).

**Evolution of business incubators in Malaysia**

Business incubators in Malaysia have evolved through a number of generations, each depicting gradual improvement in terms of the availability of services and resources. Figure 2.6 presents the transformation of incubators from the first-generation to the third-generation incubators in Malaysia. Grimaldi and Grandi (2005) observed that the existence of different incubators and the evolution of business incubator models over time were necessary to accommodate the requirements and needs of businesses, which in turn were the impetus that drove diversity in service provision at incubators.

![Figure 2.6: Evolution of business incubators in Malaysia (Mohd Saffar, 2007)](image)

According to Mohd Saffar (2007) most incubators in developing countries are still trapped in the first and second-generation types of incubators, which are the early versions of incubator models introduced in the 1990s. This situation is similar to that of the Malaysian business-incubation scenario, where 77.3% of the incubators are still found to be in the first two generations, as shown in Table 2.5 (Mohd Saffar, 2007). The number of incubators in the third-generation model which offers more sophisticated facilities such as technology labs is comparatively low.
**Table 2.5: Organisational forms of incubators**

<table>
<thead>
<tr>
<th>Incubators in Malaysia</th>
<th>106</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>First-generation incubators</em></td>
<td></td>
</tr>
<tr>
<td>Landlord-tenant, shared facilities, reactive support</td>
<td>38</td>
</tr>
<tr>
<td><em>Second-generation incubators</em></td>
<td></td>
</tr>
<tr>
<td>Landlord-tenant, shared facilities, proactive support + consulting and (or) advisory</td>
<td>44</td>
</tr>
<tr>
<td><em>Third-generation incubators</em></td>
<td></td>
</tr>
<tr>
<td>Facilities + business advisory services + Acceleration Technology Labs</td>
<td>24</td>
</tr>
</tbody>
</table>

Source: Mohd Saffar (2007)

*First-generation incubators*

In the early 1990s, Malaysia launched its first batch of incubators and initially focused on providing shared office space for new entrepreneurs. This batch of incubators—the *first-generation*—are characterised by a landlord-tenant model. The basic function of a business incubator in this model was to provide office space for the entrepreneur in which to initiate business activities (InfoDev, 2009). Rental rates of office space were comparatively lower than at normal business premises, making it an attractive proposition to try to “win” a spot in the incubators.

Services offered at *first-generation* incubators were fundamental and aimed to accommodate the basic needs of new businesses (Lalkaka, 2001). Besides office space, incubatees are provided with shared facilities such as administrative services, meeting rooms, and access to telephone, fax machines, and secretarial support (Aerts, MatthysSENS & Vandenbempt, 2007). These additional facilities are provided upon inquiry from incubatees, signifying reactive support (InfoDev, 2009). Lalkaka described the *first-generation* incubators as a place that offers “affordable space and shared facilities to carefully selected entrepreneurial groups” (2001, p. 4). He later added that counselling, skill enhancement, and networking services became part of the services.

*Second-generation incubators*

The *first-generation* incubators initially provided sufficient support for the incubatees who only sought office space and basic office facilities. The need for consultancy and business advice became significant in the mid-1990s, which altered the model of the *first-generation* incubators to become *second-generation* incubators. In addition to the typical office space, the *second-generation* incubators are characterised by shared facilities, proactive support, and consulting and advisory services (Lalkaka, 2001). This type of incubator model predominantly existed between 1995 and 1998, when the ICT
industry was booming. These incubators were supposed to grow and develop the ICT industry and to provide a “convergence of support, towards creating growth-potential, tech-based ventures” (Lalkaka, 2001, p. 4). Alternatively, business incubators in this generation were also known as “innovation centres” (Ramasamy, Chakrabarty & Cheah, 2003) that featured support for establishing new industries and institutes of research.

Third-generation incubators

The need to develop third-generation incubators that focus on the importance of business support was pivotal according to Peters, Rice and Sundararajan (2004) who postulate that business support services were far more important than facilities and administrative services were. Within five years after the modelling of the second-generation incubators, the global incubation circle anticipated the next model of business incubators, and hence, third-generation incubators were introduced. The cause of this shift was aligned with the boom of the ICT industry in 1998–1999 where businesses required more sophisticated IT assistance such as technology labs, technopreneur development-focused programs, technology-development consulting, and industry-development consulting. The European Commission (2002) reported that incubators in Europe that emerged in the late 1990s focused more on establishing promising start-ups in the ICT and high-tech sector, which required sophistication in terms of technical facilities and incubation programs.

According to Scaramuzzi (2002), these incubators provide a full range of support services for the development of knowledge-based businesses. Lalkaka described this generation of incubators as able to “de-emphasize low rentals and focus on enhanced business services, for both tenants and affiliates on an out-reach basis” (Lalkaka, 1997, p. 30). Scaramuzzi (2002) added that the strength of the third-generation incubators lies in their capacity to disseminate knowledge and resources, and to provide linkages to external networks, acknowledged as an advantage of business incubation (Allen & McCluskey, 1990; Bollingtoft & Ulhoi, 2005). A summary of the incubator generational typology, their characteristics, and list of references is presented in Table 2.6.
Table 2.6: Incubator generational typology and characteristics

<table>
<thead>
<tr>
<th>Incubator Generational Typology</th>
<th>Characteristics</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>First-generation</td>
<td>Shared facilities</td>
<td>• Lalkaka &amp; Abetti, 1999</td>
</tr>
<tr>
<td></td>
<td>Reactive support</td>
<td>• Scaramuzzi, 2002</td>
</tr>
<tr>
<td></td>
<td>Landlord-tenant relationship</td>
<td>• Rice, 2002</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Lakshminarayanan, 2004</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Aerts, Matthyssens &amp; Vandenbempt, 2007</td>
</tr>
<tr>
<td>Second-generation</td>
<td>Advisory services</td>
<td>• Lalkaka, 1997; 2001</td>
</tr>
<tr>
<td></td>
<td>Proactive support</td>
<td>• Scaramuzzi, 2002</td>
</tr>
<tr>
<td></td>
<td>Services available within and outside of incubators</td>
<td>• Lakshminarayanan, 2004</td>
</tr>
<tr>
<td></td>
<td>Consultancy services, training sessions, network</td>
<td>• Aerts, Matthyssens &amp; Vandenbempt, 2007</td>
</tr>
<tr>
<td></td>
<td>access to funding</td>
<td></td>
</tr>
<tr>
<td>Third-generation</td>
<td>Access to funding</td>
<td>• Lalkaka, 1997; 2001</td>
</tr>
<tr>
<td></td>
<td>Accelerating progress</td>
<td>• Scaramuzzi, 2002</td>
</tr>
<tr>
<td></td>
<td>Mentoring and technology labs</td>
<td>• Lakshminarayanan, 2004</td>
</tr>
<tr>
<td></td>
<td>Enhanced services to knowledge-based enterprises</td>
<td>• Mohd Saffar, 2008</td>
</tr>
</tbody>
</table>

Subsequently, these new generation incubators are known to provide both pre-incubation and post-incubation services to their incubatees. Pre-incubation services include assistance in entrepreneurial readiness training and fast tracking, while post-incubation services include facilities, follow-up consulting, and advice to graduates. As such, more incubators around the world are now adopting the third-generation incubator model for its value-added features and its ability to cater to the present needs of technology-based entrepreneurs. However, this is not the case in Malaysia, as is detailed in the literature (InfoDev, 2009).

The contribution of incubators towards the creation and development of ICT SMEs has not, according to some authors, been fairly recognised (InfoDev, 2009) implying to a critical area that needs to be studied. Additionally, the fact that the majority of the incubators are still confined in the first and second-generation types of incubators and have not progressed to a more sophisticated type of incubator (that is, the third and now the emerging fourth-generation incubators) raises a compelling reason to undertake this research. Concurrently, it raises the issue of professional management services, observed to be lacking in some ICT incubators (Siegel, 2006). These services are critical in adding to the skills of the workforce and in building the capacity of future human resources. This thesis provides an understanding of the business incubation process in Malaysian ICT incubators and highlights areas that could be improved in terms of fast tracking the incubator status to more advanced types.
The next section offers a justification of the significance of conducting this study, adding to the breadth of knowledge on business incubation.

2.9.1 Investigating the business incubation process in Malaysia

A review of the literature indicates that empirical research examining business incubation processes in Malaysia is scant, even more so in the ICT sector. Likewise, it is a major concern that the majority of the literature to date has focused more upon the outcomes of the business-incubation process such as program sustainability and growth, incubatees’ survival and growth, contributions to the sponsoring university’s mission, and community-related impacts (Mian, 1997), rather than the processes that created such outputs (Albert, Bernasconi & Gaynor, 2002; McAdam et al., 2006; White & McLaughlin, 2006; Sun, Ni & Leung, 2007; Bergek & Norrman, 2008).

The extant literature is anecdotal in nature and the concept of how business incubators create and develop SMEs remains fairly rudimentary (Mian, 1997). According to Hackett and Dilts (2004b) in Warren et al. (2009, p. 485), there has been little effort beyond the work of Campbell, Kendrick and Samuelson (1985) to “unpack the variables associated with the incubation process”. Ongoing debates on relationships (Bhabra-Remedios & Cornelius, 2003; Rothaermel & Thursby, 2005; McAdam & McAdam, 2008) between business incubator performance and elements in the business-incubation process encouraged the present researcher to examine such relationships in the Malaysian ICT incubator context. The elements in the incubation process include selection criteria used to choose potential incubatees, intensity of monitoring and business assistance provided to incubatees, resources provided at the incubators, and professional management services which are all believed to be important factors in the incubation process. A review of the incubation literature identified these factors as important elements in the incubation process (Aerts, Matthyssens & Vandenbempt, 2007; Shalaby, 2007; Schwartz & Hornyh, 2008) and will be further discussed in Chapter 3.

This study fills a gap in the incubation literature by providing empirical evidence regarding the process of business incubation in ICT incubators in Malaysia. The lack of empirical data, particularly in the Malaysian context, points to this research being of significance to practitioners, policymakers, and to the extension of theoretical knowledge of elements significant to the business-incubation process.
2.9.2 Issues and constraints surrounding the Malaysian ICT incubators

Malaysian ICT incubators are experiencing a lag in growth and development and are faced with several issues that foil their effective role as an economic development tool (Mahmud, 2003). For instance, very few of the incubators have active investment activities and are, reportedly, not commercially viable.

Problems identified with Malaysian incubators are often associated with the management of the incubators. Many incubator managers are deemed not to have adequate entrepreneurial skills to run the incubators (Jusoh, 2006; Mohd Saffar, 2007). Likewise, these incubator managers have been observed to lack the capabilities and experience critical for new businesses to survive and prosper. As a result, many incubatees fail to meet their goal of launching a successful business. This has urged the government to re-examine the viability of the incubator programs, aiming to improve the situation (Malaysia Plan, 2006). The incubators still have a strong tendency to mirror the landlord-tenant model. Despite the government’s various initiatives to transform the incubator status to third-generation models, evidence suggest that “incubators in Malaysia are not properly managed, leading to the discouraging number of start-ups going out of business” (Jusoh, 2006, p. 28).

The reality is there is a lack of management capability in incubators in Malaysia. One of the identified problems lies in the duplication in tasks in developing technopreneurs in Malaysia leading to “lack of coordination, implementation procedures and wastage of resources” (Mohd Saffar, 2007, p. 8). The tasks are taken up by a number of agencies which report to different Ministries, causing an undesirable duplication of roles and responsibilities (Robinson, 2010). For example, technology incubators, general incubators, and agro incubators are placed under the Ministry of Science, Technology, and Innovation, the Ministry of Entrepreneurship Cooperation and Development, and the Ministry of Agriculture and Agro-based Industries respectively. Because of this, incubators in some states may not have the same privileged facilities as other incubators do in the Kuala Lumpur area, which is regarded as a more positive locale for the incubation industry. Shanmugan (2001) asserted that Malaysian incubators need to increase their success rate of generating more graduates and pushing them into making an Initial Public Offer (IPO). With all the obstacles faced by the Malaysian incubators thus far, it is very fitting that research is conducted to examine and identify areas of
improvement for the Malaysian ICT incubators, so that key success factors are identified that could lead to outcomes favorable to incubator success.

This chapter presented an overview of the significance of SMEs to the Malaysian economy; the small but important steps being taken to facilitate better approaches to ICT business incubation; and a generational typology of business incubators. The chapter also includes a discussion of the significance of the study, which is further addressed in Chapter 3.
CHAPTER 3

CONCEPTUAL FRAMEWORK AND RESEARCH PROPOSITIONS

3.1 Introduction

The preceding chapter presented an overview of the business incubation phenomenon; it elaborated on historical development of business incubation, key definitions used in the business incubation literature, the role of incubators in enhancing economic development in various countries, and covered characteristics of incubators. The chapter concluded with a review of issues and constraints facing Malaysian ICT incubators.

This chapter presents a review of pertinent literature addressing the theoretical conceptualisations of the business incubation framework underlying this thesis. First, the gaps in the extant incubation literature are presented, followed by a discussion on the significance of conducting this study. The latter part of this chapter provides an extensive review of variables used in the theoretical framework investigated, and introduces the research questions and research propositions developed in this thesis.

3.2 Gaps in the Extant Incubation Research

A review of the literature revealed there has been extensive research conducted on business incubation (Lalkaka, 1997; Hackett & Dilts, 2004b; Phan, Siegel & Wright, 2005). Autio and Klofsten (1998) stated there exists a gap in the study of business incubators where empirical analysis is necessary to identify and analyse advantageous management practices in SME support arrangements. CSES (2002), in its benchmarking report conducted among European incubators, provided valuable conclusions that have formed the basis of much incubation research. Included among the findings are some significant outcomes of business incubators: job and wealth creation, acceleration and maximisation of start-up growth, and the adoption of best practices by business incubators.

Given the absence of any systematic review of the business incubation literature, Hackett and Dilts (2004b) analysed the literature in chronological order and recognised five primary research orientations in incubation—these are studies centred on incubator development, incubator configurations, incubatee development, incubator-incubation
impacts, and theorising about business incubation.

Following an examination of Hackett and Dilt’s (2004b) review of the incubation literature, this research is prompted to study the impacts of business incubation process on incubation performance. A problem lies in the dearth of knowledge and research surrounding the status and effectiveness of incubation in Malaysia, particularly in the ICT industry. Extant literature with reference to the Malaysian incubation phenomenon reflects the immature status of the subject in the limited academic research conducted (Mohd Yunos, 2001). Much information regarding the status of Malaysian incubators and the incubation system has been found in professional literature appearing on websites, annual incubator reports, consultancy surveys, benchmarking reports, magazines, and in various other publications (InfoDev, 2009), however, there is a concerning lack of empirically-based research. For example, there has been no comprehensive study which specifically aims to investigate the ICT incubation process and its influence on business incubation performance. Extant literature that discusses the Malaysian system merely reports the status of the incubation system, focusing on non-specific types of incubators, and with no initiative to examine actual experience (Mahmud, 2003; Ghazi, 2006; Jusoh, 2006).

This study addresses that gap and explores the lack of clarity in the underlying components impacting on ICT incubation performance in Malaysia. This research unfolds the components in the incubation process that together meet the objective of incubators as a driver for the Malaysian economy.

3.3 Significance of Study

The incubator-incubation literature suggests that a more developed understanding of the underlying processes of incubation and the types and timing of interventions may be critical for achieving accelerated incubatee growth (Lawrence et al., 1997; Khavul et al., 1998; Reid & Garnsey, 1998). Patton, Warren, and Bream (2009) interpret this as the need for incubators to deliver more intangible types of assistance, including the diagnosis of business needs, support with business-planning, introductions to peer group networks, the deployment of professional networks, mentors, and funding agencies, as opposed to the mere provision of basic physical infrastructure.
Despite the increased number of incubators established, the impact on the economic development of Malaysia is still unfelt, as was revealed in the previous chapter (MDeC, 2009). The current number of incubators is 106 nationwide; however, the effectiveness of these incubators in producing successful ICT SMEs and their resultant impact on the Malaysia economy remains in question. This is not only the case in Malaysia, as other developing countries share a similar experience. This was reported by Klok (2001), who stated that data suggesting business incubators’ contribution to economic development in developing countries are virtually non-existent. Subsequently, the state of the Malaysian incubation industry has been criticised as being in need of a boost to strengthen and materialise its role as an economic driver (Ghazi, 2006; Mohd Saffar, 2007).

The study of business incubation in Malaysia reported in this thesis may assist in extending knowledge and practice of business incubation processes, policies, and small business management. It provides a foundation from which learning and development programs for the incubators may be provided.

3.4 Conceptual Framework

This section presents the conceptual framework that forms the basis of this thesis. It provides a discussion of each of the constructs underpinning the framework that are widely acknowledged in the incubation literature.
Incubatee screening is a widely accepted element of the incubation model, and is postulated as a ‘defining characteristic’ of an incubator (CSES, 2002). Researchers (Lumpkin & Ireland, 1988; Peters, Rice & Sundararajan, 2004) agree that careful selection of incubatees is an important management task. It is a significant component of the incubation process (Mian, 1997; Hackett & Dilts, 2004a; Aerts, Matthyssens & Vandenbempt, 2007), as it can increase the probability of incubatee and incubator success (Kuratko, LaFollette & William, 1987; Merrifield, 1987). Lumpkin and Ireland

Figure 3.1: Proposed theoretical framework of business incubation process

3.4.1 Selection Performance
(1988) found that in a survey of 75 incubators, only 15% of the sample did not use a set of factors in their screening practices, while the rest adopted thorough screening processes, concentrating on market, personal, and financial characteristics of the potential incubatee. Advocates of incubatee screening practices Wiggins and Gibson (2003), postulate selecting companies is perhaps the most important consideration that sets apart one incubator from another.

Incubators that maintain certain standards in selecting potential incubatees create value, and hence minimise the number of incubatee failures (Hackett & Dilts, 2004a; Hamdani, 2006; Aerts, MatthysSENS & Vandenbempt, 2007), as this allows incubators to detect characteristics that are deemed essential to develop sound enterprises. Chinsomboon (2000) equated selection criteria for incubatees with criteria used by venture capitalists to invest in businesses. This was also performed by Hackett and Dilts (2008) in their study to measure the business incubation process where items related to venture capitalists’ criteria were used in the selection performance part of the questionnaire. More recent studies have similarly acknowledged the similarities of the criteria and have adopted equivalent scales (Ganamotse, 2011).

Extant literature on business incubation has indicated several benefits of selection criteria. As more technology incubators and sector-specific incubators emerged, there is a need to define the criteria for incubatee selection, as posited by Lambing and Kuehl (2003) where incubatee screening is necessary to create more focused groups of entrepreneurs such as technology entrepreneurs. Aerts et al. (2007) confirmed in their study that a more balanced screening profile consisting of market, team, and financial characteristics of the potential incubatees positively relates the incubatee survival rate.

Although the importance of selection criteria is shared by these researchers, opinions differ, however, with regard to what appropriate selection criteria are (Bergek & Norrman, 2008). Hence, there is some inconsistency regarding criteria used for incubatee selection. In this regard, Hackett and Dilts argued the task of selecting potential incubatees is a challenge for it requires “a sophisticated understanding of the market and the process of new venture formation” (2004b, p. 61). Similarly, Kuratko, LaFollette, and William (1987) perceived that inconsistency in incubatee selection may lead to the selection of incubatees that are either too strong or too weak to be hatched in an incubator, and stressed the importance of standard screening measures, in line with
the incubators’ goals.

Research on incubation selection criteria continued to propagate in search for the ideal set of standards that would lead to increased incubation performance. Bergek and Norrman (2008) proposed a model for selection criteria combining selection primarily based on idea and selection primarily based on entrepreneur or the team. The authors suggested two basic approaches to incubatee selection: (i) “picking-the-winner”; and (ii) “survival-of-the-fittest”. In the first approach, incubator managers try to identify a few successful ventures before selection, which if taken to its extreme, will result in the incubator behaving like private venture capital firms. In the second approach, incubator managers adopt a more relaxed style of incubatee selection and often take on a larger number of firms. This approach relies on the market and time to eventually separate winners from losers. The model then combines these two approaches with the selection components introduced earlier, and results in four “selection strategies” which has been noted to result in a variety of incubator “portfolios”.

The model developed by Bergek and Norrman (2008) seemed to overlook other equally important characteristics of the potential incubatees that need to be considered such as market properties of the proposed business, and lacked detailed guidelines on how to pick the two types of entrepreneurs. Hackett and Dilts (2004a) developed a comprehensive framework where incubatee selection process is covered by four dimensions: selection based on managerial, market, product, and financial characteristics of the applicants. Vanderstraeten and Matthyssens (2010) confirmed there has been no studies other than by Hackett and Dilts (2008) that provided validated scales measuring Selection Performance. Despite numerous assertions on the importance of selection criteria in ensuring incubation success, there have been limited studies examining the relationship between selection practices of business incubators and their performance in relation to new venture creation (Ganamotse, 2011) or incubatee success (Hackett & Dilts, 2004b).

The following section is a discussion of selection practices undertaken by incubators as found in the literature.

3.4.1.1 Selection Based on Managerial Characteristics

The review of the literature revealed that incubators screen potential incubatees based
on a wide and diversified set of criteria (Aerts, MatthysSENS & VandenbergMpt, 2007). Selection based on the composition of the team is cited in the literature as noteworthy (Mian, 1997), particularly searching for a qualified management team. Lumpkin and Ireland (1988) had earlier stated that managerial skills and experience are essential selection criteria which incubators should apply in their search for potential incubatees. Supporting this view are many empirical studies (Cooper & Bruno, 1977; Roure & Maidique, 1986; Stuart & Abetti, 1987) that state the difference between successful firms and unsuccessful firms is that the former have founders with relevant experience. Gartner’s (1985) study associated successful new venture creation with the team’s relevant education, work experience, and industry experience.

More recent studies show that the importance of prior knowledge and experience contributes to the entrepreneurial venture are common pre-requisites that should be in entrepreneurs as found in recent opportunity recognition literature (Shane & Venkataraman, 2000). The basis for incorporating managerial characteristics of the team in incubatee selection criteria can be understood through Wright and Vanaelst’s (2009) examination of the potential links between the team and new business outcome and the team’s turnover. Riquelme and Watson (2002) postulated that incubators that seek managerial characteristics such as prior employment experience and technical expertise of the applicant’s management team are expected to outperform incubators that do not. Selection based on management team characteristics enables the potential incubatees and their teams to be evaluated on their managerial and technical experience, which are important for developing a successful new venture (Bergek & Norrman, 2008). However, this entrepreneurial-focused approach requires the incubator management to have the ability to judge personality and knowledge of business-development requirements in relation to the experience, skills, and other characteristics of the potential incubatees. Wright and Vanalaest (2009) promote managerial characteristics as important as they attribute to problem solving capabilities from diverse education backgrounds and skills. They also believe that the experience of the team speeds up the decision-making process, hence not much time is wasted on building trust and bonding among the team. In a similar vein, experienced teams would know how to utilise incubator resources optimally, which will facilitate successful business incubation (McAdam & McAdam, 2008).
Several studies have examined the dimensions of managerial characteristics that incubators look for in potential incubatees. In their survey of US incubator managers, Lumpkin and Ireland (1988) measured the ‘experience of the management team’ using skills for management, marketing, technical, and financial skills in the potential incubatee. Mian (1997) found that university technology business incubators in the United States used three types of incubatee selection criteria which are the general, technical, and business skills of the potential incubatees. Echoing similar views Hall and Hofer (1993) asserted that technical expertise and prior entrepreneurial experience of the potential incubatee’s management team are selection criteria that are significant in evaluating new ventures; this is akin to selecting new enterprises for an incubator.

3.4.1.2 Selection Based on Market Characteristics

Incubators have been found to select their incubatees based on characteristics of the market in which they plan to establish (Mian, 1997; Aerts, Matthyssens & Vandebempt, 2007; Hackett & Dilts, 2008). Incubators generally seek applicants who have an idea of their potential market, as postulated by MacMillan, Siegel and Narasimha (1985) and Hall and Hofer (1993) and who stressed the importance of long-term growth of the market potential of the incubatees. Supporting this, CSES (2002) pointed out that the ability of the potential incubatee to determine the size of the target market will have a very important bearing on how successful the incubator itself can be in achieving its mission. Hackett and Dilts (2004a) included this aspect of selection criteria in their construct stating that the market characteristics at which the incubatees intend to aim should be considered as a selection criterion. This is on the basis that the time taken to identify the potential market of the future incubatees could be shortened and hence incubatees could progress faster during the incubation period.

Selection based on market characteristics has been noted to be a practice of US incubator managers where persistence of marketability of the product or service (Lumpkin & Ireland, 1988) is assessed. Hackett and Dilts (2008) cited in Tyebjee and Bruno (1984) who suggested that other dimensions of selection based on market characteristics include whether customers within the target market are accessible to the new enterprise, and the incubatees’ potential in creating new markets. The extent to which the product has a high market growth potential, and a large target market with purchasing power have also been previously linked to growth of new ventures (Hackett...
Similarly, it has been suggested in the literature that successful new ventures ought to have access to a larger market share than the competitors and to a market with purchase capabilities (Roure & Maidique, 1986).

3.4.1.3 Selection Based on Product Characteristics

One of the more common yardsticks used by incubators in their selection process is selection based on the product characteristics (Lumpkin & Ireland, 1988; Bergek & Norrman, 2008). Technology incubators, for example, select businesses that focus on technology, particularly a specific technology orientation with high job-creation potential as reported in CSES (2002), thus creating sector-specific incubators. University incubators tend to select potential incubatees based on business ideas originating from university research and those that have commercialisation potential. Selection made based on product characteristics is also evident in Schwartz’s (2008) study where he pointed out incubators tend to select incubatees based on characteristics of the product or service in order to gauge their market potential and the chance of the success of the underlying business model.

Early literature on evaluation of new ventures quoted uniqueness of the product, ownership of patent protection, technological edge of the product (Tyebjee & Bruno, 1984), and relative advantage of the product over competitors’ products (Barney, 1991) as some of the criteria that are used by venture capitalists (Hackett & Dilts, 2008). This type of selection is premised on the basis that products that are differentiated from existing ones could lead to new venture success (Hackett & Dilts, 2008). Barney (1991) asserted that products could be assessed on a number of dimensions, including rareness, inimitability, substitutability of the product (MacMillan, Siegel & Narasimha, 1985; Barney, 1991), and ability to demonstrate a defendable competitive position.

3.4.1.4 Selection Based on Financial Characteristics

Many incubators have used financial capabilities of the potential incubatees as a criterion for selection (Lumpkin & Ireland, 1988; Bergek & Norrman, 2008). Financial strength of the potential incubatees has been noted as important as it demonstrates their potential and to sustain and be successful (Ganamotse, 2011). Merrifield (1987) identified profit potential as one of six criteria that are used in an incubatee selection process. Similarly, as a result of analysing the selection criteria of six university-
sponsored incubators, Mian (1994) found that incubatees were selected based on their existing cash flow, high growth potential, and ability to pay the rent. Despite limited literature focusing on the influence of financial-based selection, Hackett and Dilts (2008) tested and validated dimensions such as the profit potential of the start-up company, the likelihood of achieving financial break-even in a short period, the start-up company’s potential to attract investment participation from venture capitalists, and having multiple and harvestable exit options.

In investigating the variables previously mentioned, this thesis employs research propositions to identify relationships between constructs of the conceptual framework. Cooper and Schindler (2006) stated that proposition is a statement about concepts that may be judged true or false if it refers to observable phenomena. The difference between hypothesis and proposition is that hypothesis is formulated for empirical testing, while propositions are not. Further, they authors assert that propositions will be accepted if they can be judged to be true or rejected if they can be judged to be false. Miles and Huberman (1994) earlier asserted that “propositions” refers to the qualitative researchers’ way of explicitly stating their ideas about what is going on as part of the process of theorising and data analysis, but maintained that propositions serve the same function as hypotheses do. Following Herbst (2001), this study uses research propositions, which will take into account both quantitative and qualitative findings rather than hypotheses for reasons that include:

- The empirical part of this study is exploratory in nature.
- The research is not entirely based on previous models and can therefore be approached from a more pragmatic view, which will be more meaningful.

In this study, the extent of Selection Performance conducted by the ICT incubators is examined. The four dimensions of Selection Performance as discussed earlier are investigated and measures of each item in the dimensions are explained in Chapter 4. Accordingly, earlier discussion regarding the importance of Selection Performance motivates the following proposition:

*Proposition 1: A systematic approach to Selection Performance will produce a higher number of incubatee graduates*
3.4.2 Monitoring and Business Assistance Intensity

Monitoring of incubatees and providing business assistance to the incubatees have been part of incubator services for quite some time. Literature on incubation acknowledged the need for incubatee monitoring to ensure that businesses progress smoothly at the incubators (Linder, 2003; O'Neal, 2005; Patton, Warren & Bream, 2009). Campbell et al. (1985), Smilor and Gill (1986) and Autio and Klofsten (1998) confirm in their studies that monitoring of incubatees is a source of value that incubators can offer to their incubatees. Merrifield (1987) views it as a critical success factor for incubators. Hackett and Dilts (2004a) confirmed in their study that business assistance is associated with business incubation performance.

Peters, Rice and Sundararajan (2004) highlighted the significance of monitoring, or coaching, which is referred to as training and educational workshops offered, seminars, programs, either for a fee or free of charge to the incubatees as factors associated with increasing incubatee graduation rates. Patton et al. (2009) stated that the incubation process needs to include monitoring and evaluation of incubatee progress to commercialise business ideas, but warned that an overly formal system has the potential to inhibit entrepreneurial flair and thus may fail to take account of the bespoke nature of business development.

3.4.2.1 Time Intensity

Studies show that frequent interaction with incubator management creates a better relationship and ultimately contributes to the incubatees’ and incubators’ success (McAdam & Marlow, 2007a, 2007b; Scillitoe & Chakrabarti, 2010). From a social-capital perspective, more frequent counselling interactions enable the creation of stronger ties that facilitate transfer of knowledge and learning between the incubator management and the venture. This includes venture learning from the incubator management, and for incubator management to learn about the needs of the venture, thus allowing them to offer relevant assistance (Scillitoe & Chakrabarti, 2010). The authors hence postulated more frequent counselling interactions can lead to both better business and technical assistance.

Furthermore, Rice (2002) suggested that the relationship between the incubator manager and the incubatee is of some importance to the development of the business
proposal. A study by Kuang et al. (2003) found in the context of university incubators that incubator management must form closer ties with incubatees to ensure incubator success. A model proposed by the authors suggests an integrative framework encompassing the involvement of incubator management and the sharing of duties with each incubatee. Rice (2002) postulated incubator manager-incubatee dyads co-produce the incubation process, implying that the time intensity of business assistance interventions must be strategically allocated by the incubator manager to the incubatees, and that incubatees must be properly prepared to utilise the advice and insights resulting from such intervention.

Scillitoe and Chakrabarti (2010) acknowledged that prior research supports the notion that counselling interactions are a valuable form of business assistance. They further suggested that more frequent counselling interactions will allow the incubator management to learn better about the needs of the venture, and thus offer more relevant business assistance (Hackett & Dilts, 2004b), and the transfer of related knowledge, either directly or by support to the venture to utilise the incubator network successfully (Rice, 2002). Alternatively, Vedel, Stephany, and Gabarret (2011) found that advice and frequency of interaction between incubator managers and incubatees do not have a positive influence on economic performance, particularly on job creation.

3.4.2.2 Comprehensiveness and Quality

The types of business assistance that incubators claim to provide include administrative-related assistance and services, production-related advice, and operations-related advice (Ansoff, 1965; Chrisman, 1989). Several studies revealed that the level of business assistance provided at the incubators has a positive influence on the incubation process outcome (Rice, 2002; Hackett & Dilts, 2004b; Bergek & Norrman, 2008). The NBIA (2006) study revealed that while there is no strong correlation between business assistance practices of the incubators and outcomes such as incubatee sales and revenue growth, positive correlations were found between assistance practices and equity investment, patents, research grants, and copyright and licensed intellectual property. Despite that, studies have shown that the range of business assistance provided by a business incubator is instrumental in business incubation success (Hackett & Dilts, 2008).

Literature suggests that incubators ensure the quality of their services by regularly
reviewing and obtaining feedback on them (Costa-David, Malan & Lalkaka, 2002; Abduh et al., 2007). The literature also reveals that incubator managers actively and continuously seek ways to improve the level of customer service satisfaction inside the incubator (Lalkaka, 2001). Consistent with the findings from a recent study comparing technology incubators and non-technology based incubators in North European Union countries (Crabtree & Miller, 1999), Hackett and Dilts (2008), Chandra, He and Fealy (2007) and Costa-David, Malan and Lalkaka (2002) confirmed that the quality of business assistance provided is essential for successful business incubation. Accordingly, earlier discussion regarding the importance of Monitoring and Business Assistance Intensity motivates the following proposition:

**Proposition 2: Incubatees are more likely to perform when monitoring and business assistance are provided**

### 3.4.3 Resource Allocation

The Resource Based View (RBV) provides a valid *raison d’être* for the Resource Allocation construct to be examined in this thesis (Penrose, 1959; Rumelt, 1984; Wernerfelt, 1984; Barney, 1991). It suggests that positive incubation process outcomes could be examined and forecast as a function of four dimensions—value, rareness, inimitability, and substitutability—and asserts that firms sustain competitive advantages by deploying valuable resources that are superior, scarce, and inimitable (Wernerfelt, 1984; Barney, 1991; Roberts & Dowling, 2002; Ray, Barney & Muhanna, 2004; Ou, Abratt & Dion, 2006). To illustrate this, the RBV posits that a well-funded incubator with industry contacts, high-quality innovations, and experienced entrepreneurs is more likely to have successful outcomes than an incubator without these resources. This theory can provide insight on the way an incubator values and selects its incubatees. Alternatively, the literature offers a contradictory view where there seems to be no justification for an RBV perspective on an incubatees’ success (Stevens & Schulze, 2005) where none of the external or internal resources show a positive relationship with firm performance.

Hackett and Dilts (2004a) operationalised an *incubator resources* definition from Daft (1983, p. 50) which states that they are “all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc. controlled by a firm that enable [it to] improve its efficiency and effectiveness”. In their study, the term ‘Resource
Munificence’ was used, which refers to “the relative abundance of incubator resources and is characterized by dimensions of resource availability, quality and utilization” (Hackett & Dilts, 2004a, p. 50). In this thesis, the term ‘Resource Allocation’ is used in place of ‘Resource Munificence’ (Hackett & Dilts, 2004a) to reflect the exploratory nature of the present research on the incubator resources available in Malaysian ICT incubators.

The incubation literature revealed many incubator studies that examined incubators’ resources such as incubators’ networks (Bollingtoft & Ulhoi, 2005; Studdard, 2006); the quality of the management team (Mian, 1997; Costa-David, Malan & Lalkaka, 2002); the type and the quality of the incubator’s connection to a university (Tamasy, 2007); a professional service network and initial government funding (Lalkaka 1996); institutional support (Mian, 1997); and the incubators’ image or prestige (Mian, 1997). It has been cited in the literature that incubatees’ reputation is enhanced because of their association with the incubator (Chrisman, Bauerschmidt & Hofer, 1998).

3.4.3.1 Resource Availability

Hackett and Dilts (2004a) referred to resource availability as the incubator’s ability to provide incubatees with access to resources. They recognised two sub-categories of incubator resources: those internal and external to the incubator. Resources related to economics, environment, personnel, or operations were identified as internal resources; external resources are those that are outside the incubator, encompassing the incubator and the clusters of industrial innovation networks related to the incubator and its incubatees.

Early incubation studies acknowledged common internal incubator resources such as affordable and flexible office space to meet the changing space needs of the incubatees (Allen & Weinberg, 1988; Allen & McCluskey, 1990; Sherman & Chappell, 1998); shared office services and meeting rooms (Kazumi, 2008); fax machines, telephones, presentation facilities, and cafeteria (Mian, 1997; Abduh et al., 2007; McAdam & McAdam, 2008). Sherman and Chappell (1998) stated that incubators’ provision of managerial expertise is an incubator resource. Scaramuzzi (2002) added that incubators typically offer access to skills and competencies in capital, technology, and facilities. Researchers Temali and Campbell (1984), Allen and Rahman (1985), Smilor (1987), and Mian (1997) acknowledged incubator resources as the ability to provide incubatees
with access to administrative support services. Scheirer, Nieva, Gaertner, Newman and Ramsey (1985), Campbell (1989), Autio and Klofsten (1998), and Rice (2002) stated that business-related information imparted to incubatees in a way that is easy for them to understand is a form of incubator resource. Technology incubators in particular have to typically offer access to advanced-technology laboratories, equipment, and other research and technical resources (Mian, 1997; Philips, 2002; Chan & Lau, 2005).

In addition to the internal resources mentioned, Brooks (1986), Smilor (1987), Hansen et al. (2000), and Hackett and Dilts (2004a) suggested that incubators provide incubatees with external resources. These resources include access to lawyers, accountants, consultants, marketing specialists, local university contacts, and intellectual property experts. Sherman and Chappell (1998) recognised incubators’ ability to provide incubatees with access to sources of capital via introductions to banks, venture capitalists, and business angels (Rice, 2002; Grimaldi & Grandi, 2005).

Studies have shown that partnerships and networking opportunities are other forms of resources that are commonly found in incubators (Scaramuzzi, 2002). Studies have demonstrated that when an incubatee is introduced to one of the incubator’s network contacts, the incubatee maximises the opportunity present in the introduction (Todorovic & Moenter, 2010). Martin (1997) suggested that networking within the incubator can take place in a natural way if a physical area is set aside for the purpose of mail collection, photocopying, coffee, and restaurant facilities.

In a similar vein, Todorovic and Moenter (2010) pointed out that the networking process improves the efficiency and effectiveness of start-up firms, allowing them to achieve goals and sustain growth (McAdam & McAdam, 2006). Nevertheless, developing an efficient network demands considerable resources, which requires a devoted entity to support the networking process.

3.4.3.2 Resources Quality
Adapted from McGrath (1999) and Rice (2002), Hackett and Dilts (2004a, p. 50) stated that resource quality refers to “the relative value of the resources the incubator provides to the incubatees”. Researchers have identified several ways to gauge the quality of incubator resources. Allen and Weinberg (1988), Allen and McCluskey (1990), and Sherman and Chappell (1998), for example, identified the incubators’ ability to offer
lease agreements that are flexible enough to meet the changing needs of the incubatees as a way to measure incubator resource quality. Alternatively, Chrisman, Bauerschmidt, and Hofer (1998) assert that incubator resource quality can be judged through the enhancement of an incubatee’s reputation because of their association with the incubator.

Hackett and Dilts (2008) suggested additional means that can explain incubator resource quality but they have yet to be tested. These include the incubator’s pleasantness and its nurturing environment, their ability to provide business-related information that is easily comprehended by the incubatees, and whether incubatees receive information on sources of smart capital.

3.4.3.4 Resource Utilisation

There has been evidence in the literature linking utilisation of incubator resources with incubation performance (Clarysse, Wright, Lockett, Van de Velde & Vohora, 2005; Todorovic & Moenter, 2010). Mian (1994) reported that higher utilisation of resources enables a conducive environment for the development of new technology-based firms.

Hamdani (2006) reported that highly utilised resources include help with business basics, marketing assistance, help with accounting or financial management, linkages to business angels or venture-capital investors, office space, and a library. Seidel (2001) found that utilisation of resources in the form of networks of contacts, incubator managers’ expertise, regular performance feedback and benchmarking against other entrepreneurs, and signalling effects through incubator affiliation all lead to benefits to the incubatees.

Hackett and Dilts (2008) suggested several areas in which utilisation of resources by incubatees can be measured including utilisation of: administrative services, advice obtained from the incubator manager, and knowledge obtained by fellow incubatees. They include areas such as incubatees acting upon the advice they receive from incubator managers and fellow incubatees, and the maximisation of opportunity emerging from an introduction to an incubator’s network of contacts. However, the effects of utilisation of such resources are limited.

The literature regarding allocation of incubation resources mentioned earlier leads to the following proposition:
Proposition 3: Incubatees are more likely to perform when appropriate incubator resources are allocated

3.4.4 Professional Management Services

Ongoing debate (Burns, 1997; Mian, 1997; Vedovello & Godinho, 2003) propels the current research to examine how (a) marketing and promotion management, (b) financial management, (c) staff and personnel management, and (d) strategic management of incubatees influence business incubation performance. Review of the incubation literature suggests there is a growing significance in improving incubation management (Kirby, 1990; Hannon, 2003; Read & Rowe, 2003; Studdard, 2006). Rice (2002) mentioned that high-technology entrepreneurial firms are often not knowledgeable about business competences such as marketing, accounting, financial and human resources required to operate a business. Echoing similar views are Lee and Yang (2000) who stated that high-technology entrepreneurial firms have a substantial degree of technological knowledge, but they lack knowledge regarding small-business management, leading to Studdard’s (2006) assertion that a firm must be able to exploit its marketing, financial, manufacturing, and human resources’ knowledge to sustain the organisational environment through its growth.

Abduh et al. (2007) assert that incubation management services cover a wide range of professional business development assistance services including strategic planning, developing a business plan, and offering support through accounting, financial management, sales or marketing advice, legal advice, and educating them on government regulations, product development, and employment assistance. Abetti (2004) pointed out that incubators need to focus their activities in congruence with incubatees’ needs and market orientation by mapping out demand and market needs; product development and production; sales and marketing; budget and profit and loss reports; and personnel advice, in order to accelerate the development and growth of the incubatees’ businesses. These professional services are critical to the success of incubator environment (Nowak & Grantham, 2000) and are sometimes accessible through a network of contacts (Hackett & Dilts, 2004b; Bollingtoft & Ulhoi, 2005; Chan & Lau, 2005; McAdam & McAdam, 2008); training (Mian, 1997; Aerts, Matthyssens & Vandenbempt, 2007); seed and venture capital (Lee & Osteryoung, 2004; Sofouli & Vonortas, 2007; McAdam & McAdam, 2008); and virtual support (Nowak & Grantham, 2000; Schwandt, 2000; Carayannis & vonZedtwitz, 2005; Durão
& Sarmento, 2005). Scaramuzzi (2002) posits the importance of management advisory services which include human resources, accounting, and public relations.

3.4.4.1 Marketing and Promotion Management

According to a study concerning incubators in developing countries by Scaramuzzi (2002), provision of significant technical assistance, especially in marketing, was found to be a key to the success of the incubatees’ development. Rice (1993) stressed that marketing and financial management are just some of the business-process knowledge areas entrepreneurs find most difficulty.

Lalkaka (1997) mentioned that incubation systems with a competitive edge should be equipped with support systems which provide integrated services such as marketing. This is to assist entrepreneurs who often have technical skills but who frequently lack the management and marketing skills necessary for success. Incubatees often face obstacles in developing their business, one of which is having limited skills with which to market their product or services (Lalkaka, 1997). Warren et al. (2009) stated that founders of technology firms usually have high-level technical knowledge, but are less competent in the area of business development and marketing. This represents shortcomings that must be addressed and examined, in particular concerning technopreneurs and the availability of marketing services in ICT incubators in this study (McAdam et al., 2006).

Some incubators have been noted to provide marketing assistance to the incubatees as part of their services (Colbert, 2007). Several studies have highlighted that marketing management is normally offered as part of the incubation services (Scaramuzzi, 2002), while some incubators render the assistance at a fee (Chan & Lau, 2005; Becker & Gassmann, 2006). Hackett and Dilts (2008) stated several tasks for incubator management to carry out with regard to the marketing of incubatees’ products and services including preparing press releases, undertaking promotional activities, preparing marketing materials (for example, brochures, newsletters, advertisements, websites), planning special events or media opportunities, representing the incubator (giving speeches and attending community events), and developing and maintaining media contacts.
The marketing assistance needed by incubatees involves the understanding of who their potential buyers are, in what form their products or services should be, and for what price the product or service should be sold (Rice & Matthews, 1995). Entrepreneurs launching new ventures have a tendency to focus on perfecting their invention, product, or service to meet their own expectations, and they run the risk of running out of time and money before getting to the market successfully, or offering a product or service that does not meet the customer needs or expectations. Scillitoe and Chakrabarti (2010) advocate providing marketing assistance for incubatees, particularly during the early stages of product or service development, as this can help them to increase the potential success of their venture. Marketing assistance has also been found in the literature to be offered virtually (Aernoudt, 2004). Researchers identified the components of entrepreneurial self-efficacy as inclusive of developing sound commercial skills, particularly in marketing, management, and financial control (Chen, Green & Crick, 1998).

3.4.4.2 Financial Management

Financial management of new business is an essential skill that is commonly cited as lacking among new entrepreneurs (Lalkaka & Abetti, 1999; Beng Hui, Fernandez & Sio, 2011). The significance of this deficiency among incubatees is that it is a major cause of incubatee fallout rates (Beng Hui, Fernandez & Sio, 2011). Areas of financial management that incubatees have been identified to need help with are in the writing of grant proposals, preparing annual operating and capital budgets, evaluating and reporting on financial performance, and monitoring budgets (Read & Rowe, 2003). Further, incubatees have been seen as needing assistance in establishing and maintaining a financial control system, as well as in making major purchasing decisions (Read & Rowe, 2003). With respect to private or for-profit incubators in particular, Lalkaka and Abetti (1999) mentioned that the sustainability of incubator operations calls for imaginative ways of raising income through corporate memberships, and appropriate fees for securing finance, equity, or royalties for incubatees.

Mian (1997) and Vedovello and Godinho (2003) pointed out that incubators need to play a role in managing financial assistance for the incubatees by providing them with information which they may use to access a network of partner firms. The relevance of providing the right mix of supportive services, which stresses financial management,
was asserted by Bohringer (2006) who stated that the correct services would support the regeneration of regions and the development of incubates.

3.4.4.3 Staff and Personnel Management

Studdard (2006) pointed out that incubatees who possess human resource knowledge have the tendency to be more efficient in developing their human resources. Incubators play an important role in providing advice to the incubatees on what sort of employees they need to hire (Hallam & DeVora, 2009), job descriptions, and other human resource related advice that could optimise their business outlook (McAdam & Marlow, 2007a). Clarysse et al., (2005) found that incubators need to provide some form of human resources management advice to incubatees, or hire experienced professional staff to do this. O’Neal (2005) found in his study that seeking professional service providers including human resources management services to meet the demands of the incubatees, was an essential strategy. In supporting new ventures to grow, literature has also indicated that incubators provide human resources advice (Hannon, 2004).

Wiggins and Gibson (2003) highlighted the importance of incubators being committed to designing valuable services that incubatees will want, and of delivering these services with great competence. Services includes human resource management of the incubatees, where they stated that incubators should be prepared to provide advice on recruitment, benefits development, and preparing an online resume bank. Cooper, Woo, Dunkelberg and William (1989) and Pena (2004) agree that human capital is a very important factor that influences incubatees’ performance, as managers with advanced education and business management experience were found to perform better than entrepreneurs without such skills.

The level of human resource management services provided by incubators has been found in the literature to be quite limited. However, there have been specific areas of human resources management on which incubatees tend to seek advice (Lee & Osteryoung, 2004). These include preparing job descriptions and personnel specifications, recruitment assistance (Deek, 2010), establishing staff appraisal and performance systems, supervising staff, dealing with staff grievance issues and disciplinary action, setting and reviewing salary structures, assigning duties and responsibilities (Read & Rowe, 2003), and developing staff training programs (Davies, 2009). Tseng (2011) found six significant roles of human resource management in
incubator development which include the following: “act as a catalyst in promoting the emergence of enterprises, reduce the failure rate of new business start-ups, generate a multiplier effect in the SME sector, serve as pilot demonstration centers, promote entrepreneurship development and technological innovation, and inspire the nation’s productive endeavours through an increasing number of enterprises (2011, p. 39).

3.4.4.4 Strategic Management

Wiggins and Gibson (2003) in their examination of the Austin Technology Incubator (ATI) found that strategic services are offered to incubatees, which include working with them to perfect their business plan, executive summaries, PowerPoint presentations, and elevator pitch. ATI connects incubatees to mentors, advisory teams, and to potential candidates for their boards of directors. Strategic management provided at incubators could cover working with incubatees to think through such things as their business model, marketing strategy, funding approach, intellectual property strategy, and product development (O’Neal, 2005). The level of strategic management services in incubators examined by incubation researchers point to the importance of establishing strategic alliances in incubators, as highlighted by Agarwal (2002).

In examining the level of strategic management offered at the incubators and effects on incubation performance, several issues of note were found in the literature. These include writing and refining strategic plans for the incubatees (McNaughton, 2006); defining and refining mission statements (Linder, 2003); acting as a staff liaison with the incubator board, identifying income-generation opportunities, identifying resource requirements and cost implications (Read & Rowe, 2003); liaising with stakeholders, policymakers, and other key players (Khota & Pretorius, 2008); (Read & Rowe, 2003); undertaking feasibility studies (Autio & Klofsten, 1998; Scaramuzzi, 2002; Hackett & Dilts, 2004b); and (Lockett, Vohora & Wright, 2002) (Read & Rowe, 2003). Thus, it is then proposed that:

**Proposition 4:** Incubatees are more likely to perform when targeted Professional Management Services are provided

The following table presents the propositions developed for this thesis.
Table 3.1: Propositions developed in this thesis

| Proposition 1 | A systematic approach to selection performance will produce a higher number of incubatee graduates |
| Proposition 2 | Incubatees are more likely to perform when monitoring and business assistance are provided |
| Proposition 3 | Incubatees are more likely to perform when appropriate incubator resources are allocated |
| Proposition 4 | Incubatees are more likely to perform when targeted Professional Management Services are provided |

3.4.5 Business incubation performance

Based on the reviewed literature, it is evident that the evaluation of business incubation performance is ever evolving and still fragmented especially in developing countries (Scaramuzzi, 2002). This is supported by Hackett and Dilts (2004a), and Phan, Siegel and Wright (2005) who stated that to date, there is no systematic framework within which to understand incubators, leading to a current lack of clarity in identifying the nature of their performance. Feeser and Willard (1989) investigated the relationship between incubatee performance of high- and low-growth tech firms and incubator characteristics including size, location, and type of incubator. Subsequently, incubation impacts are surprisingly understudied and represent fertile ground for future research (Hackett & Dilts, 2004a). Tang and Llerena (2007) postulated good performance of business incubators helps an economy to attain its macroeconomic targets through promoting economic growth and increased employment.

Incubator-incubation impact studies emerged in the 1990s to uncover the effectiveness of incubation programs in various set-ups (Hackett & Dilts, 2004b). Researchers Allen and McCluskey (1990) investigated the impacts of business incubation on the survival rates of incubatees and found that the age of the incubator, and knowledge accumulated and disseminated by the incubator over time are the most important variables for new incubating ventures. Udell (1990) added that incubation impacts are seen in the form of the number and rate of new creations of start-ups, corporate start-ups, and new jobs.

Voisey, Gornall, Jones and Thomas (2006) captured incubation performance hard and soft measures for incubatees and incubator-specific measures. To assess incubatee hard
measures, they used indicators such as sales turnover, profitability, growth of enterprise, and graduation to independent trading (Tang & Llerena, 2007). To assess incubator hard measures, number of clients (Tang & Llerena, 2007), number of businesses trading independently, meeting targets, and still in continued operation were used. Alternatively, soft measures refer to the enhanced skills that the incubatees acquire, such as increased client professionalism, improved client business skills including in the use of IT, ICT, and presentation skills, increased and productive networking with peers, increased client knowledge, cost savings due to the use of incubator resources, and positive publicity. The soft measures used to gauge incubator performance also include growth in expertise and (or) experience of staff, recognition by the enterprise-support community, continued support from stakeholders, and internal evaluation based on the needs of incubatees.

Findings from the incubation impact research theme include measures of performance for incubators and incubatees, and the economic impacts on the community. Campbell and Allen (1987, p. 189) offered the following milestones to gauge incubator success:

“creation of a responsive business consulting network, participation of financial intermediaries in incubatee capitalisation, the point at which a majority of incubatees are start-up firms as opposed to previously existing small businesses, and the synergism that occurs when tenants develop trade relations with one another such as subcontracting and joint purchasing”.

Alternatively, Autio and Kelfsten (1998) regard the degree of fit between the business incubation services offered by the incubator and the needs of the local market as a measure of incubator success. Aernoudt (2004) used six criteria to assess US incubators, including: the size of the incubator in square feet, survival rate of graduates, number of tenants, employment by incubatees, employment created by graduates, and graduates remaining in the community.

Researchers have listed community development and job creation via incubators as a performance indicator, where incubators are more cost-effective than attracting existing firms to a new community would be (Markley & McNamara, 1995; Sherman & Chappell, 1998). Mian’s (1994) examination of some 30 university-sponsored
technology incubators highlighted several assessment indicators that included tenant performance review, funding sources, targeted technologies, strategic operational policies, services, value-added components, and growth of the client firms.

The literature suggests that the impact of business incubators at the community level goes far beyond just creating jobs at the incubators (Markley & McNamara, 1995). The multiplier effect on the economic activities of the community was evidenced by purchase of houses and appliances by new employees, knowledge spill-overs, wealth creation, social capital, and increased business at other local establishments. Carroll (1986) mentioned the multiplier effect in terms of both employment and income expenditure as being the secondary impact of business incubation.

Incubators evidently represent lower-cost means to job creation than cost-sharing corporate relocation programs do (Markley & McNamara, 1995; Sherman & Chappell, 1998). The study of cost related-to-job creation by business incubators was specifically undertaken by NBIA (2003) and it suggested that incubators generally create jobs at a much lower cost than traditional methods. According to NBIA (2003) traditional job-creation mechanisms would normally cost more than USD 10,000 per new job, whereas incubators could create jobs at a cost of one tenth of that.

Likewise, incubation impact studies revealed indicators used to gauge incubatee success. Graduation from the incubator has been widely cited as a measure of the success of incubatees (Hackett & Dilts, 2004b). Researchers have applied incubatee growth measures such as increased number of jobs or sales over time, and development measures such as product innovation, quality of the management team, and strategic alliances formed over time (Udell, 1990; Bearse, 1998). Other forms of performance indicators include reducing risk and improving the survival rate of incubatees (Hackett & Dilts, 2004b).

Based on the reviewed literature, there appears to be a lack of agreement among scholars on an accepted approach to measuring incubation success. For this thesis, it is proposed that business incubation performance is measured in four categories reflecting incubatee growth adapted from Hackett and Dilts’ (2008) previously validated scales. The categories are i) ‘Our incubatee is barely surviving’, ii) ‘Our incubatee has met its break-even and is moving toward a path of profitability’, iii) ‘Our incubatee is making
The discussion on the constructs of the conceptual framework (Figure 3.1) informs the foundation for the research design of this study which will be detailed in the following chapter. The framework explores the significance of the relationships between the dimensions of the four constructs, the constructs, and business incubation performance in the Malaysian ICT incubator context.

3.5 Conclusion

This chapter has highlighted the pertinent variables in the business incubation process that will be examined with respect to business incubation performance. Current knowledge on the business incubation process in Malaysia will be enhanced as a result of this study and findings will add to the extant body of incubation research. In sum, it is believed that a significant research direction lies in the identification and examination of underlying components that contribute to the ICT business incubation performance in Malaysia.

The research objectives of this study are to examine the business incubation process in ICT incubators in Malaysia and, second, to investigate the impacts of underlying components in the business incubation process on business incubation performance. A model or framework that can be used as a tool to guide policymakers’ decisions and to assist practitioners in better managing incubators is envisioned at the end of this thesis. The research objectives suggest the following research questions:

Research Question 1:

To what extent do Selection Performance, Monitoring and Business Assistance Intensity, Resource Allocation, and Professional Management Services impact on the business incubation performance of ICT incubators in Malaysia?

Research Question 2:

How do Selection Performance, Monitoring and Business Assistance Intensity, Resource Allocation, and Professional Management Services impact on the business incubation performance of ICT incubators in
This study contributes to the field of business incubation and small business development research by examining efforts to facilitate the entrepreneurial process through the aggregation and support of new ventures in business incubators. The research fills an existing gap in the extant incubation literature, particularly in providing empirical data regarding the Malaysian business incubation and landscape. Outcomes of this research will provide valuable knowledge and practice for the purpose of initiating new policies or for improving currently adopted incubation practices. Better incubation management practices are expected to raise the performance of the incubators as a driver for the macro economy. The following chapter presents the research methodology adopted for this study.
CHAPTER 4

RESEARCH METHODOLOGY

4.1 Introduction

This chapter presents the methodology adopted in this research. The chapter is structured in the following manner: it begins by reviewing the research paradigms that underpin the methodology, followed by an introduction of the mixed-methods approach, and the justification for adopting this approach. The chapter is then divided into two sections. Study I describes the quantitative part of the research consisting of the design, data collection, and data analysis procedures; Study II describes the qualitative research design, data collection, and data analysis procedures. To conclude the chapter, ethical considerations are addressed.

4.2 Research Paradigms

The paradigm debate which encompasses discussion on concepts, methods, and standards of quality concerning the combination of qualitative and quantitative approaches has been going on for almost three decades (Yin, 2003). The differences regarding quantitative versus qualitative research were resolved during the 1990s (Tashakkori & Teddlie, 2003) with the emergence of the compatibility thesis. A consensus was reached that it was acceptable to mix qualitative and quantitative methods in research studies that called for different types of data to address research questions.

The Paradigm Contrast Table, which has evolved in the last 20 years presents basic philosophical and methodological differences between paradigms. Lincoln and Guba (2000) initially presented two paradigms: constructivism (labelled naturalism) and positivism. Table 4.1 depicts the original Paradigm Contrast Table.
Table 4.1: The Original Paradigm Contrast Table

<table>
<thead>
<tr>
<th>Dimensions of Contrast</th>
<th>Constructivist (Naturalist) Paradigm</th>
<th>Positivist Paradigm</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Epistemology:</em> the relationship of the knower to the unknown; the nature of knowledge and its justification</td>
<td>Knower and known are interactive, inseparable.</td>
<td>Knower and known are independent; a dualism.</td>
</tr>
<tr>
<td><em>Axiology:</em> The role of values in inquiry</td>
<td>Inquiry is value-bound.</td>
<td>Inquiry is value-free.</td>
</tr>
<tr>
<td><em>Ontology:</em> the nature of reality, being and truth</td>
<td>Reality is multiple, constructed, and holistic.</td>
<td>Reality is single, tangible, and can be fragmented.</td>
</tr>
<tr>
<td>The possibility of causal linkages</td>
<td>All entities are in a state of mutual, simultaneous, shaping so that it is impossible to distinguish causes from effects.</td>
<td>There are real causes, temporally precedent to or simultaneous with their effects.</td>
</tr>
<tr>
<td>The possibility of generalisation</td>
<td>Only time and context-bound working hypotheses (ideographic statements) are possible.</td>
<td>Time- and context-free generalisations (nomothetic statements) are possible.</td>
</tr>
</tbody>
</table>

Source: Lincoln and Guba (2000)

Lincoln and Guba (2000) differentiated the two paradigms based on five dimensions: epistemology, axiology, ontology, possibility of causal linkages, and generalisability. Another study by Tashakkori and Teddlie (1998) compared four paradigms: *positivist, post-positivist, pragmatism, and constructivist*. A fifth paradigm was later added to the literature by Mertens (2005) the *transformative perspective*, as shown in Table 4.2.

Advocates from both quantitative and qualitative research believe in the strengths of their respective research paradigms. The *positivist* paradigm—which largely drives quantitative research—was the earliest research paradigm adopted. A *positivist* approach portrays the researcher as remote from the research object, formulating hypotheses through deductive reasoning, which are tested using statistical procedures. Fundamental to the *positivist*’s philosophy is the notion that structures and procedures of the natural sciences are applicable to the social sciences, and the differences occurring in the environment via character, culture, language, and feelings do not affect implementation of the scientific method (Tashakkori & Teddlie, 2003). Johnson and Onwuegbuzie (2004) assert that quantitative purists such as Ayer (1959), Popper (1959), Schrag (1992), and Maxwell and Delaney (2004) express assumptions that are consistent with *positivist* philosophy. The *positivist* approach is best suited to controlled research that can be easily quantified, such as in the natural sciences.
### Table 4.2: Expanded Paradigm Contrast Table: Comparing five research dimensions

<table>
<thead>
<tr>
<th>Dimensions of Contrast</th>
<th>Positivism</th>
<th>Post-positivism</th>
<th>Pragmatism</th>
<th>Constructivism</th>
<th>Transformative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methods</td>
<td>QUAN</td>
<td>Primarily QUAN</td>
<td>Both QUAL and QUAN; researcher answers questions using best methods</td>
<td>QUAL</td>
<td>Both QUAL and QUAN; community of participants involved in methods decisions</td>
</tr>
<tr>
<td>Logic</td>
<td>Hypothetico-deductive (originally inductive)</td>
<td>Hypothetico-deductive</td>
<td>Both inductive and hypothetico-deductive</td>
<td>Inductive</td>
<td>Both inductive and hypothetico-deductive</td>
</tr>
<tr>
<td>Epistemology (researcher/participant relationship)</td>
<td>Objective point of view (dualism)</td>
<td>Modified dualism</td>
<td>Both objective and subjective points of view, depending on stage of research cycle</td>
<td>Subjective point of view; reality co-constructed with participants</td>
<td>Both objectivity and interaction with participants valued by researchers</td>
</tr>
<tr>
<td>Axiology (role of values)</td>
<td>Value-free inquiry</td>
<td>Values in inquiry, but their influence may be controlled</td>
<td>Values important in interpreting results</td>
<td>Value-bound inquiry</td>
<td>All aspects of research guided by social injustice</td>
</tr>
<tr>
<td>Ontology (the nature of reality)</td>
<td>Naïve realism (an objective, external reality that can be comprehended)</td>
<td>Critical realism (external reality that is understood imperfectly and probabilistically)</td>
<td>Diverse viewpoints regarding social realities; best explanations within personal value systems</td>
<td>Ontological relativism - multiple, constructed realities</td>
<td>Diverse viewpoints regarding social realities; explanations that promote justice</td>
</tr>
<tr>
<td>Possibility of causal linkages</td>
<td>Real causes temporally precedent to or simultaneous with effects</td>
<td>Causes identifiable in a probabilistic sense that changes over time; internal validity important</td>
<td>Causal relations, but they are transitory and hard to identify; both internal validity and credibility important</td>
<td>Impossible to distinguish causes from effects; credibility of descriptions important</td>
<td>Causal relations that should be understood within the framework of social justice</td>
</tr>
<tr>
<td>Possibility of generalisation</td>
<td>Nomothetic statements possible</td>
<td>Modified nomothetic position; external validity important</td>
<td>Ideographic statements emphasised; both external validity and transferability issues important</td>
<td>Only ideographic statements possible; transferability issues important</td>
<td>Ideographic statements emphasised; results linked to issues of social inequality and social justice</td>
</tr>
</tbody>
</table>


Whilst the positivist or post-positivist paradigm tends predominantly to underpin quantitative approaches to data collection and analysis, the interpretivist or
constructivist paradigm generally supports qualitative methods (Glesne & Peshkin, 1992; Bogdan & Biklen, 1998; Silverman, 2000; Wiersma, 2000; Mertens, 2005). Lincoln and Guba (2000), and Schwandt (2000) argue for the superiority of constructivism, idealism, relativism, humanism, hermeneutics, and, sometimes, postmodernism. To collect data, qualitative researchers tend to rely on participants’ views through interviews, observations, documents, and visual data analysis. However, quantitative methods may also be utilised to support or expand upon qualitative data, and this effectively deepens the understanding of the phenomenon in question. Similarly, constructivists do not generally begin with a theory (as with post-positivists), rather, they “generate or inductively develop a theory or pattern of meanings” (Creswell, 2003, p. 9) throughout the research process. The constructivist researcher is most likely to rely on qualitative data collection methods and analysis or a combination of qualitative and quantitative methods (mixed-methods).

Having understood the nature of positivist and constructivist paradigms, this research considered a third paradigm: the pragmatism perspective. According to and Tashakkori and Teddlie (2003, p. 86), two major characteristics of pragmatism are “the rejection of dogmatic either-or choice between constructivist and post-positivist and the search for practical answers to questions that intrigue investigators”. Another paradigm which has been associated with mixed-methods research is the transformative perspective. For this particular study, the researcher adopts the pragmatism paradigm to explain the basis for conducting the research using the mixed-methods approach, largely because of its greater suitability in guiding data collection and analysis than the positivist and constructivist paradigms. Researchers including Tashakkori and Teddlie (1998), Morgan (1998), Patton (2002), Biesta and Burbules (2003), Rallis and Rossman (2003), Maxcy (2003), and Johnson and Onwuegbuzie (2004) propose that pragmatism is best suited to the use of mixed-methods research.

The pragmatists believe that either quantitative or qualitative methods are useful and they choose to utilise the full array of qualitative and quantitative methods (Tashakkori & Teddlie, 2003). The decision on whether to use the methods individually or collectively depends on the research questions and on the ongoing phase of the inductive-deductive research cycle. Pragmatists believe that research on any given question at any point in time falls somewhere within the inductive-deductive research
cycle (Tashakkori & Teddlie, 2003). The pragmatic paradigm provides an opportunity for “multiple methods, different worldviews, and different assumptions, as well as different forms of data collection and analysis in the mixed-methods study” (Creswell, 2003, p. 12).

4.3 Mixed-methods Approach

The mixed-methods approach has been utilised in many fields of study including the social, behavioural, and health sciences (Yin, 2003). Mixed-methods research is easily recognised through the utilisation of both qualitative and quantitative approaches in one or more of the following areas: research questions (with qualitative and quantitative approaches); the manner in which the research questions are developed (participatory or pre-planned); sampling procedures (for example, probability and purposive); data collection procedures (for example, focus groups and surveys); data (for example, numerical and textual); data analysis (statistical and thematic); and conclusion (‘objective’ and ‘subjective’). Tashakkori and Creswell (2007, p. 3) defined mixed-methods as “research in which the investigator collects and analyses data, integrates the findings, and draws inferences using both qualitative and quantitative approaches or methods in a single study or a program of inquiry”.

Johnson and Onwuegbuzie (2004) advocate the use of mixed-methods research as the third research paradigm in educational research, and they recognise the importance and usefulness of both quantitative and qualitative research. The authors added that the goal of mixed-methods research is no longer to replace either of these approaches, but rather to draw from the strengths and minimise the weaknesses of both in mono-method studies. More recently, Johnson, Onwuegbuzie, and Turner (2007, p. 113) examined how the field of mixed-methods is being defined, and they positioned mixed-methods between the extremes of quantitative research and qualitative research with it being fully respective of both viewpoints, while also seeking a “workable middle solution for many (research) problems of interest”.

This thesis incorporates a mixed-methods design, employing both quantitative and qualitative studies. Creswell, Clark, Gutmann and Hanson (2003) identified six major mixed-methods strategies (that is, sequential explanatory, sequential exploratory, sequential transformative, concurrent triangulation, concurrent nested, and concurrent transformative) that are defined by four criteria: implementation, priority, integration
stage, and theoretical perspective. This thesis utilises a *concurrent triangulation design* modelled by a one data collection phase, where both quantitative and qualitative data are collected simultaneously, as depicted in Figure 4.1.

![Figure 4.1: Concurrent triangulation design (Creswell *et al.*, 2003)](image)

In the concurrent triangulation approach, the researcher collects quantitative and qualitative data concurrently and then compares the two databases to determine if there is convergence, differences, or some combination (Creswell *et al.*, 2003). Alternatively, authors like Greene, Caracelli and Graham (1989), Steckler, McLeroy, Goodman, Bird and McCormick (1992) and Morgan (1998) refer to this comparison as *confirmation*, *disconfirmation*, *cross-validation*, or *corroboration*. Using this approach, the quantitative and qualitative data collection is concurrent—happening in one research phase of the study—resulting in a shorter data-collection time period as compared to one of the sequential approaches. The weight between the quantitative and qualitative is ideally equal, although in practice one method may yield priority to another. The stage at which the two databases are usually mixed is found in the interpretation or discussion section, with the aim of merging the data. This is usually done by first providing the quantitative statistical results, followed by qualitative quotes that support or disconfirm the quantitative results.

### 4.4 Justification of a mixed-methods approach

This research investigates the causal relationships between underlying factors of the business incubation process and the business incubation performance of ICT incubators in Malaysia. Further investigation on how these factors impact upon the incubatees’ performance is also proposed in order to understand the significance of the factors.
The decision to choose an appropriate method in research hinges upon the aim of the study. It should be determined by the research questions (Marshall, 1996). In approaching the research task using the *pragmatic paradigm*, the mixed-methods approach is deemed to be the methodology that will result in achieving the research objectives. Hence, this research uses a quantitative approach to address the first research question and qualitative methods to address the second research question.

Previous incubation literature indicates a significant amount of research adopting the mixed-methods approach (Crabtree & Miller, 1999; Clarysse et al., 2005; Atherton & Hannon, 2006; Becker & Gassmann, 2006; Scillitoe & Chakrabarti, 2010). While some researchers question this methodological mix in view of the distinct aims and purposes of each method, researchers like Becker and Gassmann (2006) support the combination of qualitative and quantitative research methods for the valuable insights that such mixed-methods bring to incubation research. Becker and Gassmann (2006) used exploratory interviews in the initial stage of their research to enhance their basic understanding of how corporate incubators function. This qualitative part of their study helped them to understand the relationship and interaction between the incubators and the parent corporation.

Following Eisenhardt’s (1989) process of inducing theory and developing strategic implications through the use of case studies, Becker and Gassmann (2006) then proceeded to use the quantitative method where they analysed a database of 950 European incubators and synthesised the findings from two benchmarking surveys conducted by the European Commission in 2001 and 2002. A third component of their research consists of interviews with researchers and heads of technology-transfer offices of leading universities in order to deepen their understanding of university incubators and to see any lessons learned from corporate incubators.

Marshall (1996) posits that the aim of a quantitative approach is to test or determine hypotheses and to produce generalisable results; the suggestion is that it is often useful in answering mechanistic-type questions such as ‘what’, ‘who’, ‘where’, and ‘how many’, as is the case with the research in this thesis. Marshall (1996, p. 522) provides a comparison to qualitative approaches by stating that the general aim is “to provide illumination and understanding of complex psychosocial issues and are most useful for answering humanistic ‘why?’ and ‘how?’ type questions”.

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Patton (2002) describes qualitative data as an in-depth description of circumstances, people, interactions, observed behaviours, events, attitudes, thoughts and beliefs, and direct quotes from people who have experienced or are experiencing the phenomenon. Additionally, sources of qualitative data usually originate from personal or organisational documents such as correspondence, records and (or) diaries, and case histories. These sources come in the form of text (that is, interview transcripts or organisational documents) and non-textual data such as tables, pictures, and audio and video recordings (Patton, 2002). Sources for both quantitative and qualitative data for the research here will be elaborated accordingly.

Beven (2007) asserts that research in the social sciences is largely characterised by deductive theory-testing based on large sample data. However, Beven (2007) argues that this approach may not be a suitable initial step for research where theory is still at a pre-definitive stage. Past research on business incubation suggested there is a continued effort by incubation researchers in developing a theory of business incubation, as it remains an atheoretical field (Hackett & Dilts, 2004a). In view of this, this thesis incorporates a mixed-methods design, to capture the viewpoints of both incubator managers and incubatees.

Given the exploratory nature of the research in trying to determine the relationship between constructs in the business-incubation process and business incubation performance, Zikmund (1997) suggests the use of qualitative research, which may come in the form of investigating secondary data, conducting experience surveys, scrutinising case studies, or utilising a pilot study. More importantly, the relationship between Selection Performance, monitoring, and business assistance intensity, Resource Allocation, Professional Management Services, and business incubation performance is seen as a research area which has not been addressed thus far (Hackett & Dilts, 2004b). In view of this, the qualitative study of this thesis employs a case study approach to complement the quantitative study.

The case studies involve developing an in-depth analysis of a single case or of multiple cases (Tashakkori & Teddlie, 2003), or is also described as “an exploratory research technique that intensively investigates one or a few situations similar to the researcher’s problem situation” (Zikmund, 1997, p. 107). Case studies are suitable for investigating the how and why questions that seek to explain (Yin, 2003), describe, build, or test
theory (Eisenhardt, 1989) which is associated with exploratory work during the formative stages of theory development (Benbasat, Goldstein & Mead, 1987). In addition, case studies are used as a follow-up to survey-based research in an attempt to examine in greater depth and to validate empirical results (Voss, Tsikriktsis & Frohlich, 2002). Zikmund (1997, p. 108) adds that the primary advantage of the case study method is “that an entire organization or entity can be investigated in depth and with meticulous attention to detail”. This attention enables the researcher to study the order of events carefully as they occur, or to concentrate on identifying the relationships among functions, individuals, or entities. Aligned with the intention here to uncover the factors impacting upon business incubation performance, as well as in what ways the factors impact, Zikmund’s claim regarding the ability of a case study to research an entire organisation is upheld. This is because this research engages responses from two levels: management and incubatees.

Consequently, the use of quantitative and qualitative approaches is deemed appropriate for this study, because first, it seeks to identify the underlying factors that have an impact on business incubation performance that can be investigated through statistical analysis; and second, it seeks to understand how these factors impact upon the incubatees’ performance, which is suited for a qualitative data collection approach such as interviews, and focus groups.

Even though past research on business incubation has indicated that the use of a mono method is useful (Rice, 2002; Studdard, 2006; vonZedtwitz & Grimaldi, 2006; Abduh et al., 2007; McAdam & Marlow, 2008; Warren, Patton & Bream, 2009), counter arguments are also possible. Beven (2007) suggested that conducting business incubation research using quantitative methodology alone could lead to questionable results, due to a lack of consensus concerning factors underlying the phenomena. For example, the author observes that the quantitative methodology provides fewer meaningful insights into unchartered relationships that are a major focus of the present research.

There have been studies conducted previously in business incubation that used a mixed-methods approach. Voisey et al. (2006) employed “a range of qualitative and quantitative methods” in their study on the measurement of success in a business incubation project. The combination of individual case study and primary data
collection on project outputs was central to their methodology, much in support of Hofstede’s (1999) analogy of the flesh and bones, where the rich data are regarded as the ‘flesh’ part of the analogy while the quantitative data are regarded as the ‘bones’.

Similarly, Evald and Bager (2006) conducted a study on incubators using both quantitative and qualitative methods comprising 20 in-depth interviews, and two rounds of questionnaire-based interviews. The main aim of the interviews was to find out the attributes of the person, that is, their role, whether they are an internal or external contact, and the framework of the relationship (for example, a contemporaneous colleague, a former colleague, or a personal friend), among other things. The study demonstrated that quantitative data alone were not sufficient in explaining precisely why new ventures did not successfully move from the technology-oriented phase to the commercialisation phase. The qualitative data helped in addressing some of the questions that were otherwise left unanswered by quantitative data alone.

Rothaermel and Thursby (2005) employed the mixed-method approach in their incubation study with the use of questionnaire and semi-structured interviews. As in some studies, the authors triangulated the two data sets to see if one set of data confirmed or disconfirmed the other set of data. Triangulation, according to Evans and Gruba (2004, p. 91) is a “term used in research work by analogy when we use more than one research method or type of data to answer the research questions or test hypotheses”.

As mentioned previously, this thesis adopts the concurrent triangulation design (Creswell et al., 2003), where the order of approach (quantitative or qualitative) does not play a primary role in analysis and presentation of the data. For presentation purposes of this thesis, the methodology for the quantitative study is explicated first, followed by the methodology for the qualitative study in Section 4.6.

4.5 Study I (Quantitative Study)

This section details the methodology used for the quantitative part of the study. The section is structured in the following manner: first, the research design is presented detailing the instrument of the quantitative study, research propositions, the pilot study, measures of constructs, and the validity and reliability of constructs. The subsequent subsections consist of procedures for data-collection and data-analysis for the
quantitative study.

4.5.1 Research Design

The quantitative part of this mixed-methods study has equal weight with the qualitative part, in the sense that no particular method is more important than the other. In particular, it aims to answer the first research question, introduced in Chapter 3:

Research Question 1:

To what extent do Selection Performance, Monitoring and Business Assistance Intensity, Resource Allocation, and Professional Management Services impact on the business incubation performance of ICT incubators in Malaysia?

The purpose of employing the quantitative method is to identify the underlying factors in the business incubation process that have an impact on business incubation performance. To investigate these underlying factors, responses from incubatees were solicited using the survey questionnaire as the research instrument.

The survey questionnaire is deemed a suitable tool for the quantitative study; it enables a large amount of data to be obtained to identify factors in the business incubation process that impact upon business incubation performance. This form of instrument has been used in various incubation studies that adopt a quantitative only or a mixed-methods approach, such as Adegbite (2001), Scaramuzzi (2002), and Voisey et al. (2006).

4.5.2 The Survey Questionnaire

The survey questionnaire was largely based on a questionnaire developed by Hackett and Dilts (2008) and the conceptual framework introduced in Chapter 3 (Figure 3.1, p.72). In the conceptual framework, four independent variables and one dependent variable were proposed. The four independent variables each have their own constructs and measurement items. The dependent variable is based on four possible outcomes of incubation which were introduced previously in Chapter 3.
The questionnaire incorporates 251 items and comprises six sections consisting of:

i) Profile of Incubatees  
ii) Selection Performance  
iii) Monitoring and Business Assistance Intensity  
iv) Resource Allocation  
v) Professional Management Services  
vi) Business incubation performance

The original survey instrument developed by Hackett and Dilts (2008) intended to establish the elements within the business incubation ‘black box’. Here their work is extended in the process of identifying the relationships between underlying factors in the incubation process and business incubation performance.

Pilot Testing of Scales and Measures

A pilot test of the survey questionnaire was conducted in 2009 involving discussions with personnel related to the field of inquiry. Essentially, the objective of conducting the pilot study was to assess questions in terms of validity, scales, and measures. The questionnaire was distributed randomly to incubatees, incubator managers, and to researchers within the entrepreneurial field via email. The purpose was to obtain feedback on the language, content, readability, and relevance of the questions for this research. Participants were also asked to identify variables which they thought had little bearing on the incubation process and performance, and any others they thought significant which had not been included.

Following this, in conjunction with the literature review, the questionnaire was reviewed in consultation with participants. Pilot study respondents commented on the questionnaire and made suggestions to improve its quality. First, respondents suggested separating the issues that were initially combined in one question. Separating issues that are closely related may result in better outcomes from the survey and may avoid vagueness. For example, ‘rareness and inimitability of the product’ was changed to two distinct statements: ‘rareness of the product’ and ‘inimitability of the product’, as the latter was considered by the pilot study participants as a more meaningful measure.

Second, it was suggested that the ‘age group’ and ‘years in position’ in the profile section of the survey be made distinct to avoid overlaps. Third, the respondents...
commented that key issues in the survey questionnaire should be bolded to distinguish them from insignificant instructions. There was also a suggestion to convert the original seven-point Likert scales to five-point Likert scales as it is less confusing for the respondents. The researcher made appropriate adjustments to the survey questionnaire to reflect the participants’ feedback. The average time taken to complete the seven-page questionnaire was about 30 minutes, as indicated by the respondents. Upon amendment of the comments received from the participants, the questionnaire was largely ready for fieldwork. The final version of the survey questionnaire is attached in Appendix A.

4.5.2.1 Measures of Selection Performance

‘Selection Performance’ refers to “the degree to which the incubator behaves like an ‘ideal type’ venture capitalist when selecting emerging organisations (options) for admission to the incubator” (Hackett & Dilts, 2004a, p. 49). Relevant dimensions of Selection Performance include an inclination to select a promising organisation for admission based on their managerial, market, product, and financial characteristics. According to Hackett and Dilts, managerial characteristics refer to “the prior employment experience and technical expertise of the applicant’s management team” (2004a, p. 49). Market characteristics denote “the properties of the market which the applicant intends to enter” (Hackett & Dilts, 2004a, p. 49). Product characteristics refer to “the properties of the product or service which the applicant intends to commercialise” (Hackett & Dilts, 2004a, p. 49) and finally, financial characteristics denote “the applicant’s profit potential” (Hackett & Dilts, 2004a, p. 49).

The scales used for this study were previously used and validated by Hackett and Dilts (2008) except for the Professional Management Services scales. Vanderstraeten and Matthyssens (2010) confirmed that Hackett and Dilts (2008) seem to be the only incubator researchers who developed validated scales to measure the effectiveness of the internal incubation process.

Hackett and Dilts (2008) used the DeVellis (2003) method to develop the scales, which resulted in the “validation of eight reliable multi-dimensional scales, as well as multiple refinements to the original incubation model” (Hackett & Dilts, 2008, p. 440). The scales used were aimed to gauge to what degree incubator managers agree with the statements provided. Hackett and Dilts (2004a) followed the generally accepted conventions in social science research and adopted ordinal scales—seven-point Likert-
type scales—to ask the respondents to rate levels of importance, agreement, and ability vis-à-vis the constructs of interest.

This study adopts a five-point Likert scale, as it produces slightly higher mean scores relative to the highest possible attainable score—compared to those produced from larger scales—and this difference was statistically significant (Dawes, 2008). With regards to other data characteristics, there was very little difference among the scale formats in terms of variation about the mean, skewness, or kurtosis. Exploratory statistical testing of the pilot test results indicated that the items followed a generally normal distribution and performed reliably. Table 4.3 presents the items used to measure the Selection Performance construct.

**Table 4.3: Selection Performance Items**

<table>
<thead>
<tr>
<th>Selection Performance (1=Strongly Disagree, 5=Strongly Agree)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Managerial characteristics</strong></td>
</tr>
<tr>
<td>Q1. We perceive prior work experience in the field to be important in the selection process</td>
</tr>
<tr>
<td>Q2. We perceive prior management experience to be important in the selection process</td>
</tr>
<tr>
<td>Q3. We perceive technical expertise within the management team to be important in the selection process</td>
</tr>
<tr>
<td>Q4. We perceive entrepreneurial experience to be important in the selection process</td>
</tr>
<tr>
<td><strong>Market characteristics</strong></td>
</tr>
<tr>
<td>Q5. We perceive long-term strategic orientation to market growth to be important in the selection process</td>
</tr>
<tr>
<td>Q6. We perceive size determination of the target market to be important in the selection process</td>
</tr>
<tr>
<td>Q7. We perceive accessibility of the target market to be important in the selection process</td>
</tr>
<tr>
<td>Q8. We perceive incubatees’ potential in creating new markets to be important in the selection process</td>
</tr>
<tr>
<td><strong>Product characteristics</strong></td>
</tr>
<tr>
<td>Q9. We perceive the uniqueness of the product to be important in the selection process</td>
</tr>
<tr>
<td>Q10. We perceive patent protection of the product to be important in the selection process</td>
</tr>
<tr>
<td>Q11. We perceive having a technological edge to the product to be important in the selection process</td>
</tr>
<tr>
<td>Q12. We perceive having a relative advantage over competitor’s product to be important in the selection process</td>
</tr>
<tr>
<td>Q13. We perceive rareness of the product to be important in the selection process</td>
</tr>
<tr>
<td>Q14. We perceive inimitability of the product to be important in the selection process</td>
</tr>
<tr>
<td>Q15. We perceive substitutability of the product to be important in the selection process</td>
</tr>
<tr>
<td><strong>Financial characteristics</strong></td>
</tr>
<tr>
<td>Q16. We perceive profit potential of the company to be important in the selection process</td>
</tr>
<tr>
<td>Q17. We perceive the strong likelihood of achieving financial break-even in a short period of time to be important in the selection process</td>
</tr>
<tr>
<td>Q18. We perceive the potential to attract investment participation from venture capitalists to be important in the selection process</td>
</tr>
<tr>
<td>Q19. We perceive having multiple, harvestable exit options to be important in the selection process</td>
</tr>
<tr>
<td>Q20. We perceive having a good cash flow to be important in the selection process</td>
</tr>
</tbody>
</table>

4.5.2.2 *Measures of Monitoring and Business Assistance Intensity*

‘Monitoring and Business Assistance Intensity’ refers to “the degree to which the incubator monitors and helps incubatees with the development of their ventures, including helping them to learn about risks involving the resources invested in a
business, and about containing the cost of potential (terminal) failure” (Hackett & Dilts, 2004a, p. 50). Hackett and Dilts (2004a) state that the time intensity of assistance provided, comprehensiveness of assistance provided, and the quality of the assistance provided all characterised this component of business incubation process. ‘Time intensity of assistance provided’ refers to “the percentage of working hours devoted to monitoring and assisting incubatees” (Hackett & Dilts, 2004a, p. 50), while ‘comprehensiveness of assistance provided’ is a measure Hackett and Dilts (2004a) adapted from Chrisman (1989), and it refers to “the degree to which strategic, operational, and administrative-related assistance are provided by the incubator to the incubatees” (2004a, p. 50). Finally, ‘quality of assistance provided’ denotes the relative value of the assistance provided by the incubator to the incubatees (McGrath, 1999; Rice, 2002; Hackett & Dilts, 2004a). Table 4.4 presents the items used to measure the Monitoring and Business Assistance Intensity construct.

Table 4.4: Monitoring and Business Assistance Intensity Items

<table>
<thead>
<tr>
<th>Monitoring and Business Assistance Intensity (1=Strongly Disagree, 5=Strongly Agree)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Time intensity</strong></td>
</tr>
<tr>
<td>Q1. On average, our company receives appropriate time in assistance</td>
</tr>
<tr>
<td>Q2. On average, our company spends appropriate time interacting with other incubatees in the incubator</td>
</tr>
<tr>
<td>Q3. On average, our company receives sufficient time working directly with the incubator manager</td>
</tr>
<tr>
<td>Q4. Our company reduces the likelihood of making expensive business mistakes through the interactions with incubator manager and other incubatees.</td>
</tr>
<tr>
<td><strong>Comprehensiveness and quality</strong></td>
</tr>
<tr>
<td>Q5. Our company receives business planning assistance from the incubator</td>
</tr>
<tr>
<td>Q6. Our company receives business feasibility analysis assistance from the incubator</td>
</tr>
<tr>
<td>Q7. Our company receives administrative assistance and services from the incubator</td>
</tr>
<tr>
<td>Q8. Our company receives production-related advice from the incubator</td>
</tr>
<tr>
<td>Q9. Our company receives operations-related advice from the incubator</td>
</tr>
<tr>
<td>Q10. The incubator regularly validates quality of potential new strategic service providers</td>
</tr>
<tr>
<td>Q11. Our incubator ensures the quality of its services by regularly reviewing them</td>
</tr>
<tr>
<td>Q12. The incubator manager actively seeks ways to continuously improve the level of customer service satisfaction inside the incubator</td>
</tr>
<tr>
<td>Q13. The other incubatees teach alternate or new strategies for achieving business success</td>
</tr>
</tbody>
</table>

4.5.2.3 Measures of Resource Allocation

‘Resource Allocation’ refers to “the relative abundance and distribution of incubator resources and is characterised by dimensions of resource availability, quality, and utilisation” (Hackett & Dilts, 2004a, p. 50). Hackett and Dilts (2004a, p. 50) used Daft’s (1983) definition of business incubator resources in Barney (1991), which is “all assets, capabilities, organizational processes, attributes, information, knowledge, etc., controlled by the incubator that enable the incubator to conceive and implement strategies that improve its efficiency and effectiveness”, as they relate to facilitating new venture development. For this construct, the intention is to measure how important
Resource Allocation is to the incubatees and is measured in three dimensions of resources; availability, quality, and utilisation. Table 4.5 presents the items used to measure this construct. Resource availability refers to “the ability of the incubators to provide incubatees with access to resources” (Hackett & Dilts, 2004a, p. 50). Resource quality represents “the relative value of the resources which the incubator provides to the incubatees” (Hackett & Dilts, 2004a, p. 50), and lastly, the incubatees’ “usage of the resources which they receive through the incubator” is signified by resources utilisation (Hackett & Dilts, 2004a, p. 50).

<table>
<thead>
<tr>
<th>Table 4.5: Resource Allocation Items</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Resource Allocation (1=Strongly Disagree, 5=Strongly Agree)</strong></td>
</tr>
<tr>
<td><strong>Resource Availability</strong></td>
</tr>
<tr>
<td>Our incubator excels at making the following resources available for the incubatees</td>
</tr>
<tr>
<td>Q1. Access to administrative support services</td>
</tr>
<tr>
<td>Q2. Access to managerial expertise</td>
</tr>
<tr>
<td>Q3. Access to sources of capital</td>
</tr>
<tr>
<td>Q4. Access to lawyers</td>
</tr>
<tr>
<td>Q5. Access to accountants</td>
</tr>
<tr>
<td>Q6. Access to consultants</td>
</tr>
<tr>
<td>Q7. Access to marketing specialists</td>
</tr>
<tr>
<td>Q8. Access to funding</td>
</tr>
<tr>
<td>Q9. Access to local university contacts</td>
</tr>
<tr>
<td>Q10. Access to intellectual property advice</td>
</tr>
<tr>
<td>Q11. Access to technology labs</td>
</tr>
<tr>
<td><strong>Resource Quality</strong></td>
</tr>
<tr>
<td>Q12. Our company is offered flexible lease agreements to meet our changing space needs</td>
</tr>
<tr>
<td>Q13. Our reputation is enhanced because of our association with the incubator</td>
</tr>
<tr>
<td>Q14. Our incubator is pleasant</td>
</tr>
<tr>
<td>Q15. Our incubator is nurturing</td>
</tr>
<tr>
<td>Q16. We receive business-related information from the incubator in a way that is easy to understand</td>
</tr>
<tr>
<td>Q17. We receive information on sources of smart capital from our incubator</td>
</tr>
<tr>
<td><strong>Resource Utilisation</strong></td>
</tr>
<tr>
<td>Q18. Our company makes full use of the administrative services offered at the incubator</td>
</tr>
<tr>
<td>Q19. Our company utilises advice obtained from the incubator manager</td>
</tr>
<tr>
<td>Q20. Our company utilises the knowledge obtained from other incubatees</td>
</tr>
<tr>
<td>Q21. Our company acts upon the advice we receive from the incubator manager</td>
</tr>
<tr>
<td>Q22. Our company acts upon the advice we receive from fellow incubatees</td>
</tr>
<tr>
<td>Q23. We maximise our opportunities from the introduction to the incubator’s network contacts</td>
</tr>
</tbody>
</table>

4.5.2.4 Measures of Professional Management Services

The final independent variable in the conceptual framework is ‘Professional Management Services’. This construct was not part of the original Hackett and Dilts (2004a) study and was added to the research framework here following identification of a gap in the incubation literature regarding the importance of management services in the incubation process, as detailed in Chapter 3. The dimensions included in this fourth construct were identified from various studies in business incubation (Hannon, 2003; Totterman & Sten, 2005; McAdam & Marlow, 2007a; Khota & Pretorius, 2008), and
from the pilot study, where a significant need for management services to be part of the services offered at the incubators was repeatedly identified. Table 4.6 presents the items used to measure the Professional Management Services construct. As shown in the table, four areas of management services are identified: marketing and promotion, financial, staff and personnel, and strategic management services.

Table 4.6: Professional Management Services Items

<table>
<thead>
<tr>
<th>Professional Management Services (1=Strongly Disagree, 5=Strongly Agree)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Marketing and promotion management</strong></td>
</tr>
<tr>
<td>Q1. Devising and managing marketing strategies</td>
</tr>
<tr>
<td>Q2. Preparing press releases</td>
</tr>
<tr>
<td>Q3. Undertaking promotional activities</td>
</tr>
<tr>
<td>Q4. Preparing marketing materials (for example, brochures, newsletters, ads, website)</td>
</tr>
<tr>
<td>Q5. Planning special events and (or) media opportunities</td>
</tr>
<tr>
<td>Q6. Representing the incubator (giving speeches, attending community events)</td>
</tr>
<tr>
<td>Q7. Developing media contacts</td>
</tr>
<tr>
<td>Q8. Maintaining media contacts</td>
</tr>
<tr>
<td><strong>Financial management</strong></td>
</tr>
<tr>
<td>Q9. Writing grant proposals</td>
</tr>
<tr>
<td>Q10. Preparing annual operating and capital budgets</td>
</tr>
<tr>
<td>Q11. Evaluating and reporting on financial performance</td>
</tr>
<tr>
<td>Q12. Monitoring budgets</td>
</tr>
<tr>
<td>Q13. Establishing a financial control system</td>
</tr>
<tr>
<td>Q14. Maintaining a financial control system</td>
</tr>
<tr>
<td>Q15. Making major purchasing decisions</td>
</tr>
<tr>
<td><strong>Staff and personnel management</strong></td>
</tr>
<tr>
<td>Q16. Preparing job descriptions and personnel specifications</td>
</tr>
<tr>
<td>Q17. Managing the hiring and firing of staff (for example, interviews and selection)</td>
</tr>
<tr>
<td>Q18. Establishing staff appraisal and performance systems</td>
</tr>
<tr>
<td>Q19. Supervising staff</td>
</tr>
<tr>
<td>Q20. Dealing with staff grievance issues and disciplinary action</td>
</tr>
<tr>
<td>Q21. Setting and reviewing salary structures</td>
</tr>
<tr>
<td>Q22. Assigning work, duties and responsibilities</td>
</tr>
<tr>
<td>Q23. Developing staff training programs</td>
</tr>
<tr>
<td><strong>Strategic management</strong></td>
</tr>
<tr>
<td>Q24. Writing and refining strategic plans for the incubator</td>
</tr>
<tr>
<td>Q25. Defining/refining mission statement</td>
</tr>
<tr>
<td>Q26. Acting as a staff liaison with the incubator board</td>
</tr>
<tr>
<td>Q27. Liaising with stakeholders, policy makers and other key players</td>
</tr>
<tr>
<td>Q28. Identifying income generation opportunities</td>
</tr>
<tr>
<td>Q29. Undertaking feasibility studies</td>
</tr>
<tr>
<td>Q30. Identifying resource requirements and cost implications</td>
</tr>
</tbody>
</table>
4.5.2.5 Measures of business incubation performance

The final construct of this study is ‘Business incubation performance’, which is the dependent variable of the conceptual framework. This construct is intended to measure performance of business incubation, as a function of the four independent variables previously explained. The measure for this construct is adapted from Hackett and Dilts’ (2008) study, where the authors measured business incubation performance in categorical terms of incubatee growth and financial performance at the time of exit from the incubator. Even though many of the companies were just recently established, financial performance and incubatee growth measures were adapted from Hackett and Dilts (2008) to measure business incubation performance.

Hackett and Dilts (2008) used five different mutually exclusive incubatee outcome states. These are: (1) the incubatee is surviving and growing profitably, (2) the incubatee is surviving and growing and is on a path toward profitability, (3) the incubatee is surviving but is not growing, and is not profitable, or is only marginally profitable, (4) incubatee operations were terminated while still in the incubator, but losses were minimised, and (5) incubatee operations were terminated while still in the incubator, and the losses were large. The literature suggests that the first three outcome states indicate success; the others indicate failure. For this thesis, four categories were used to describe incubatee outcomes which include (1) ‘Our company is barely surviving’, (2) ‘Our company has met its break-even and is moving on a path towards profitability’, (3) ‘Our company is making profit’, and (4) ‘Our company is highly profitable’. Incubatees were asked to select one outcome which they felt best explained their incubation outcome experience thus far.

4.5.2.6 Validity and reliability of the questionnaire

This study adopts the Hair et al.’s (2010) framework in addressing issues regarding the validity and reliability of the research instrument. Content validity, also known as face validity, refers to the assessment of the correspondence of the variables to be included in a summated scale and its conceptual definition (Hair et al., 2010). This form of validity test aims to ensure that the selection of scale items extends past empirical issues to include theoretical and practical considerations.
The instrument used to evaluate the five research constructs in this thesis has content validation as the measurement items selected were derived from an extensive literature review and subsequent pilot study. Construct validity refers to the extent to which a set of measured items actually reflects the theoretical, latent, construct which those items are designed to measure (Hair et al., 2010). Construct validity deals with the accuracy of measurement and provides confidence that item measures taken from a sample represent the true score that exists in the population.

There are three related issues: uni-dimensionality, convergent validity, and discriminant validity. Uni-dimensionality is the degree to which a set of items (that form an instrument) measure an underlying construct (Hair et al., 2010). Each critical factor of the research construct was evaluated by factor-analysing measurement instruments using Cronbach’s alpha reliability tests. According to Churchill (1979), coefficient or Cronbach’s alphas should be the first measure used to assess the quality of an instrument. A cut-off point (α=0.7) for the alpha value suggested by Nunally and Bernstein (1994) was used as a reasonable indicator of fit. All of the constructs in this study obtained Cronbach’s alphas of at least 0.7 indicating reliable measures deemed suitable for fieldwork. Further details regarding validity and reliability of the data are presented in Chapter 5.

### 4.5.3 Data Collection Procedures

Critical to the success of this research task in gaining access to the sample was that the research was facilitated by the President of NINA and incubator managers. A copy of the letter from Mr. Andrew Wong acknowledging and supporting this research is attached in Appendix B. Essentially, the president informed members of NINA by providing information regarding the study, including what the research was about, who was undertaking it, and in what manner. Subsequently, the information was passed down to incubatees by the incubator managers.

**Participants**

Participants for the survey questionnaire were initially identified through the websites of their respective incubators. However, only a few incubators made this information accessible through their websites. Through contacts with the incubator managers, and government agencies such as MDeC and SIRIM, associations (such as with NINA)
were formed and basic information regarding the names of the incubatees, email addresses, and phone numbers were obtained. These agencies have shown strong support for this study by providing the researcher with the list of incubatees and by expediting their responses to the quantitative part of this research. The participants were made up of incubatees of ICT incubators that were chosen for the qualitative part of the study. These companies are mostly ICT-based, with diverse business natures ranging from mobile and wireless communication to Internet-based business applications in the financial sector. A letter of invitation was first extended to incubatees by email to obtain their agreement to join the study. A copy of the letter is attached in the Appendix C of this thesis. 180 incubatees, which is the entire population of the ICT incubatees were targeted to be participants of the survey questionnaire.

Upon receiving their agreement, participants were then informed of the link to the survey questionnaire. This method of distribution was more accessible, effective, and less confronting to the incubatees. The link to the online survey questionnaire was emailed to the incubatees in February 2010, together with a short introductory letter from the researcher indicating the nature of the study, the researcher’s affiliation, and confirming that participation was voluntary (this was further reiterated on the cover letter of the questionnaire). The delivery of the questionnaires to participants was synchronised with the Innovation Week held in March 2010 in Kuala Lumpur, an event organised by NINA. The researcher had a research assistant distribute and collect the survey questionnaires at a seminar in a controlled manner, guided by a developed protocol. The total number of survey questionnaires obtained from the Innovation Week was 49. All questionnaires were mailed back to the researcher in Melbourne at the end of April 2010. Responses received from the Innovation Week were keyed into the online survey tool and all data were then extracted from the online survey tool into an SPSS file, a process that took three weeks of intensive work. By the end of May 2010, the total number of participants was 118. This yielded a response rate of 65.6%.

4.5.4 Data Analysis Procedures

In selecting an appropriate technique for analysing the data set, Hair et al.’s (2010) procedure for appropriate selection of a multivariate technique was followed. This is based on the researcher’s judgment in relation to criteria regarding the research objective(s) and the nature of the data. The primary research objective of this thesis is to
investigate the underlying components of business incubation performance and how these factors impact on performance. Further, Hair et al. (2010, p. 96) detail that principal component analysis is the most appropriate technique if the research is exploratory in nature, and if researchers wish to “find a way to condense (summarize) the information contained in a number of original variables into smaller set of new, composite dimensions or variates (factors) with a minimum loss of information”. Supporting this view, Tabachnick and Fidell (2007) advocate PCA as a better choice for researchers who require an empirical summary of the data set.

Data analyses were undertaken in three principal stages (data screening, exploratory factor analysis (EFA), and multinomial logistic regression) using SPSS Statistics 18.0. As part of the preparation and screening process, data were tested for violations of statistical assumptions (for example, multicollinearity, outliers, and normality), as well as identification of missing data. Data screening revealed there were no missing data. EFA involving PCA with Varimax rotation was used to determine the number of factors associated with Selection Performance, Monitoring and Business Assistance Intensity, Resource Allocation, Professional Management Services, and Business incubation performance. Varimax rotation was selected because this criterion facilitates the unidimensionality test by “simplifying the columns of the factor matrix” and provides a clear separation of factors (Hair et al., 2010).

In terms of prior research in the field of inquiry, a number of studies analyse their data using PCA with Varimax rotation. Factor or component solutions are rotated—usually orthogonally with axis maintained at 90 degrees—to provide a more meaningful, simpler, factor structure which aids in interpreting the underlying meaning of the factor.

EFA was conducted to eliminate survey items with loadings <.3 on factors (Hair et al., 2010) and to determine initial patterns of factor loadings. An underlying assumption of this statistical procedure is to find out whether items cluster to form factors. Items that correlate with each other are assumed to represent a similar factor. In order to extract factors, different statistical criteria can be applied. In this case, factor extraction was based on Eigenvalues which are greater than one and a scree plot test (Hair et al., 2010). Factors with Eigenvalues after the point where the Eigenvalue line drops beyond the first set of extrapolation are excluded. At the completion of the EFA, multinomial logistic regression was applied on the quantitative data to investigate the relationships
between extracted components from the EFA and business incubation performance.

Multinomial Logistic Regression

The third statistical procedure undertaken was the multinomial logistic regression to identify the magnitude of effects of the elements in the business incubation process on business incubation performance. This procedure was necessary due to the categorical nature of the dependent variable, as presented in Section 4.5.2.5. In normal circumstances, with a continuous dependent variable, the CFA is usually performed to establish the relationship between the independent variables and the dependent variable. However, the nature of the dependent variable calls for a multinomial logistic regression as a secondary statistical technique.

Multinomial logistic regression has been employed by previous researchers in numerous entrepreneurship (McCracken, 1998; Lee, Lee & Pennings, 2001; Patton, 2002; Townsend, Busenitz & Arthurs, 2010) and business incubation research (Rothaermel & Thursby, 2005). Logistic regression is used to model the relationship between a binary response variable and one or more predictor variables, which may be either discrete or continuous. In other words, logistic regression can be used to predict a dependent variable on the basis of continuous and (or) categorical independent variables. The method also enables determination of the percentage of variance in the dependent variable that is explained by the independent variables; rank the relative importance of independent variables; assess interaction effects; and to understand the impact of covariate control variables (Peng, Lee & Ingersoll, 2002).

Logistic regression applies maximum likelihood estimation after transforming the dependent variable into a logit variable (the natural log of the odds of the dependent occurring or not). In this way, logistic regression estimates the probability of a certain event occurring. The outcome variable is the probability of falling into one of the outcome categories based on a nonlinear function with four outcomes. In this thesis, logistic regression is used to estimate the probability of a certain business incubation performance occurring based on the independent variables.

Logistic regression uses several evaluations to interpret the analysis, including the log-likelihood ratio, Pearson Chi-square and Deviance Statistics, and Odds Ratio. The log-likelihood statistic calculates changes in the log odds of the dependent variable, not
changes in the dependent variable itself. Discriminant analysis has been used in the past but is now more frequently being replaced with logistic regression, as it requires fewer theoretical assumptions, is more statistically robust in practice, and is easier to use and understand than discriminant analysis. Two goodness-of-fit tests (Pearson and Deviance) were performed; tables of observed and expected frequencies and measures of association were produced. Finally, the odds ratio \((Exp (B))\) is used as an indicator of the change in odds resulting from a unit change in the predictor (Peng, Lee & Ingersoll, 2002). The following paragraphs describe each of the evaluations in detail.

**Log-likelihood**

The log-likelihood statistic is a way to assess the fit of the model by using observed and predicted values (Field, 2009). It is based on summing the probabilities associated with the predicted and actual outcomes, and it indicates how much unexplained information there is after the model has been fitted. Hence, larger values of a log-likelihood statistic indicate poorly fitting statistical models, suggesting more unexplained observations. For this research, the log-likelihood statistic was found for all independent variables to be significant, indicating a good model fit. Details of these results are presented in Chapter 5.

**Pearson Chi-square and Deviance Statistics**

In normal linear regression, summary measures of fit are functions of a residual defined as the difference between the observed and fitted values. In logistic regression, there are several ways to measure this difference. There are two measures of the difference between the observed and the fitted values: the Pearson residual and the Deviance residual. The statistics are significant when the predicted values are not significantly different from the observed values, indicating the model is a good fit for the data. The results of all Pearson, Chi-square, and Deviance statistics are elaborated in Chapter 5.

**Odds Ratio**

The value of the odds ratio \((Exp (B))\) is another crucial value for the interpretation of a logistic regression. This value is an indicator of the change in odds resulting from a unit change in the predictor (Field, 2009). The change in odds can be interpreted as follows: if the value is greater than 1, then it indicates that as the predictor increases, the odds of the outcome occurring increase. Conversely, if the value is less than one, it indicates that as the predictor increases, the odds of the outcome occurring decrease.
Interpretation and labelling of the underlying components impacting on business incubation performance, as well as results from the logistic regression analysis are presented in Chapter 5. The quantitative analytical methodology has been presented and discussed in this section; it has been noted that a range of criteria set out by authorities on logistic regression analysis have been closely followed. This ensures that the method of analysis is the most appropriate, given the research objectives and the nature of the data.

4.6 Study II (Qualitative Study)

As discussed at the beginning of the chapter, this research adopts both quantitative and qualitative approaches to data collection and analysis. This section describes the approach adopted for the qualitative study which aims to provide a deeper understanding of the quantitative data. Specifically, the qualitative data could provide explanations regarding how certain elements in the business incubation process influence business incubation performance. Study II comprises the qualitative component of the thesis and incorporates a case study methodology. The aim of the qualitative component of the research is to answer the second research question introduced earlier in Chapter 3:

*Research Question 2:*

*How do Selection Performance, Monitoring and Business Assistance Intensity, Resource Allocation, and Professional Management Services impact on the business incubation performance of ICT incubators in Malaysia?*

The sections that follow describe the research design, the instrument utilised, the pilot study, criteria for evaluating the validity and reliability of the case studies, and data collection and data analysis procedures.

While the quantitative component of the research investigates possible relationships, the qualitative component provides an in-depth examination of how relationships between variables are formed. For example, the quantitative model investigates, on the one hand, whether there is a positive relationship between Selection Performance and business incubation performance; the qualitative component in Study II, on the other hand, seeks
to discover how Selection Performance impacts on business incubation performance and the actions incubators undertake to manage this process. The justification for employing the qualitative method in conjunction with the quantitative method is analogous to that of adding flesh to a skeleton and to understand the conditions of the ICT incubators in Malaysia better. Specifically, the present research aims to acquire an in-depth understanding of incubator managers’ attitudes to Selection Performance, Monitoring and Business Assistance Intensity, Resource Allocation, Professional Management Services, and ICT Business incubation performance.

4.6.1 Research Design

According to Creswell (2003), the data-collection steps include setting the boundaries for the study, collecting information through unstructured (or semi-structured) observations and interviews, documents and visual materials, as well as establishing the protocol for recording information. The qualitative study utilises the purposive sampling technique. This technique was deemed suitable because the sample size of the ICT incubators was not large, and purposive sampling allows for rich information to be obtained (Patton, 2002). Here the case study approach was adopted, involving six ICT incubator managers to obtain deeper understanding of the impacts of underlying factors in the business incubation process on business incubation performance.

Case Study Instrument

For the purpose of this thesis, an interview protocol was developed outlining interview guidelines relating to the research questions identified in the literature review. A case study protocol contains the instrument, procedure, and general rules to be followed during each interview. This is necessary to increase the reliability of case study research and to guide the researcher in undertaking data collection (Yin, 2003). Questions in the interview schedule were designed to engage responses at the incubator manager level.

The interview schedule comprised the main form of data collection covering broad topic areas such as incubator manager profile; key roles of the incubator; Selection Performance; Monitoring and Business Assistance Intensity; Resource Allocation; Professional Management Services; and Incubatee Growth. These constructs were tentative, but flexible enough to allow new research themes to emerge for theory-building purposes (Yin, 2003). The participants were asked the same series of
questions. By the end of the six interviews emerging patterns were detected.

There is considerable variation in the ways in which qualitative interviews are conducted. According to Fontana and Frey (2005), interviews can be structured, semi-structured or unstructured. Structured interviews involve interviewer asking respondents the same questions that are very much like a questionnaire in the same manner (Sommer & Sommer, 1980). Unstructured interviews, according to Crabtree and Miller (1999) and Patton (2002) are conducted without a pre-determined set of questions and typically appear to be a lengthy conversation with occasional prompts on the part of the researcher. A researcher could begin the interview by posing a fairly broad question.

Semi-structured interviews falls between the structured and unstructured interview (McCracken, 1998) and are known to be more flexible (Fontana & Frey, 2005). Questions are open-ended, hence not limiting the respondents or interviewees to a choice of answers (McCracken, 1998; Townsend, Busenitz & Arthurs, 2010). This thesis has adopted the semi-structured interview. The decision to adopt the semi-structured interview here was prompted by the need to allow a comfortable setting for both interviewer and interviewee in which to discuss the topic in detail. The interviewer can make use of cues and prompts to help and direct the interviewee to the research topic area, thus being able to gather a more in-depth or detailed data set (McCracken, 1998; Perry, 1998; Patton, 2002).

4.6.2 Validity and Reliability

According to Yin (2003), the quality of case study design can be judged according to four design tests: construct validity (establishing correct operational measures for the concepts being studied); internal validity (establishing causal relationships); external validity (establishing domains on which findings can be generalised); and reliability (demonstrating that the operations of a study can be replicated with similar results). According to Creswell (2003), validity in qualitative research does not carry the same connotations as it does in quantitative research, nor is it a companion of reliability or generalisability. Rather, qualitative research uses reliability to check for consistent patterns of theme development among several investigators of a team. However, generally, reliability and generalisability play minimal roles in qualitative inquiry.
Validity is seen as a strength of qualitative research and it is often used to suggest determining whether the findings are accurate from the standpoint of the researcher, the participant, or the readers of an account (Creswell, 2003). Terms in the qualitative literature that are often used to address this idea include ‘trustworthiness’, ‘authenticity’, and ‘credibility’. Creswell (2003) further suggests eight strategies in validating qualitative data. The three most frequently used methods are described as follows:

1. *Triangulation* of different data sources of information by examining evidence from the sources and using it to build a coherent justification. In this study, I used multiple sources to build a case for discussion including incubator brochures, information on incubators from various websites, benchmarking papers, and interview transcripts.

2. Use of *member-checking* to determine the accuracy of qualitative findings through reporting back a final presentation of data to the participants. Participants indicate whether the content of the report is accurate and as closely interpreted by the researcher as possible. I returned to incubator managers concerning their responses during the interview to establish the correctness of the content of the interview.

3. Use of *thick description* to convey the qualitative findings. This method should theoretically transport readers to the setting and give the discussion an element of shared experience. This thesis engages this approach by first presenting the within-case analysis for all six cases, followed by a cross-case analysis to allow any emergent themes to surface.

4.6.2.1 *Construct Validity*

A primary element of Construct Validity is triangulation which involves the use of multiple data sources to support evidence (Yin, 2003). As noted previously, for this thesis a triangulated approach that incorporates both quantitative and qualitative procedures was employed. Yin (2003) adds that quantitative data alone can reveal relationships that are not immediately evident to a researcher, and hence could contribute towards misleading impressions being presented in qualitative data. Other sources of data are also critical in triangulation, such as company reports, historical documentation, and website material.
The interview protocol was based on precedents in case study research and served as a guide when semi-structured interviews were conducted. When interesting avenues not directly related to the interview guide arose, the lines of questioning surrounding these issues were pursued and comments noted. I obtained relevant incubator documents and products manufactured by incubatees to gain a better understanding of their business, and also to substantiate any of their verbal statements (Creswell, 2003).

The second element of Construct Validity relates to the ability of readers to follow data and analysis from the initial formulation of research questions to the conclusions (Yin, 2003). For these case studies, an independent external reviewer examined the research questions, research plan, interview protocol, and individual case summaries. Case studies were reviewed for logic, flow, clarity, and content. This process determined whether the cases revealed a logical flow and a chain of evidence. Academically, peer review has been ongoing and constructive, with feedback from senior professors engaged in the field. As well, the proposed research design was presented at three conferences (two in Australia and one in Macau) and at the ANZAM 2010 Doctoral Workshop in Australia, yielding invaluable feedback.

4.6.2.2 Internal Validity

Internal Validity is a concern for explanatory case studies, particularly when a researcher attempts to demonstrate that an outcome was caused by an independent variable (Yin, 2003). Internal Validity in case study research concerns making proper inferences from data, considering alternative explanations, use of convergent data, and related tactics (Yin, 2003). For the purpose of this qualitative study, pattern matching during data analysis was used both within and across cases to ensure that any inference made from data is correct, and that alternative explanations or possibilities have been considered.

4.6.2.3 External Validity

External Validity reflects how accurately the results represent a phenomenon under investigation, and determines whether results can be generalised (Yin, 2003). This is an issue that was addressed at the design stage. A lack of generalisation has been the major criticism of case studies (Yin, 2003); this is addressed by replicating case studies and verifying patterns. The research framework developed for this thesis has to some extent
provided perspectives that increase our understanding of the results provided by the logistic regression analysis, enabling flesh to be added to the skeleton.

4.6.2.4 Reliability

Reliability addresses the repeatability of an experiment, that is, whether replication will achieve similar results (Yin, 2003). Reliability was maintained by using a case study protocol and the development of a case study database. The actual field aspect of the research began with a pilot study of the interview protocol. In case study research, the purpose of a pilot study is not to pre-test (Yin, 2003), but to refine research further regarding content and procedures. Several participants requested a copy of the interview guide beforehand so that they would know what type of questions to expect. The standard form of letter of introduction is included in Appendix D. Detailed presentation of the pilot study is elaborated in the next section.

To corroborate evidence further, a case study database was established, which includes a copy of the completed interview guide for each incubator, any additional notes taken in addition to the interview guide, recorded audio tapes, and a written summary of each case. This database is maintained as per the strict guidelines laid out by the Ethics Committee of the College of Business of RMIT University.

As case studies involve multiple data sources, information gathered from the interview schedule (open-ended and closed questions), printed materials provided by participating incubators to the researcher (for example, brochures, pamphlets), and information from incubator websites were all included in the database. Validity and reliability concerns were addressed using Yin’s (2003) four tests, a strategy well supported in the literature. In the following sections the pilot study for the interview protocol and data collection procedures are discussed.

4.6.2.5 Pilot Study for the Interview Protocol

A pilot test of the interview protocol was conducted in November 2009. It involved discussion with personnel related to the field of inquiry. In essence, the objective of conducting the pilot study was to assess the language, validity, and relevance of the open-ended questions. The interview protocol was distributed via email to academics and researchers within the entrepreneurial field to obtain their feedback. Participants in the pilot study were asked to identify language in the interview protocol which they
thought could be improved and to keep track of the time they needed to answer the questions.

Subsequently, in conjunction with the literature review and the survey questionnaire, the interview protocol was reviewed in consultation with participants. Pilot study respondents commented on the interview protocol and made suggestions to improve the structure. As with the survey questionnaire, participants of the pilot study suggested splitting two or more issues into distinct questions to avoid ambiguity. The researcher amended the interview protocol as per the comments received, and data collection for the qualitative study was largely ready to be carried out.

4.6.3 Data Collection Procedures

Incubator managers from six ICT incubators in Malaysia were interviewed. The general process for selecting interview participants was based on a number of dimensions: type of industry (ICT), type of incubator (government, private, university), and focus (local, regional, national, global). The sample size was not decided a priori. An underlying principle is to select information-rich cases which are worthy of further research (Patton, 1980). A goal of purposive sampling is to select cases that replicate and (or) extend cases, and theoretical reasons that fit into various theoretical categories and (or) provide examples of polar types (Bryman & Burges, 1999).

Criteria for Case Selection

Eisenhardt stated that “there is no ideal number of cases, a number between four and ten cases often works well” (1989, p. 545). Kemper, Stringfield, and Teddlie (2003) recommended the use of the extreme and (or) deviant cases, and typical case sampling techniques (that is, seeking out the most outstanding cases such as those reflecting success and (or) failures) to learn about outliers or to seek those that are average and (thus representative); choosing confirming and (or) disconfirming cases (the latter means finding specific sampling units that fit into emerging patterns regarding data, while the former means seeking those that are exceptions, to provide rival explanations for emerging patterns); or opting for stratified purposive sampling (that is, deliberately selecting a target population based on strata that reflect average, above average, or below average categories, with the aim of discovering similar and differing elements across subgroups).
The study consists of interviews with six cases comprised of ICT incubator managers within the MSC Malaysia vicinity. The general process for selecting interview participants was based on the type of incubator the participants were heading. Contacts with the incubator managers were first established in November 2009 through emails and mailed formal requests. Participants responded positively to the request and granted interviews to the researcher from January 2010 to February 2010. Some incubator managers requested preliminary information regarding the interview in order to prepare. The interview protocol is included in Appendix E. I reviewed each incubator’s website before conducting the interview. A prior understanding of each incubator made the interview process more productive than it otherwise would be. Participants were given Plain Language Statements (attached in Appendix F) and were asked to sign a Consent Form (attached in Appendix G).

Each interview was digitally recorded with the permission of the interviewees and lasted for an average of 45 to 50 minutes. All the interviews were held at the incubator managers’ offices. At the end of the session, incubator managers expressed their support for the study and provided information regarding their incubatees upon the request of the researcher. The incubator managers gave the researcher insights into the practice of business incubation at their respective incubators. Follow-up communications via email interviews were also undertaken to gather further information and to clarify any issues, following Creswell’s (2003) guidelines. I also collected printed materials (such as brochures, booklets, and so forth) from each incubator and took a site tour to get a sense of the layout of the incubator and its operational features.

4.6.4 Data Analysis Procedures

The qualitative data of this study were analysed using the framework analysis approach, which required sifting, charting, and sorting key issues and themes from the data. These procedures involved five steps: familiarisation; identifying a thematic framework; indexing; charting and mapping; and interpretation (Srivastava & Thomson, 2009).

In the first step, I became familiar with the transcripts of the data collected from the interviews and gained an overview of the data (Ritchie & Spencer, 1994). I listened to the audiotapes and read the transcripts, and gained an awareness of key ideas and recurrent themes emerging from the data. The six interviews took about two and a half weeks to complete the familiarisation step.
The second stage, identifying a thematic framework followed familiarisation when I identified emerging themes or issues in the data set. Although the researcher was guided by a priori themes that were identified from the conceptual framework, the themes and issues were mainly dictated by the data arising from the notes made during the familiarisation stage. The key issues and themes identified at this stage form the basis of a thematic framework, which is used to filter and classify the data (Ritchie & Spencer, 1994). In trying to devise and refine a thematic framework, both logical and intuitive thinking was required. I made judgments throughout this stage about the meaning, relevance, and importance of issues and about implicit connections between ideas. Simultaneously, it was important to address the original research questions continually.

In the third stage, I identified portions or sections of the data from the interview transcripts that corresponded to a particular theme. I followed Ritchie and Spencer’s (1994) recommendation to use a numerical system for indexing the references and annotations in the margin beside the text. This stage is similar to what other qualitative analysis approaches refer to as coding (Winter, 2010).

The fourth stage entailed arranging specific pieces of data indexed in the previous stage in charts of the themes. The data were lifted from their original textual context and placed in charts that consist of headings and subheadings drawn from the thematic framework, or from a priori research inquiries, or in the best perceived manner to report the research (Ritchie & Spencer, 1994).

The fifth and final stage required the analysis of key characteristics as laid out in the charts, where at the end of the process the data set is interpreted with the aid of a schematic diagram of the phenomenon, often aided by visual displays and plots. Ritchie and Spencer (1994) suggest that it may be appropriate to define concepts, map the range and nature of phenomena, create typologies, find associations within the data and provide explanations, or develop strategies at this point. Miles and Huberman (1994) also suggest the use of a wide range of display ideas, which may be useful for data exploration in the context of Framework Analysis. The central aim of these techniques is to enable the researcher to display ideas from the data visually as an aid to developing and testing interpretations.
In analysing the qualitative data, I followed the suggestion of Patton (2002, p. 440) where he stated, “in analyzing interviews, the researcher has the option of beginning with case analysis or cross-case analysis”. Beginning the analysis with case analysis means writing a case study for each person interviewed, whereas beginning with cross-case analysis means grouping together answers from different people to common questions, or analysing different perspectives on central issues (Patton, 2002). In this thesis, I have begun the qualitative analysis by presenting the within-case analysis first, followed by cross-case analysis. This approach was taken to provide an overview of the ICT incubators in general prior to understanding the issues that surround the incubators.

4.6.4.1 Within-case Analysis

Eisenhardt states that “analysing data is at the heart of building theory from case studies, but is the most difficult and least codified part of the process (1989, p. 539). Analysis consists of data reduction, data display, and drawing conclusions and verification (Miles & Huberman, 1994). When multiple cases are employed in a study, each must first be analysed on its own (Yin, 1994; Eisenhardt, 1989). The objective of within-case analysis is for researchers to become familiar with each individual case before making comparisons and drawing conclusions (Bryman & Burges, 1999). Within-case analysis involves detailed case study write-ups for each case, and is often purely descriptive in nature. However, longitudinal graphs and tabular displays are sometimes used.

The format for a within-case analysis followed specific research questions, using data displays to organise, compress, and assemble information in a way that allows conclusions to be drawn (Miles & Huberman, 1994). Displays include extended text, matrices, graphs, and networks. Miles and Huberman (1994) stressed the importance of taking both a variable-oriented, conceptual approach (explanatory effects and case dynamics matrices), and a process-oriented, story-like approach (causal networks). Displays of single-case data can be folded easily into multiple-case analysis when formats of displays in a multiple-case study are comparable (Miles & Huberman, 1994).

I recorded and hypothesised some of the emerging patterns during data collection and initial analysis. According to Miles and Huberman (1994, p. 70) identification of emerging patterns is a way of grouping “data into a smaller number of overarching themes and constructs, warning against the danger of getting locked too quickly into
naming a pattern and assuming you understand it”. This process revises and sharpens lines of inquiry as data collection and analysis progress. However, these patterns can only be confirmed through the constant revision and reshaping which occur during cross-case analyses, the construction of causal networks, and detailed analysis of variable interactions. Such methods of analysis discourage premature analytic closure (Miles & Huberman, 1994). In this thesis, overriding themes and patterns were clarified, tested, and expanded through data analysis, and formed the basis for the findings and conclusions of this study. The within-case analysis of the qualitative approach is presented in Chapter 6.

4.6.4.2 Cross-case Analysis

Cross-case analysis followed completion of the within-case analysis (Yin, 1994). Cross-case analyses force researchers to derive conclusions from a set of cases (Bryman & Burges, 1999); that is, an emergent theory fits the data in all cases. Cross-case analysis aims at ordering and explaining both variable and process-oriented strategies that complement each other. Miles and Huberman (1994) noted that cases can often be sorted into explanatory families sharing common scenarios, but it is important to look carefully at deviant cases and not to force cross-case explanations. Cross-case causal networking is a comparative analysis of all cases in a sample, using variables found to be the most influential in accounting for the outcome variables (Miles & Huberman, 1994). This process transcends the case-specific explanations of findings that uncover and reinforce constructs.

Yin (1994) recommended the application of pattern matching as a preferred approach to analysing data across cases, comparing tabular summaries for each of the cases to identify patterns. When general patterns were suggested, analysis became more detailed in order to look for underlying explanations. This process involves comparing empirically based patterns with a predicted one, and when patterns coincide, results can help to strengthen the internal validity of a case study (Yin, 1994).

The analysis examines an underlying definition of constructs to ensure that the comparison is valid in all cases. This procedure was undertaken because “careful construction of construct definitions and evidence produces the sharply defined, measurable constructs which are necessary for strong theory” (Bryman & Burges, 1999, p. 542). For multiple case studies, theoretical replication is achieved when patterns
coincide across cases.

The reason for the application of cross-case searching tactics is to compel researchers to go beyond initial impressions, especially with the use of structured and diverse lenses on data (Bryman & Burges, 1999). The shaping of hypotheses in theory-building research implies a measurement of constructs and verification of relationships (Miles & Huberman, 1994; Voss, Tsikriktsis & Frohlich, 2002). As more information becomes available during data collection, recurring patterns of interaction between variables within the research framework begin to surface, both within and across cases. A number of variables appear to be connected, while others appear random. Several tactics for generating meaning were applied for the whole process, such as noting patterns, detecting plausibility, clustering, counting, making contrasts and (or) comparisons, noting relationships between variables, finding intervening variables, and building a logical chain of evidence (Miles & Huberman, 1994, pp. 245-262).

During the course of this process, it is important to seek negative evidence that opposes emerging relationships and to pose rival explanations. In the concluding phase of theory building, Eisenhardt stated that an essential feature is “comparison of the emergent concepts, theory, or hypotheses with the extant literature” (1989, p. 544). This involves asking what is this similar to, what does it contradict, and why. Thus, examining literature which conflicts with the emergent theory, and those discussing similar findings, can corroborate internal validity and (or) generalisation (Miles & Huberman, 1994). I engaged this approach in performing the cross-case analysis to identify contradiction within the emergent themes.

4.6.4.3 Data display

Qualitative data are often displayed in the form of tabular formats. Vignettes are often used to represent qualitative data and engage the participants actively in producing, reflecting on, and learning from the data (Miles & Huberman, 1994). A vignette is a focused description of a series of events taken to be representative, typical, or emblematic in the case study (Miles & Huberman, 1994). In this study, the use of vignettes is evident throughout the qualitative data analysis section where incubator managers’ insights are inserted to add depth in describing and analysing the perceived incubation process. I followed Lacey and Luff’s (2001) recommendation to display qualitative data using thematic charts to enable easy comprehension for the reader.
4.7 Ethical considerations

This thesis followed Ethics Guideline Procedures outlined by RMIT University in the Ethics Review Process. Ethics approval was obtained to carry out this research. The research was thoroughly prepared, organised, and considerate of participants in this study. A copy of the Ethics Approval is attached in Appendix H.

4.8 Conclusion

The methodology of any research plays an important role to ensure a thorough understanding and investigation of a subject. The business incubation field of research requires the feedback and opinion from key informants in the field such as the incubator managers and the incubator tenants. Based on the extended review of the different methodologies adopted from previous incubation studies, it was appropriate to adopt the outlined mixed-methods approach for this study into the business incubation process in Malaysian ICT incubators. This is due to the sample size and the scope of the research being confined to a specific type of incubator. Data from both quantitative and qualitative parts of the research bring significant value to the research and triangulation of both sets of primary along with secondary data provides a comprehensive understanding in answering the research questions.

As with any mixed-methods research, one of the aims is to determine whether the combination of the two methods would yield converging, inconsistent, or contradicting views (Johnson, Onwuegbuzie & Turner, 2007). In this particular case, the responses given by the incubatees are analysed in conjunction with the incubator managers’ responses to understand the extent of their agreement or disagreement regarding elements underlying the business incubation process, and the influence of each element on business incubation performance.

The next chapter presents the results from the quantitative study and is followed by qualitative findings in Chapter 6.
CHAPTER 5

QUANTITATIVE ANALYSIS AND RESULTS

5.1 Introduction

This chapter presents the results and analysis of the quantitative study. The analyses for this chapter were conducted in accordance with the research and analytical designs discussed in Chapter 4, in order to identify the underlying components impacting upon business incubation performance. This chapter details analytical procedures undertaken on the quantitative data which include data screening, exploratory factor analysis, and multinomial logistic regression.

The penultimate chapter of this thesis (Chapter 6) will synthesize findings from both quantitative and qualitative data sets where research questions will be reviewed, in order to identify unique contributions of this research, and culminate with a conceptual model that will incorporate integral elements from both methodologies.

5.2 Participants characteristics

The sample is consistent with participant characteristics as discussed in Section 4.5.3, consisting of 118 incubatees from various ICT incubators in Malaysia. Incubatees surveyed were representative of the Malaysian ICT incubatee population \((n = 180)\) and the sample breakdown of the participating incubatees is presented in Table 5.1. Of the 118 incubatees surveyed, 11% are still within their first year of establishment, 40% have been operating for 2-3 years, while the remaining have been established for more than three years. The sample represents a range of incubatees from government incubators (54.2%), private incubators (35.6%), and university-linked incubators (10.2%).

Participants consist of head of companies with undergraduate qualifications (54%), master’s degree (30%), and diploma (16%). In terms of gender distribution, 67.8% were male business owners and 32.2% were female. Male participants appear to have more experience based on the length of time they have been in the current positions as head of their firms, indicating there are fewer females in managerial positions in the ICT
SMEs. In terms of the type of businesses, the incubatees were mainly in the business application software development, internet-based businesses, and digital content development.

Table 5.1: Characteristics of participating incubatees

<table>
<thead>
<tr>
<th></th>
<th>Government</th>
<th>Private</th>
<th>University</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Academic qualifications</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Masters/Postgraduate</td>
<td>26</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>Undergraduate Degree</td>
<td>32</td>
<td>25</td>
<td>7</td>
</tr>
<tr>
<td>Diploma</td>
<td>6</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td><strong>Age of company</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 1 year</td>
<td>9</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>1-3 years</td>
<td>23</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>More than 3 years</td>
<td>32</td>
<td>34</td>
<td>10</td>
</tr>
<tr>
<td><strong>Types of business</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mobile and wireless communication</td>
<td>8</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Business application software development</td>
<td>12</td>
<td>19</td>
<td>8</td>
</tr>
<tr>
<td>Internet-based business applications in the financial sector</td>
<td>12</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Digital content development</td>
<td>12</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>E-commerce for networking and outsourcing</td>
<td>12</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Bio-informatics</td>
<td>3</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>E-government</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Of the 180 questionnaires distributed to the entire population of ICT incubatees, 118 were returned yielding a response rate of 65.5%. Questionnaires were distributed in person as well as electronically to incubatees of ICT incubators via a website developed by the researcher at www.incubatorstudy.com. The website provides a user-friendly interface for the ease of incubatees and the flexibility to return to their saved responses in the event that questionnaires could not be completed in one session.

Non-Response Bias
Non-respondents composed of incubatees who were unable to respond to the survey questionnaire due to their busy schedule and for other reasons were unwilling to participate in the research. The favourable response rate and the similarity in demographic profile between the sample and the sampling frame suggest that non-response bias is not an issue in this study.

All measures demonstrate a satisfactory range of variance, indicating that the measures are useful for a correlation study. Additionally, frequency analysis of the variables show
that all items have scores spanning the entire range of the respective scales suggesting that floor or ceiling effects are not a significant issue.

Response Bias
To overcome response bias the anchors used for questions with agreement scale consisted of two response options for agreement; two response options for disagreement; and one response option for neither agree nor disagree. This ensured that respondents were not confined to either side of the agreement spectrum (that is, agree or disagree). As mentioned in Chapter 4, the survey questionnaire used in this study was partially adapted from Hackett and Dilts’ (2008) study where development and validation of the constructs and scales have been previously performed. This applied to the Selection Performance, Monitoring and Business Assistance Intensity, and Resource Allocation constructs. Hence, the issue of response bias was also addressed by ensuring that questions in the questionnaire were clear, precise, and relatively short. The fourth construct was developed and added to the conceptual framework by the present researcher to reflect the growing importance of the Professional Management Services component in the business incubation process as previously discussed in Chapter 3. The researcher also avoided any leading questions, double-barreled or double negative questions in the survey questionnaire. The procedures taken by the researcher have helped in reducing the possibility of response bias in the survey questionnaire. A pilot study was also conducted prior to the questionnaire being distributed to the incubatees as explained in Chapter 4 under the quantitative methodology section.

5.3 Preliminary Analysis
In order to identify the underlying components of the business incubation process, the data set was prepared for analysis using SPSS Statistics 18.0. As discussed in Section 4.5.4, PCA was selected as the method of analysis as a result of strong theoretical support for this approach in reducing data sets to something more interpretable. Prior to conducting multivariate analyses, preliminary data analysis was conducted including visual inspection of the data, identification of outliers, and an assessment of the central tendencies of the data (Hair et al., 2010).
Missing Data

According to Tabachnick and Fidell (2007), missing data is one of the most common problems that researchers face. However, the data set generated by the questionnaire responses appears to be complete without any missing data. Hence, a procedure to overcome the problem of missing data was not necessary in this study.

First, data were visually inspected to assess their normality, homogeneity of variance, and scedasticity. According to Hackett and Dilts (2008), the data need not be perfectly normal and it is possible to assert the approximate normality of underlying theoretical distribution based on the descriptive statistics for each item. Upon assessment, all items obtained normal distributions and were retained for further analyses.

Second, the researcher examined whether common methods variance was an issue and this was done using the Harman’s one-factor test (Podsakoff, MacKenzie & Lee, 2003). All items were entered together into a factor analysis and the results of the unrotated factor solution were examined. Substantial common methods variance would be present should a single factor emerge or one general factor accounting for most of the covariance in the independent variables (Podsakoff, MacKenzie & Lee, 2003). The results revealed that eleven components emerged with the primary component explaining 41% of the variance. This suggests that the risk of common methods variance is low.

Third, identification of outliers was conducted using procedures from Hair et al. (2010). The standardised means for each variable were examined to identify cases with standardised means exceeding ±2.5 which suggests the possibility of being an outlier. Data revealed that there were no outliers.

Fourth, data were examined for skewness and kurtosis. Following Tabachnik and Fidell (2007) a skewness and kurtosis statistic between -4 to +4 was deemed acceptable. Ultimately, all data met the acceptable ranges and supported the univariate normality and were retained for further analyses.
As have been detailed by multivariate analysis authorities such as Hair et al. (2010) and Tabachnick and Fidell (2007), the following provides a general three step guide to factor analysis for researchers:

Step 1: Preparing and examining the correlation matrix. Tabachnick and Fidell (2007) recommend Kaiser’s measure of sampling adequacy where values greater than .6 are considered appropriate and values above .8 as ‘meritorious’. Initial data screening and preparation returned a value of .917 indicating that sampling adequacy has been achieved and that the matrix is therefore suitable for factor analysis.

Step 2: Extracting and determining the number of components or factors from the correlation matrix. The initial PCA revealed that eleven components yielded Eigenvalues greater than 1, for 86 variables in the data set which is within the range advocated by Tabachnick and Fidell (2007), that the number of components should be between the number of variables divided by three and the number of variables divided by five. For the present data set, this would mean 17 – 29 components hence the eleven components extracted in the initial PCA appear to be slightly under the criteria and therefore the number of components is a little under-estimated. The eleven components accounted for 79.2% of the total variance explained. This accords well with the acceptance level of 60% of total variance explained set out by Hair et al., (2010) and Tabachnick and Fidell (2007).

Step 3: Interpretation of factors. According to Tabachnick and Fidell (2007), only variables with loadings of .30 and above are interpreted. A greater loading indicates a more pure measure of the factor. Other authors including Comrey and Lee (1992) suggest that loadings more than .71 are considered excellent, .63 very good, .55 good, .45 fair, and .32 poor. A factor is usually assigned a name or a label that characterises the factor. In interpreting the component matrix, Comrey and Lee’s (1992) classifications were used as a guide in characterising the components.

The data set has been screened and prepared for analysis, sampling adequacy and factorability of the correlation matrix assessed; hence Step 1 of the PCA is now complete. The following sections will report the findings from Steps 2 and 3 of the analysis.
5.3.1 Extracting and determining the number of components

As detailed in the previous section, PCA was computed on the data set containing 118 responses across 86 variables. To achieve parsimony, Tabachnick and Fidell (2007) consider desirable that each item loads significantly on only one component. However Hair et al. (2010, p. 113) stated that “most factor solutions do not result in a simple structure solution (a single high loading for each variable on only one factor)” and given that the objective is to minimise the number of significant cross loadings, the authors advocate that items with significant loadings on several factors should be considered for deletion. Further, the authors added that after an examination of the correlation matrix and the communalities for each item, items that do not load on any component or do not meet the critical .50 communality level (which explains 50% of the variance of each item) should also be considered for deletion.

Criteria for extracting factors in Exploratory Factor Analysis

For this thesis, five criteria were taken into account when extracting factors: item loadings (those loadings less than .32 and loaded on multiple factors were eliminated during factor analysis), Eigenvalues (Kaiser, 1960), variance percentage (solutions accounting for 60% of the total variance – in some cases less), scree plot tests (Cattell, 1978) and prior research.

Eigenvalues measure the amount of variation and percentage of variance of a total sample accounted for by each factor (Hair et al., 2010). The ratio of Eigenvalues is the ratio of explanatory importance of the factors with respect to the variables. Factors with low Eigenvalues can be viewed as contributing little to the explanation of variances in the variables and thus can be considered redundant. The Kaiser rule is to drop all components with Eigenvalues under 1.0, indicating that an Eigenvalue of 1 represents a substantial amount of variation (Hair et al., 2010). However, Lance, Butts, and Michels (2006) maintained that Eigenvalues usually overestimate the true number of factors. All items in the data set loaded higher than .32 and had Eigenvalues higher than 1. Therefore there was no issue of item elimination.

According to Hair et al. (2010) the conceptual assumptions underlying factor analysis relate to the set of variables selected and the sample chosen. A basic assumption of factor analysis is that some underlying structure does exist in the set of selected
variables. Statistical procedures used in this research involves checking if there are any violations to the assumptions, followed by exploratory factor analysis, reliability and validity and finally, multinomial logistic regression. Furthermore, the Eigenvalues in the scree plots also suggested that eleven components solution is a reasonable assumption.

### 5.3.2 Unidimensionality

Factor analysis was conducted to assess the unidimensionality of the four constructs: (i) Selection Performance, (ii) Monitoring and Business Assistance Intensity, (iii) Resource Allocation, and (iv) Professional Management Services. Specifically, PCA was used with Varimax Rotation as it is a good general approach that simplifies the interpretation of factors (Hair et al., 2010). Factor loadings were generally aligned with previous research by Hackett and Dilts (2008) and conceptual understanding of the underlying structure of the data with a few items loading on multiple factors. Hair et al. (2010) suggest that each item must load on just one factor to be able to assert a reasonable degree of unidimensionality. Thus, the researcher employed an iterative, trial-and-error process of re-specifying the factor analytic model, followed by examination of wording of each item in an effort to find common threads that led to the factor loadings obtained.

### 5.3.3 Unidimensionality testing – Selection Performance

The result of PCA revealed three components representing the Selection Performance construct, one less component than the theoretical framework, with loadings that were generally aligned with expectations. Collectively, the three components explained 69.54% of the total variance, which accords well with Hair et al.’s (2010) 60% benchmark. The results of the PCA for the Selection Performance construct are presented in Table 5.2.

Component 1 appears to be measuring items that are a combination of what had been theorised as selection based on managerial or entrepreneurial and market characteristics. The reason managerial characteristics items merged with market characteristics items could be because products in the ICT industry are highly innovative where market variables can be largely unknown and the intersection between accumulated experience and entrepreneurial capabilities in combination with user-driven design dampen the influence of ‘traditional’ market factors such as supply and demand; market
fragmentation and consolidation. This could also be interpreted as a result of the hyper competition in this volatile industry where entrepreneurs tend to develop products that customers or market do not even know they want. This component has been labeled ‘Market and managerial-based selection’ and item loadings ranged from .534 to .787.

**Table 5.2: Variables loading on Selection Performance construct**

<table>
<thead>
<tr>
<th>Selection Performance items</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>10a [Long-term strategic orientation to market growth]</td>
<td>.787</td>
</tr>
<tr>
<td>10d [Incubees' potential in creating new markets]</td>
<td>.774</td>
</tr>
<tr>
<td>10b [Size determination of target market]</td>
<td>.771</td>
</tr>
<tr>
<td>10c [Accessibility of target market]</td>
<td>.766</td>
</tr>
<tr>
<td>9a [Prior work experience]</td>
<td>.723</td>
</tr>
<tr>
<td>9c [Technical expertise]</td>
<td>.633</td>
</tr>
<tr>
<td>9b [Prior management experience]</td>
<td>.630</td>
</tr>
<tr>
<td>9d [Entrepreneurial experience]</td>
<td>.534</td>
</tr>
<tr>
<td>11f [Inimitability of product]</td>
<td>.881</td>
</tr>
<tr>
<td>11e [Rareness of product]</td>
<td>.811</td>
</tr>
<tr>
<td>11g [Substitutability of the product]</td>
<td>.852</td>
</tr>
<tr>
<td>11a [Uniqueness of product]</td>
<td>.848</td>
</tr>
<tr>
<td>11b [Patent protection for product]</td>
<td>.647</td>
</tr>
<tr>
<td>11d [Having a relative advantage over competitor's product]</td>
<td>.552</td>
</tr>
<tr>
<td>12c [Having a good cash flow]</td>
<td>.773</td>
</tr>
<tr>
<td>12b [The strong likelihood of achieving financial break-even in a short period of time]</td>
<td>.766</td>
</tr>
<tr>
<td>12d [Having multiple, harvestable exit options]</td>
<td>.723</td>
</tr>
<tr>
<td>12a [Profit potential of the company]</td>
<td>.696</td>
</tr>
<tr>
<td>12c [The potential to attract investment participation from venture capitalists]</td>
<td>.654</td>
</tr>
</tbody>
</table>

Component 2 composed of items that measure selection based on product characteristics. Specifically, items addressed the inimitability, rareness, substitutability, uniqueness, and patent protection of the product. One theoretically derived item which has been previously shown to load on this component was found to cross-load with Component 3, which is intended to measure selection based on financial characteristics. The item was 11c (having a technological edge to the product). The cross-load between items measuring selection based on product and selection based on financial characteristics also occurred in Hackett and Dilts’ (2008) study. Item 11c has been deleted and tabled in Appendix I. Accordingly, Component 2 has been labeled as ‘Product-based selection’. The items in this component received loadings from .552 to .881 indicating good measures.

Component 3 composed of items intended to measure the selection of incubatees based on the financial capabilities of the potential incubatees. Items that are grouped in this component reflect the incubators’ tendency to choose incubatees based on their
financial capabilities. Measures include the company’s cash flow, the likelihood of meeting break-even within a short period, having harvestable exit options, the profit potential of the company, and the potential to attract investment participation from venture capitalists. The items in this component received loadings from .654 to .773 and the component was labeled ‘Financial-based selection’. The factor analytic results of this study slightly differ from Hackett and Dilts’ (2008) where the number of components in this study was one less than in their study.

5.3.4 Unidimensionality testing – Monitoring and Business Assistance Intensity

The factor analysis results for Monitoring and Business Assistance Intensity items show two distinct components that were aligned as theorised as presented in Table 5.3. Collectively, the two components explained 76.6% of the variance.

<table>
<thead>
<tr>
<th>Monitoring and Business Assistance Intensity items</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>14h [The incubator manager actively seeks ways to continuously improve the level of customer service satisfaction inside the incubator]</td>
<td>.898</td>
</tr>
<tr>
<td>14g [Our incubator ensures the quality of its services by regularly reviewing them]</td>
<td>.897</td>
</tr>
<tr>
<td>14a [Our company receives business planning assistance from the incubator]</td>
<td>.893</td>
</tr>
<tr>
<td>14f [The incubator regularly validates quality of potential new strategic service providers]</td>
<td>.893</td>
</tr>
<tr>
<td>14c [Our company receives administrative assistance and services from the incubator]</td>
<td>.876</td>
</tr>
<tr>
<td>14e [Our company receives operations-related advice from the incubator]</td>
<td>.873</td>
</tr>
<tr>
<td>14i [The other incubatees teach alternate or new strategies for achieving business success]</td>
<td>.868</td>
</tr>
<tr>
<td>14d [Our company receives production-related advice from the incubator]</td>
<td>.846</td>
</tr>
<tr>
<td>13a [Company receives sufficient time working directly with incubator manager]</td>
<td>.865</td>
</tr>
<tr>
<td>13b [Company spends appropriate amount of time interacting with other incubatees]</td>
<td>.839</td>
</tr>
<tr>
<td>13c [Interactions with incubator manager reduce the likelihood of company making expensive business mistakes]</td>
<td>.778</td>
</tr>
<tr>
<td>13d [Company receives appropriate time in assistance]</td>
<td>.777</td>
</tr>
</tbody>
</table>

All items loaded on a single component, with no multiple loadings on any component, suggesting parsimonious results. The first component obtained loadings that measure the comprehensiveness and quality of the monitoring and business assistance. The loadings suggest that incubators ensure the quality of the business assistance rendered by actively seeking ways to improve the level of customer services, through regular review of the incubatees, and by regularly validating quality of potential new strategic
service providers. Additionally, it also suggests the level of comprehensiveness of the services rendered include incubatees receiving business planning assistance, administrative assistance, operations-related advice, production-related advice, and business feasibility analysis. The high loadings obtained could possibly be due to the high correlation between the items in the component. The factor loadings for the first component in the Monitoring and Business Assistance Intensity construct ranged between .834 and .898 and the component has been labeled ‘Comprehensiveness and Quality’.

The second component composed of items that aligned with Hackett and Dilt’s (2008), which measure the time intensity of interaction between incubatees and incubator managers, and amongst incubatees. The loadings suggest that items used for the time intensity measurement cover various aspects such as the time working directly with incubator managers, other incubatees, and the implication of interaction, including reducing the likelihood of the future incubatee making expensive business mistakes. The implication of this component could be used to explain the required amount of time that is needed to contribute to incubation success. The factor loadings for the items were from .777 to .865 and this component was labeled ‘Time intensity’.

5.3.5 Unidimensionality testing – Resource Allocation

Following Hair et al. (2010) the researcher examined the wording of each item loading on the first component of this construct in an attempt to find a common thread that led to the loadings obtained. The results of factor analysis performed on questions related to Resource Allocation showed two components as shown in Table 5.4, one less component compared to theoretical findings. For the first component, it appears that items from the Resources Quality component and Resources Utilisation component have emerged to form one single component. The reason for this could well be due to the correlations that exist among the items. For example, 16e and 17d both have the connotation of “receiving advice from incubator manager” which may explain why the two items load on the same component. Similarly, items 16d, 16c, and 17a could be loading on the same component because all three items are referring to characteristics of the incubator. The implication of the combination of items result in a composite component labeled as “Resource Utilisation and Quality.” The items received significant loadings in the range of .602 to .825.
Table 5.4: Variables loading on Resource Allocation construct

<table>
<thead>
<tr>
<th>Resource allocation items</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>16e [We receive business-related information from the incubator in a way that is easy to understand]</td>
<td>1 .825</td>
</tr>
<tr>
<td>17d [Our company acts upon the advice we receive from the incubator manager]</td>
<td>2 .810</td>
</tr>
<tr>
<td>17f [We maximize our opportunities from the introduction to the incubator’s network contacts]</td>
<td></td>
</tr>
<tr>
<td>17b [Our company utilises advice obtained from the incubator manager]</td>
<td>.768</td>
</tr>
<tr>
<td>17c [Our company utilises the knowledge obtained from other incubatees]</td>
<td>.740</td>
</tr>
<tr>
<td>16d [Our incubator is nurturing]</td>
<td>.732</td>
</tr>
<tr>
<td>16c [Our incubator is pleasant]</td>
<td>.732</td>
</tr>
<tr>
<td>17e [Our company acts upon the advice we receive from fellow incubatees]</td>
<td>.709</td>
</tr>
<tr>
<td>17a [Our company makes full use of the administrative services offered at the incubator]</td>
<td>.700</td>
</tr>
<tr>
<td>16f [We receive information on sources of smart capital from our incubator]</td>
<td>.668</td>
</tr>
<tr>
<td>15b [Access to managerial expertise]</td>
<td>.652</td>
</tr>
<tr>
<td>16b [Our reputation is enhanced because of our association with the incubator]</td>
<td>.631</td>
</tr>
<tr>
<td>16a [Our company is offered flexible lease agreements to meet our changing space needs]</td>
<td>.602</td>
</tr>
<tr>
<td>15e [Access to accountants]</td>
<td>.824</td>
</tr>
<tr>
<td>15h [Access to funding]</td>
<td>.811</td>
</tr>
<tr>
<td>15d [Access to lawyers]</td>
<td>.809</td>
</tr>
<tr>
<td>15k [Access to technology labs]</td>
<td>.744</td>
</tr>
<tr>
<td>15j [Access to intellectual property advice]</td>
<td>.743</td>
</tr>
<tr>
<td>15l [Access to local university contacts]</td>
<td>.736</td>
</tr>
<tr>
<td>15c [Access to sources of capital]</td>
<td>.723</td>
</tr>
<tr>
<td>15f [Access to consultants]</td>
<td>.584</td>
</tr>
</tbody>
</table>

Items in this component address some aspect of perceived quality of the incubator resources, and the utilisation of the resources by incubatees. Specifically, items address the following characteristics: incubatees’ perception on the effects of the resources such as easy-to-understand information, maximising company’s opportunity towards networking, utilisation of knowledge gained from other incubatees and the incubator itself, and enhanced reputation of companies because of the association with the incubators.

The second component exhibits items that would theoretically load on “Resource Availability” and are intended to measure the availability of resources at the incubators. Items loading on this component all indicate the types of resources which are available to the incubatees. The items received loadings between .584 and .824 and the component has been labeled “Resource Availability.” Some cross-loadings emerged and possible reasons for this are that items in the second component may also have correlations to items in the first component. For example, items 15a and 15g refer to marketing specialists and administrative support services, both of which are resources at
the incubator that could be assessed in terms of its utilisation and quality. Ultimately, the EFA resulted in the reduction of the two items (15a and 15g) with remaining items loading unidimensionally on two factors that cumulatively explain 70.7% of the variance.

5.3.6 Unidimensionality testing – Professional Management Services

Finally, the factor analysis results of Professional Management Services construct showed four components as predicted in the conceptual model. All items loaded on a single component, with a few cross-loads as presented in Table 5.5. Collectively, the four components explained 74.1% of the variance.

<table>
<thead>
<tr>
<th>Professional Management Services items</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>20e [Dealing with staff grievance issues and disciplinary action]</td>
<td>.794</td>
</tr>
<tr>
<td>20c [Establishing staff appraisal and performance systems]</td>
<td>.782</td>
</tr>
<tr>
<td>20g [Assigning work, duties and responsibilities]</td>
<td>.773</td>
</tr>
<tr>
<td>20b [Managing the hiring and firing of staff (e.g. interviews and selection)]</td>
<td>.760</td>
</tr>
<tr>
<td>20a [Preparing job descriptions and personnel specifications]</td>
<td>.736</td>
</tr>
<tr>
<td>20f [Setting and reviewing salary structures]</td>
<td>.711</td>
</tr>
<tr>
<td>20h [Developing staff training programers]</td>
<td>.710</td>
</tr>
<tr>
<td>20d [Supervising staff]</td>
<td>.698</td>
</tr>
<tr>
<td>19d [Monitoring budgets]</td>
<td>.827</td>
</tr>
<tr>
<td>19c [Evaluating and reporting on financial performance]</td>
<td>.810</td>
</tr>
<tr>
<td>19e [Establishing a financial control system]</td>
<td>.806</td>
</tr>
<tr>
<td>19f [Maintaining a financial control system]</td>
<td>.804</td>
</tr>
<tr>
<td>19g [Making major purchasing decisions]</td>
<td>.601</td>
</tr>
<tr>
<td>18c [Undertaking promotional activities]</td>
<td>.821</td>
</tr>
<tr>
<td>18b [Preparing press releases]</td>
<td>.732</td>
</tr>
<tr>
<td>18d [Preparing marketing materials (e.g. brochures, newsletters, ads, website)]</td>
<td>.645</td>
</tr>
<tr>
<td>18e [Planning special events/media opportunities]</td>
<td>.632</td>
</tr>
<tr>
<td>21d [Liaising with stakeholders, policy makers and other key players]</td>
<td>.733</td>
</tr>
<tr>
<td>21g [Identifying resource requirements and cost implications]</td>
<td>.669</td>
</tr>
<tr>
<td>21a [Writing and refining strategic plans for the incubator]</td>
<td>.656</td>
</tr>
<tr>
<td>21b [Defining/refining mission statement]</td>
<td>.642</td>
</tr>
<tr>
<td>21c [Acting as a staff liaison with the incubator board]</td>
<td>.572</td>
</tr>
<tr>
<td>21f [Undertaking feasibility studies]</td>
<td>.535</td>
</tr>
</tbody>
</table>

Component 1 is composed of items measuring the level of human resource-related services available at the incubators. Specifically, items in this component measured the incubators’ role in preparing job description and personnel specifications, managing the hiring and firing of staff of the companies, establishing staff appraisal and performance systems, staff supervision, dealing with staff grievances and disciplinary issues, setting and reviewing salary structures, assigning work, duties and responsibilities and
developing staff training programs. This component obtained loadings of between 0.698 and 0.794. This component was labeled ‘Staff and Personnel Management’.

The second component is characterised by loadings measuring the level of financial management services provided by the incubators. Items loading on this component measured incubator’s involvement in issues such as monitoring incubatee’s budget, evaluation and report on financial performance, establishing a financial control system, maintaining a financial control system, preparing annual operating and capital budgets, writing grant proposals, and making major purchasing decisions. The factor loadings obtained by these items were from .601 to .827. The component has been labeled ‘Financial Management’.

The third component is composed of items measuring the level of incubators’ involvement in marketing and promotion of incubatee products. Specifically, the items addressed aspects pertaining to marketing of incubatee products such as incubator’s involvement in devising and managing marketing strategies, preparing press releases, undertaking promotional activities, preparing marketing materials, planning special events/media opportunities, representing the incubator, developing media contacts and maintaining media contacts. The factor loadings obtained ranged between .632 and .821. This component has been labeled ‘Marketing and Promotion Management’.

The fourth and final component is composed of items measuring the level of strategic management by the incubators. Generally, items in this factor addressed some aspect of incubators’ involvement in the strategic development of the incubatees. Specifically, items address the following characteristics: incubator’s role in assisting with writing and refining strategic plans for the incubator, defining, and refining mission statement, acting as staff liaison with incubator board, identification of income generation opportunities, and identification of resource requirements and cost implications. The component obtained factor loadings from .535 to .733. This component has been labeled ‘Strategic Management’.

Several cross-loads occurred for a number of reasons. Cross-loads between the second component and the third component occurred for two items, which are 18a and 18f. The
two items were theoretically loading on the marketing related component, however, the EFA results showed that they also loaded on the component that measures financial management services of the incubators. Items 18a and 18f were deleted and tabled in Appendix I.

Cross-loads involving Components 2 and 4 also occurred for items 19b, 19a, and 21e. As mentioned earlier, Component 2 appears to measure the level of incubator’s involvement in financial management of the incubatees, while component 4 measures the level of incubator’s involvement in strategic management. Item 19a and 19b, which theoretically should load on Component 2 have cross-loaded to component 4. The cross-load occurred due to the association of the word ‘budget’ with ‘grant’ and how they may be related to the strategic management of the incubators. Another item, 21e, which loaded on both Component 2 and 4 suggested that the cross-load occurred due to the association between the word ‘opportunities’ and items loading on strategic management. Due to the sizable cross-loadings, items 19a, 19b, and 21e were deleted and tabled in Appendix I.

Cross-loads between items in Component 3 and 4 occurred for two items; 18g and 18h. Both items were theoretically related to component 3, which measures the level of marketing management at the incubators. The cross-load with Component 4 could be explained by the use of the words ‘developing’ and ‘maintaining’ which both associate well with strategic management. Items 18g and 18h were deleted due to cross-loading above the .30 level and tabled in Appendix I. The item deletion resulted in an improved total variance explained from 74.1% to 77.5%. Consistent with theory, the majority of items loaded on their corresponding constructs.

In summary, ten items were deleted due to cross-loadings. The items deleted are presented in Appendix I. Consistent with theory, majority of items loaded on their corresponding constructs. As previously noted, EFA assists in identifying whether items fit within theoretical factor structures.

5.4 Reliability

Instrument reliability refers to the internal consistency of items that comprise a latent construct (Hair et al., 2010). Following Hair et al. (2010), this exploratory research
established an alpha (α) of .6 as the threshold for being a reliable scale. The Cronbach’s alphas for all components were calculated and listed in Table 5.6.

Table 5.6: Cronbach’s alpha values for all components

<table>
<thead>
<tr>
<th>Construct</th>
<th>Component</th>
<th>Component Label</th>
<th>Cronbach’s Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selection Performance</td>
<td>1</td>
<td>Market and managerial based selection</td>
<td>.921</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Product-based selection</td>
<td>.926</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Financial-based selection</td>
<td>.880</td>
</tr>
<tr>
<td>Monitoring and Business Intensity</td>
<td>4</td>
<td>Comprehensiveness and Quality</td>
<td>.967</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Time Intensity</td>
<td>.854</td>
</tr>
<tr>
<td>Resource Allocation</td>
<td>6</td>
<td>Resource Utilisation and Quality</td>
<td>.958</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Resource Availability</td>
<td>.958</td>
</tr>
<tr>
<td>Professional Management Services</td>
<td>8</td>
<td>Staff and Personnel Management</td>
<td>.964</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>Financial Management</td>
<td>.945</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>Marketing and Promotion Management</td>
<td>.942</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>Strategic Management</td>
<td>.955</td>
</tr>
</tbody>
</table>

The scales used to measure the constructs achieved a high degree of reliability, with all scales performing well above the .6 threshold. Furthermore, the coefficients appear to satisfy Nunnally’s (1978) suggested minimum criterion of α = .70. Nevertheless, Nunnally (1978) stated that reliabilities of α = .50 to α = .60 are sufficient for early stages of basic research. Table 5.7 summarises the extracted components and brief interpretation of each component.

Table 5.7: Summary of extracted components

<table>
<thead>
<tr>
<th>Construct</th>
<th>Component</th>
<th>Component Label</th>
<th>Component Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selection Performance</td>
<td>1</td>
<td>Market and managerial-based selection</td>
<td>Relates that knowledge regarding market properties and prior management experience of the incubatees are essential to incubation admission.</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Product-based selection</td>
<td>Relates that incubators place importance on choosing products that are unique, inimitable, and have a technological edge.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Financial-based selection</td>
<td>Relates there is an association between applicants’ financial capabilities and the incubator management’s decision to accept them.</td>
</tr>
<tr>
<td>Construct</td>
<td>Component</td>
<td>Component Label</td>
<td>Component Interpretation</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>-----------</td>
<td>------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Monitoring and Business Assistance Intensity</td>
<td>4</td>
<td>Comprehensiveness and Quality</td>
<td>Relates that the range of business assistance is critical for incubatees especially in areas such as administrative, business planning, and operations. This supports key issues such as regular validation and review of the services.</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Time Intensity</td>
<td>Relates that both formal and informal networking activities in the incubator are critical in building good relationships and encouraging incubator’s success.</td>
</tr>
<tr>
<td>Resource Allocation</td>
<td>6</td>
<td>Resource Utilisation and Quality</td>
<td>Relates that there is an association between flexibility in lease agreements, maximising incubatees’ opportunities through the incubator network, enhancing reputation and the utilisation by incubatees.</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Resource Availability</td>
<td>Relates that access to a range of expertise in different areas is critical for incubatees.</td>
</tr>
<tr>
<td>Professional Management Services</td>
<td>8</td>
<td>Staff and Personnel Management</td>
<td>Relates that basic human resource assistance such as establishing staff appraisal, managing and hiring of staff, and preparing job descriptions are relevant management services.</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>Financial Management</td>
<td>Relates that services such as evaluating financial performance, maintaining financial control systems and writing grant proposals are valuable financial services to the incubatees.</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>Marketing and Promotion Management</td>
<td>Relates there is an association between undertaking promotional activities, developing and maintaining media contacts, preparing marketing materials and incubatees’ needs for management services</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>Strategic Management</td>
<td>Relates to the incubator’s role in establishing long-term strategic outcomes for the incubatees involving identification of resource</td>
</tr>
</tbody>
</table>
The results of the factor analysis have been presented and the following section will present the multinomial logistic regression analysis which aims to determine the relationship between the identified components and business incubation performance.

5.5 Multinomial logistic regression

As mentioned earlier in the methodology chapter, multinomial logistic regression is used to model the relationship between a categorical dependent variable and one or more predictor variables, which may be either discrete or continuous. This technique has been used in broader areas in social sciences (Janik & Kravitz, 1994; Tolman & Weisz, 1995; Chuang, 1997) and higher education (Austin, Yaffee & Hinkle, 1992; Peng, So, Stage & St. John, 2002). According to Peng, Lee, and Ingersoll (2002), logistic regression is well suited for describing and testing propositions concerning relationships between a categorical dependent variable and one or more categorical or continuous explanatory variables. Logistic regression can be used to predict a dependent variable based on continuous and/or categorical independent variables and to determine the variance in the dependent variable explained by the independents. Likewise, to rank the relative importance of independents, to assess interaction effects, and to understand the impact of covariate control variables (Cox & Snell, 1989; Hosmer & Lemeshow, 2000). In this thesis, logistic regression analysis was employed to address the first research question, previously introduced in Chapter 3:

To what extent do Selection Performance, Monitoring and Business Assistance Intensity, Resource Allocation, and Professional Management Services impact on the business incubation performance of ICT incubators in Malaysia?

Logistic regression applies maximum likelihood estimation after transforming the dependent into a logit variable (the natural log of the odds of the dependent occurring or not). In this way, logistic regression estimates the probability of a certain event occurring. Logistic regression calculates changes in the log odds of the dependent, not changes in the dependent variable itself. Discriminant analysis has been used in the past but is now more frequently being replaced with logistic regression, as this approach
requires fewer assumptions in theory, is more statistically robust in practice, and is
easier to use and understand than discriminant analysis (Peng et al., 2002; Anderson &
Rutkowski, 2008). Two goodness-of-fit tests (Pearson & Deviance) were performed; a
table of observed and expected frequencies, and measures of association were produced.

The data set was analysed using multinomial logistic regression with a forward
contingional (stepwise) application. The stepwise application to the logistic regression
was employed so that only significant variables were included in the final analysis. As
mentioned in the methodology chapter, the 11 extracted components of the factor
analysis were used as the independent variables in the logistic regression analysis, while
the four categorical outcomes of business incubation performance remained as the
dependent variables, namely, (1) ‘Our company is barely surviving’, (2) ‘Our company
has met its break-even and is moving on a path toward profitability’, (3) ‘Our company
is making profit’, and (4) ‘Our company is highly profitable’.

The prediction probabilities were saved during the analysis and used to examine the
goodness-of-fit of the regression to the model. The Pseudo $R^2$ values serve as a
replacement for the $R^2$ statistic used in linear regression. The regression score was a
calculation of the likelihood of each component extracted from the factor analysis that
could predict the performance of incubation.

The logistic regression analysis was performed in five phases consisting of one full
model analysis and four individual model analyses. The full model analysis incorporates
eleven components previously extracted from the factor analysis, and grouped under
their respective broader constructs, that is, Selection Performance, Monitoring and
Business Assistance Intensity, Resource Allocation, and Professional Management
Services, to examine their relationships with the four outcome categories.

The individual model analysis examines each component’s relationship with business
incubation performance. Results of the logistic regression analyses will be presented in
the following manner: firstly, a full model evaluation explaining the relationship
between the four broad constructs and business incubation performance will be
presented. Secondly, evaluations from the Selection Performance construct will be
presented, followed by evaluations from Monitoring and Business Assistance Intensity, resource allocation and finally, the Professional Management Services construct.

**Evaluations of the logistic regression model**

Peng, Lee and Ingersoll (2002), advocate that logistic regression evaluations may be evaluated based on the following: (a) overall model evaluation, (b) statistical tests of individual predictors, (c) goodness-of-fit statistics, and (d) validations of predicted probabilities. This approach has been adopted here in presenting the results.

*Overall model evaluation.* A logistic model is said to provide better fit to the data if it demonstrates an improvement over the intercept-only model (also called the null model). The intercept-only model serves as a good baseline because it contains no predictors. Consequently, according to this model, all observations would be predicted to belong in the largest outcome category. An improvement over this model is examined using inferential statistical tests such as the likelihood ratio and Wald tests. Table 5.8 presents the overall model evaluation consisting of all four constructs. The table reveals that Selection Performance (F1), Monitoring and Business Assistance Intensity (F2), Resource Allocation (F3), and Professional Management Services (F4) are all statistically significant in predicting business incubation performance ($p < .05$). These results provide an extension to Hackett and Dilts’ (2008) study by investigating the relationships between the four constructs and business incubation performance.

The presence of a relationship between the dependent variable and combination of independent variables is based on the statistical significance of the final model chi-square in the model-fitting information table (Table 5.8). In this analysis, the probability of the model chi-square (14.02) was .003, which is less than the level of significance of .05. Similarly, the level of significance for individual constructs all show values less than .05, indicating statistical significance. The existence of relationships between Selection Performance, Monitoring and Business Assistance Intensity, Resource Allocation, and Professional Management Services and business incubation performance was supported.
As mentioned earlier, the dependent variable is business incubation performance which is measured by four categorical outcomes. Logistic regression enables independent variables to predict group memberships, and as this study has four outcomes, one of the outcomes (‘Our company is barely surviving’) has been used as a reference category. Hence, there are three groups generating from this data: Group 1 (‘Our company has met its break even and is moving toward profitability’), Group 2 (‘Our company is making profit’), and Group 3 (‘Our company is highly profitable’). Based on data presented in Table 5.9, the first group shows no significant relationship between the constructs and business incubation performance with all values of $p$ greater than the significance level of .05. However, Groups 2 and 3 show significant relationships with business incubation performance with some constructs having $p$-values of less than the significance level of .05 including Selection Performance ($p = .009$) for Group 2 and ($p = .048$) for Group 3, Monitoring and Business Assistance Intensity ($p = .016$) for Group 2, and Professional Management Services ($p = .010$) for Group 2, and ($p = .041$) for Group 3.

Examining the log odds of the three groups we are able to gauge the impact of a one-unit change in the independent variables on the log odds of the dependent variable. For example in Group 2 a positive relationship between the dependent variable ‘Our company is making profit’ and the independent variable ‘Selection Performance’ is observed whereby the likelihood of a company making profit through better Selection Performance is increased by a factor of 1.215. Similarly, with $p=.016$, a unit increase in Monitoring and Business Assistance Intensity results in the log odds of the dependent variable ‘Our company is making profit’ increasing by 29.8% (1.295-1=.295). The Professional Management Services impact is slightly smaller in this group, where a one-unit increase in Professional Management Services results in the increase of the dependent variable by 13% (1.13-1=.13). The relationships between Selection Performance, Monitoring and Business Assistance Intensity and Professional
Management Services and business incubation performance are hence supported. Incubators that adopt Selection Performance, Monitoring and Business Assistance Intensity, and Professional Management are more likely to have incubatees that are making profit.

Table 5.9: Parameter estimates for the full model

<table>
<thead>
<tr>
<th>Group 1: Our company has met its break-even and is moving on a path to profitability</th>
<th>$\beta$</th>
<th>SE $\beta$</th>
<th>Wald’s $\chi^2$</th>
<th>$p$</th>
<th>$e^\beta$ (odds ratio)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predictor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>.176</td>
<td>2.943</td>
<td>.004</td>
<td>.952</td>
<td>.952</td>
</tr>
<tr>
<td>Selection Performance (F1)</td>
<td>.001</td>
<td>.024</td>
<td>.002</td>
<td>.963</td>
<td>1.000</td>
</tr>
<tr>
<td>Monitoring and Business Assistance Intensity (F2)</td>
<td>.000</td>
<td>.061</td>
<td>.000</td>
<td>.998</td>
<td>1.000</td>
</tr>
<tr>
<td>Resource Allocation (F3)</td>
<td>.057</td>
<td>.043</td>
<td>1.762</td>
<td>.184</td>
<td>.944</td>
</tr>
<tr>
<td>Professional Management Services (F4)</td>
<td>.020</td>
<td>.026</td>
<td>.585</td>
<td>.444</td>
<td>1.020</td>
</tr>
</tbody>
</table>

| Group 2: Our company is making profit       |         |            |                 |     |                      |
| Constant                                    | 35.271  | 14.425     | 5.979           | .014|                      |
| Selection Performance (F1)                  | .195    | .075       | 6.731           | .009| 1.215                |
| Monitoring and Business Assistance Intensity (F2) | .258    | .107       | 5.828           | .016| 1.295                |
| Resource Allocation (F3)                    | .026    | .084       | .098            | .754| 1.027                |
| Professional Management Services (F4)       | .122    | .047       | 6.618           | .010| 1.130                |

| Group 3: Our company is highly profitable    |         |            |                 |     |                      |
| Constant                                    | 41.092  | 22.568     | 3.315           | .069| 41.092               |
| Selection Performance (F1)                  | .265    | .134       | 3.914           | .048| 1.304                |
| Monitoring and Business Assistance Intensity (F2) | .145    | .182       | .640            | .424| 1.156                |
| Resource Allocation (F3)                    | .083    | .138       | .356            | .551| 1.086                |
| Professional Management Services (F4)       | .202    | .099       | 4.162           | .041| 1.223                |

For Group 3, two components were statistically significant in predicting business incubation performance: Selection Performance and Professional Management Services. The value of the log odds ($e^\beta$) is 1.304 which implies that for each unit increase in Selection Performance, the odds increase by 30.4% (1.304-1= .304). Professional Management Services also has an impact in Group 3 where for an increase in each unit; the odds are increased by 22.3% (1.223-1=.223). The relationships between these constructs and business incubation performance are hence supported, suggesting that incubators that adopt Selection Performance and Professional Management Services are more likely to produce highly profitable incubatees. The significance of the constructs will be elaborated in the following paragraph.

Statistical tests of individual predictors. The statistical significance of individual regression coefficients ($\beta$s) is tested using the Wald chi-square statistic. According to
Table 5.9, constructs F1, F2, and F4 were significant predictors of the second group with outcome category “Our companies are making profit” \((p < .05)\). The high corresponding Wald test values also show the significance of these three constructs. This means that incubatees could be making profit if they are carefully selected, given the adequate monitoring and business assistance, and provided Professional Management Services. Meanwhile, providing them with resources does not necessarily aid them towards making profit. For the present data set, the test result \((p > .05)\) suggested that an alternative model without the intercept might be applied to the data. Consequently, F1 and F4 were also significant predictors for the outcome category ‘Our company is highly profitable’. This could be interpreted as companies tend to be highly profitable when incubators select the incubatees carefully, as well as providing them with Professional Management Services. Consequently, monitoring of incubatees and providing resources to the incubatees may not be significant to creating incubatees that are highly profitable.

The \(\beta\)s are the logistic regression coefficients. Negative \(\beta\)s reveal a negative or inverse relationship, whereas positive \(\beta\)s indicate positive relationship (Field, 2009). The odds ratios in the last column are more straightforward in interpretation than the \(\beta\)s (log odds). An odds ratio of 1 is equivalent to a log odds of 0. An odds ratio of 1 and a log odds of 0 signify no relation of the independent variable to the dependent variable. The odds ratio are the probability that an event will happen divided by the probability that the event will not happen (Dee, Livesey, Gill & Minshall, 2011). Studies in the past that used logistic regression analysis presented the odds ratios in their results such as Meisels and Liaw (1993), Rush and Vitale (1994), and McNeal (1998).

**Goodness-of-fit statistics.** Goodness-of-fit statistics assess the fit of a logistic model against actual outcomes. Two descriptive measures are presented in Table 5.10, which are the \(R^2\) indices, defined by Cox and Snell (1989) and Nagelkerke (1991), respectively. These indices are variations of the \(R^2\) concept defined for the OLS regression model. Due to the limited interpretation of the \(R^2\) in logistic regression (Peng, Lee & Ingersoll, 2002), the \(R^2\) indices can be treated as supplementary to each other, more useful evaluative indices, such as the overall evaluation model, tests of individual regression coefficients, and the goodness-of-fit test statistic (Peng, Lee & Ingersoll, 2002). The Cox and Snell \(R^2\) measure indicates a greater model fit with higher values, but with a limit of less than 1 (<1) (Hair et al., 2010). The Nagelkerke \(R^2\) is an adjusted version of the Cox and Snell \(R^2\) and covers the full range from 0 to 1 (Hair et
al., 2010), and therefore it is often preferred. The $R^2$ values indicate how useful the explanatory variables are in predicting the response variable and can be referred to as measures of effect size.

Table 5.10: Goodness-of-fit tests of the full model

<table>
<thead>
<tr>
<th></th>
<th>Chi-Square</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson</td>
<td>257.923</td>
<td>297</td>
<td>.951</td>
</tr>
<tr>
<td>Deviance</td>
<td>217.464</td>
<td>297</td>
<td>1.000</td>
</tr>
<tr>
<td>$R^2$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cox and Snell</td>
<td></td>
<td>.297</td>
<td></td>
</tr>
<tr>
<td>Nagelkerke</td>
<td></td>
<td>.326</td>
<td></td>
</tr>
</tbody>
</table>

In normal linear regression, summary measures of fit are functions of a residual defined as the difference between the observed and fitted value. In logistic regression, there are several ways to measure the difference between the observed and fitted values. There are two measures of the difference between the observed and the fitted values: the Pearson residual and the Deviance residual, both suggesting that the model fits to the data well. In other words, the null hypothesis of a good model fit to data was tenable.

Validations of predicted probabilities. Logistic regression predicts the logit of an event outcome from a set of predictors. The resultant predicted probabilities could then be revalidated with the actual outcome to determine if high probabilities are indeed associated with events and low probabilities with non-events. The degree to which predicted probabilities agree with actual outcomes is expressed as either a measure of association or a classification table. Peng, Lee and Ingersoll (2002) recommend the use of the classification in addition to the overall evaluation table to help communicate findings to readers. The classification table (Table 5.11), which produces a contingency table of observed versus predicted responses for all combinations of predictor variables (Field, 2009), indicates the extent of how the model correctly predicts each outcome category. This table is “most appropriate when classification is a stated goal of the analysis; otherwise it should only supplement more rigorous methods of assessment of fit” (Hosmer & Lemeshow, 2000, p. 160). The benchmark used to characterise a multinomial logistic regression model as useful is a 25% improvement over the rate of accuracy achievable by chance alone (Naderi, Abdullah, Aizan, Sharir & Kumar, 2009). In this study, the full model classifies 48.6% correctly, which is well above the 39.5% (1.25 x 31.6% = 39.5%) chance accuracy criteria, hence classification accuracy is satisfied in this study.
Table 5.11: Classification table for the full model

<table>
<thead>
<tr>
<th>Observed</th>
<th>Predicted</th>
<th>% Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Our company is barely surviving</td>
<td>Our company has met its break-even and is moving on a path toward profitability</td>
<td></td>
</tr>
<tr>
<td>Our company has met its break-even and is moving on a path toward profitability</td>
<td>Our company is making profit</td>
<td>42.9%</td>
</tr>
<tr>
<td>Our company is making profit</td>
<td>Our company is highly profitable</td>
<td>37.8%</td>
</tr>
<tr>
<td>Our company is highly profitable</td>
<td></td>
<td>66.7%</td>
</tr>
<tr>
<td>Overall Percentage</td>
<td></td>
<td>25.0%</td>
</tr>
<tr>
<td>12, 6, 10, 0</td>
<td></td>
<td>48.6%</td>
</tr>
</tbody>
</table>

The study focuses on the performance outcomes of the incubatees, which is the dependent variable with four categories: ‘Our company is barely surviving’; ‘Our company has met its break-even and moving on a path toward profitability’; ‘Our company is making profit’; and ‘Our company is highly profitable’. One hundred and eighteen responses were obtained from ICT incubatee firms located at ICT incubators in Malaysia in 2010. Findings indicate that 32 firms (27.1%) were barely surviving, 44 firms (37.3%) had met their break-even, 38 firms (32.2%) were making profit, and 4 firms (3.4%) were highly profitable. The remaining results of the logistic regression analysis will be presented in the next section. The analysis examines individual elements within each construct and investigates their relationships with business incubation performance.

5.5.1 Selection Performance

Due to the exploratory nature of this study, Field (2009) recommends the use of stepwise methods in situations where little previous research exists on which to base hypotheses for testing and when the research seeks a model to fit the data. Both forward entry and backward entry methods were tested with each yielding results that were not too different from each other.

The model-fitting information table (Table 5.12) compares the model (or models in a stepwise analysis) to the baseline (the model with only the intercept term in it and no
predictor variables). It is a useful table that denotes the improvement of the model as a result of entering the predictors of the model (Field, 2009). The chi-square statistics for this model suggest that it is highly significant with all values of $p$ lesser than the significance level of .05, indicating there exists a relationship between the individual items of Selection Performance and business incubation performance as shown in Table 5.12.

### Table 5.12: Model-fitting information table Selection Performance Construct

<table>
<thead>
<tr>
<th>Construct</th>
<th>Chi-Square</th>
<th>$df$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>.000</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Financial-based selection</td>
<td>52.368</td>
<td>33</td>
<td>.017</td>
</tr>
<tr>
<td>Market and managerial-based selection</td>
<td>72.543</td>
<td>48</td>
<td>.013</td>
</tr>
<tr>
<td>Product-based selection</td>
<td>78.000</td>
<td>42</td>
<td>.001</td>
</tr>
</tbody>
</table>

Based on the parameter estimates in Table 5.13, selection based on product characteristics appears to be the strongest predictor for Group 2 ‘Our company is making profit’ with significance level lesser than .05 ($p < .05$) and Wald’s $\chi^2 = 4.183$. The value of $e^{\hat{b}}$, which is 1.157 implies that for each unit increase in ‘Product-based selection’, there is a 15.7% increase in the dependent variable ‘Our company is making profit’. This suggests that incubators that select incubatees based on their product characteristics are more likely to have incubatees that are making profit. Interestingly, ‘Financial-based selection’ and ‘Market and managerial-based selection’ are not statistically significant in predicting specific categories of the dependent variable. This type of discrepancy can occur in logistic regression as exemplified in a study by Naderi et al. (2009). Another source supporting this inconsistency stated that even though an independent variable has an overall relationship with the dependent variable, it might or might not be statistically significant in differentiating between pairs of groups defined by the dependent variable” (Bayaga, 2010).

The Pearson and Deviance statistic tests for the fit of the model to the data, as shown in Table 5.14. Specifically, it tests whether the predicted values from the model differ significantly from the observed values. In order for a model to have a good fit, the predicted values should not be significantly different from the observed values (Field, 2009). Evidence of the goodness-of-fit of logistic models can be explained by $R^2$ index either for the entire model or for each predictor.
Table 5.13: Parameter estimates for Selection Performance construct

<table>
<thead>
<tr>
<th>Group 1: Our company has met its break-even and is moving on a path to profitability</th>
<th>β</th>
<th>SE β</th>
<th>Wald's χ²</th>
<th>p</th>
<th>e^β (odds ratio)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-.623</td>
<td>1.421</td>
<td>.192</td>
<td>.661</td>
<td>-</td>
</tr>
<tr>
<td>Financial-based selection</td>
<td>.139</td>
<td>.107</td>
<td>1.703</td>
<td>.192</td>
<td>1.150</td>
</tr>
<tr>
<td>Market and managerial-based selection</td>
<td>-.093</td>
<td>.075</td>
<td>1.558</td>
<td>.212</td>
<td>.911</td>
</tr>
<tr>
<td>Product-based selection</td>
<td>.049</td>
<td>.058</td>
<td>.735</td>
<td>.391</td>
<td>1.051</td>
</tr>
<tr>
<td><strong>Group 2: Our company is making profit</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-4.528</td>
<td>2.059</td>
<td>4.835</td>
<td>.028</td>
<td>-</td>
</tr>
<tr>
<td>Financial-based selection</td>
<td>-.036</td>
<td>.123</td>
<td>.087</td>
<td>.768</td>
<td>.964</td>
</tr>
<tr>
<td>Market and managerial-based selection</td>
<td>.056</td>
<td>.087</td>
<td>.419</td>
<td>.517</td>
<td>1.058</td>
</tr>
<tr>
<td>Product-based selection</td>
<td>.146</td>
<td>.071</td>
<td>4.183</td>
<td>.041</td>
<td>1.157</td>
</tr>
<tr>
<td><strong>Group 3: Our company is highly profitable</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-5.904</td>
<td>4.855</td>
<td>1.479</td>
<td>.224</td>
<td>-</td>
</tr>
<tr>
<td>Financial-based selection</td>
<td>.083</td>
<td>.232</td>
<td>.127</td>
<td>.721</td>
<td>1.086</td>
</tr>
<tr>
<td>Market and managerial-based selection</td>
<td>-.122</td>
<td>.136</td>
<td>.812</td>
<td>.368</td>
<td>.885</td>
</tr>
<tr>
<td>Product-based selection</td>
<td>.251</td>
<td>.194</td>
<td>1.678</td>
<td>.195</td>
<td>1.285</td>
</tr>
</tbody>
</table>

a. ‘Our company is barely surviving’ is used as a reference category

The Deviance statistic here demonstrates that the model is a good fit of the data (p = .99, which is significantly higher than .05). The Nagelkerke $R^2$ value of .83 indicates the model is useful in predicting business incubation performance.

Table 5.14: Goodness-of-fit tests for Selection Performance

<table>
<thead>
<tr>
<th></th>
<th>Chi-square</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson</td>
<td>66.345</td>
<td>159</td>
<td>1.000</td>
</tr>
<tr>
<td>Deviance</td>
<td>73.844</td>
<td>159</td>
<td>.99</td>
</tr>
<tr>
<td>$R^2$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cox and Snell</td>
<td></td>
<td></td>
<td>.755</td>
</tr>
<tr>
<td>Nagelkerke</td>
<td></td>
<td></td>
<td>.830</td>
</tr>
</tbody>
</table>

Finally, the classification table for analysis of Selection Performance elements as shown in Table 5.15 suggests a 75.4% correct prediction, which is well above the criteria for chance accuracy of 39.5%. This indicates that the criteria for classification accuracy are satisfied for the analysis.
The following section presents regression analysis of the Monitoring and Business Assistance Intensity construct.

5.5.2 Monitoring and Business Assistance Intensity

The model-fitting information in Table 5.16 details the overall fit of the model. Firstly, the chi-square statistics for this model show that ‘Comprehensiveness and Quality’ of the business assistance contributes significantly to the model, \( p < .05 \) while ‘Time Intensity’ of the interaction is not a significant predictor of the model \( p > .05 \). This suggests that the existence of the relationship between the ‘Comprehensiveness and Quality’ and business incubation performance is supported while the relationship between ‘Time Intensity’ and business incubation performance is not.

Table 5.16: Model-fitting information table for Monitoring and Business Assistance Intensity Construct

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Chi-Square</th>
<th>df</th>
<th>( p )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>4.387</td>
<td>3</td>
<td>.223</td>
</tr>
<tr>
<td>Comprehensiveness and Quality</td>
<td>10.598</td>
<td>3</td>
<td>.014</td>
</tr>
<tr>
<td>Time Intensity</td>
<td>.665</td>
<td>3</td>
<td>.881</td>
</tr>
</tbody>
</table>

The parameter estimates in Table 5.17 shows that ‘Comprehensiveness and Quality’ of the business services appears to be a significant predictor of the outcome ‘Our company is making profit’, \( p = .003; \text{Wald’s} \chi^2 = 8.925 \). However, ‘Comprehensiveness and Quality’ was not able to predict Groups 1 and 3 memberships. The odds ratio of 1.124 indicates that the likelihood of a company making profit through a one-unit change of ‘Comprehensiveness and Quality’ of monitoring and business assistance is increased by
a factor of 1.124. The Deviance statistic demonstrates that the model is a good fit of the data ($p = .954$, which is much higher than $.05$) as shown in Table 5.18.

**Table 5.17: Parameter estimates for Monitoring and Business Assistance Intensity construct**

<table>
<thead>
<tr>
<th>Group 1: Our company has met its break-even and is moving on a path toward profitability</th>
<th>$\beta$</th>
<th>$SE\beta$</th>
<th>Wald’s $\chi^2$</th>
<th>$p$</th>
<th>$e^\beta$ (odds ratio)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>- .882</td>
<td>1.843</td>
<td>.229</td>
<td>.632</td>
<td></td>
</tr>
<tr>
<td>Comprehensiveness and Quality</td>
<td>.051</td>
<td>.028</td>
<td>3.255</td>
<td>.071</td>
<td>1.052</td>
</tr>
<tr>
<td>Time Intensity</td>
<td>-.012</td>
<td>.095</td>
<td>.016</td>
<td>.898</td>
<td>.988</td>
</tr>
</tbody>
</table>

**Group 2: Our company is making profit**

| Constant | -4.519 | 2.232 | 4.098 | .043 |
| Comprehensiveness and Quality | .117 | .039 | 8.925 | .003 | 1.124 |
| Time Intensity | .064 | .108 | .345 | .557 | 1.066 |

**Group 3: Our company is highly profitable**

| Constant | - .931 | 3.508 | .070 | .791 |
| Comprehensiveness and Quality | .004 | .055 | .005 | .944 | 1.004 |
| Time Intensity | -.060 | .186 | .104 | .747 | .942 |

a. ‘Our company is barely surviving’ is used as a reference category

**Table 5.18: Goodness-of-fit tests for Monitoring and Business Assistance Intensity**

<table>
<thead>
<tr>
<th></th>
<th>Chi-Square</th>
<th>df</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson</td>
<td>148.844</td>
<td>171</td>
<td>.888</td>
</tr>
<tr>
<td>Deviance</td>
<td>141.052</td>
<td>171</td>
<td>.954</td>
</tr>
<tr>
<td>$R^2$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cox and Snell</td>
<td></td>
<td></td>
<td>.114</td>
</tr>
<tr>
<td>Nagelkerke</td>
<td></td>
<td></td>
<td>.125</td>
</tr>
</tbody>
</table>

The classification table for analysis of Monitoring and Business Assistance Intensity construct (Table 5.19) demonstrates a 43.2% correct prediction, which is larger than the 39.5% chance accuracy criteria, hence criteria for classification accuracy is satisfied.
Table 5.19: Classification table predicting membership of outcome categories by Monitoring and Business Assistance Intensity

<table>
<thead>
<tr>
<th>Observed</th>
<th>Predicted</th>
<th></th>
<th></th>
<th></th>
<th>% Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Our company is barely surviving</td>
<td>10</td>
<td>11</td>
<td>8</td>
<td>0</td>
<td>34.5%</td>
</tr>
<tr>
<td>Our company has met its break-even and is moving on a path toward profitability</td>
<td>7</td>
<td>15</td>
<td>19</td>
<td>0</td>
<td>36.6%</td>
</tr>
<tr>
<td>Our company is making profit</td>
<td>1</td>
<td>17</td>
<td>20</td>
<td>0</td>
<td>52.6%</td>
</tr>
<tr>
<td>Our company is highly profitable</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>6</td>
<td>60.0%</td>
</tr>
<tr>
<td>Overall Percentage</td>
<td>16.1%</td>
<td>38.9%</td>
<td>39.8%</td>
<td>5.08%</td>
<td>43.2%</td>
</tr>
</tbody>
</table>

The following section presents multinomial logistic regression analysis for the third component, Resource Allocation.

5.5.3 Resource Allocation

Based on the full model analysis presented earlier in Table 5.8, Resource Allocation appeared to be statistically significant in predicting business incubation performance. This section examines the construct’s individual elements and their relationship to incubation performance. The overall fit of the model for this particular construct is represented in Table 5.20. Firstly, the chi-square statistics for this model suggest that all elements within Resource Allocation are statistically significant where significant values are well below .05. This suggests that the existence of a relationship between each element within Resource Allocation and business incubation is supported.

Table 5.20: Model-fitting information table for Resource Allocation Construct

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Chi-Square</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>14.984</td>
<td>3</td>
<td>.002</td>
</tr>
<tr>
<td>Resource Utilisation and Quality</td>
<td>11.905</td>
<td>3</td>
<td>.008</td>
</tr>
<tr>
<td>Resource Availability</td>
<td>7.854</td>
<td>3</td>
<td>.049</td>
</tr>
</tbody>
</table>

Individual contributions of the variables to the model indicate that not all elements within the Resource Allocation construct are significant predictors for business incubation performance as shown in Table 5.21. ‘Resource Utilisation and Quality’ and ‘Resource Availability’ appear to be statistically significant in predicting Group 1 ‘Our company has met its break-even and is moving on a path toward profitability’, but were not significant in predicting Groups 2 and 3. The odds ratio further suggests that for
each unit increase in ‘Resource Utilisation and Quality’, the odds of a company meeting its break-even and is moving on a path toward profitability is decreased by 26% (.740 - 1.0 = -.26). Alternatively, for each unit increase in ‘Resource Availability’, the odds of a company meeting its break-even and is moving on a path toward profitability is increased by 17.8% (1.178 - 1). This can be interpreted as companies are 17.8% more likely to meet its break-even and move on toward profitability with a unit increase of ‘Resource Availability’.

The Pearson and Deviance statistics for Resource Allocation are shown in Table 5.22, suggesting good model fit, with Deviance statistic value of $p = 1.00$, and Pearson value of 0.929. The Pseudo $R^2$ values show that both Cox and Snell’s and the Nagelkerke’s measure to be 0.246 and 0.271 respectively.

### Table 5.21: Parameter estimates for Resource Allocation construct

<table>
<thead>
<tr>
<th>Group 1: Our company has met its break-even and is moving on a path toward profitability</th>
<th>$\beta$</th>
<th>SE $\beta$</th>
<th>Wald’s $\chi^2$</th>
<th>$p$</th>
<th>$e^\beta$ (odds ratio)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>1.958</td>
<td>1.933</td>
<td>1.026</td>
<td>.311</td>
<td></td>
</tr>
<tr>
<td>Resource Utilisation and Quality</td>
<td>-.302</td>
<td>.129</td>
<td>5.481</td>
<td>.019</td>
<td>.740</td>
</tr>
<tr>
<td>Resource Availability</td>
<td>.164</td>
<td>.068</td>
<td>5.704</td>
<td>.017</td>
<td>1.178</td>
</tr>
</tbody>
</table>

| Group 2: Our company is making profit       |        |            |                |     |                     |
| Constant                                   | -8.494 | 4.248      | 3.998          | .046|                      |
| Resource Utilisation and Quality           | .155   | .146       | 1.127          | .288| 1.167                |
| Resource Availability                      | .147   | .087       | 2.885          | .089| 1.158                |

| Group 3: Our company is highly profitable   |        |            |                |     |                     |
| Constant                                   | -16.281| 13.630     | 1.427          | .232|                      |
| Resource Utilisation and Quality           | .041   | .400       | .010           | .919| 1.041                |
| Resource Availability                      | .386   | .220       | 3.072          | .080| 1.472                |

a. ‘Our company is barely surviving’ is used as a reference category

### Table 5.22: Goodness-of-fit tests for Resource Allocation

<table>
<thead>
<tr>
<th></th>
<th>Chi-Square</th>
<th>df</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson</td>
<td>256.36</td>
<td>291</td>
<td>.929</td>
</tr>
<tr>
<td>Deviance</td>
<td>216.71</td>
<td>291</td>
<td>1.000</td>
</tr>
<tr>
<td>$R^2$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cox and Snell</td>
<td></td>
<td></td>
<td>.246</td>
</tr>
<tr>
<td>Nagelkerke</td>
<td></td>
<td></td>
<td>.271</td>
</tr>
</tbody>
</table>
The final table presented for the logistic regression analysis for Resource Allocation is the classification table (Table 5.23). The table suggests that the model has predicted 49.6% correctly, satisfying the criteria for chance accuracy of 39.5%.

Table 5.23: Classification table predicting membership of outcome categories by Resource Allocation

<table>
<thead>
<tr>
<th>Observed</th>
<th>Predicted</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>% Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Our company is barely surviving</td>
<td>Our company has met its break-even and is moving on a path toward profitability</td>
<td>Our company is making profit</td>
<td>Our company is highly profitable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Our company is barely surviving</td>
<td>6</td>
<td>9</td>
<td>17</td>
<td>0</td>
<td>18.8%</td>
<td></td>
</tr>
<tr>
<td>Our company has met its break-even and is moving on a path toward profitability</td>
<td>2</td>
<td>27</td>
<td>14</td>
<td>0</td>
<td>62.8%</td>
<td></td>
</tr>
<tr>
<td>Our company is making profit</td>
<td>3</td>
<td>10</td>
<td>25</td>
<td>0</td>
<td>65.8%</td>
<td></td>
</tr>
<tr>
<td>Our company is highly profitable</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>.0%</td>
<td></td>
</tr>
<tr>
<td>Overall Percentage</td>
<td>9.4%</td>
<td>41.0%</td>
<td>49.6%</td>
<td>.0%</td>
<td>49.6%</td>
<td></td>
</tr>
</tbody>
</table>

The analysis for the final construct, Professional Management Services will now be presented.

5.5.4 Professional Management Services

The model-fitting information regarding Professional Management Services as shown in Table 5.24 indicates that only ‘Staff and Personnel Management’ contributes significantly to the model \((p = .044)\), while other components such as ‘Strategic Management’, ‘Financial Management’ and ‘Marketing and Promotion Management’ are not significant. This suggests that the existence of a relationship between ‘Staff and Personnel Management’ and business incubation performance was supported, while the relationships between business incubation performance and the other three components were not supported.

The logistic regression results show that ‘Strategic Management’, ‘Financial Management’, and ‘Marketing and Promotion Management’ are non-significant in predicting incubation performance. This suggests that the provision of such services is not mandatory in achieving incubation success. These services, however, should not be misinterpreted as entirely superfluous, but rather, should be made accessible at, and as and when basis.
Table 5.24: Model-fitting information for Professional Management Services construct

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Chi-Square</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>9.700</td>
<td>3</td>
<td>.021</td>
</tr>
<tr>
<td>Strategic Management</td>
<td>2.369</td>
<td>3</td>
<td>.499</td>
</tr>
<tr>
<td>Financial Management</td>
<td>4.030</td>
<td>3</td>
<td>.258</td>
</tr>
<tr>
<td>Marketing and Promotion Management</td>
<td>3.670</td>
<td>3</td>
<td>.299</td>
</tr>
<tr>
<td>Staff and Personnel Management</td>
<td>8.117</td>
<td>3</td>
<td>.044</td>
</tr>
</tbody>
</table>

The parameter estimates shown in Table 5.25 also indicates that ‘Staff and Personnel Management’ is statistically significant in predicting Group 2, while non-significant in predicting other groups. Examining the log odds of the 3 groups, we are able to gauge the impact of ‘Staff and Personnel Management’ on the log odds of the dependent variable. In Group 2, a positive relationship between ‘Our company is making profit’ and ‘Staff and Personnel Management’ is observed whereby the likelihood of a company making profit through better ‘Staff and Personnel Management’ is increased by a factor of 1.189. This implies that a company is 18.9% more likely to be making profit with a unit increase in ‘Staff and Personnel Management’.

It is also of worth to note non-significant elements of Professional Management Services in Table 5.25. For example, ‘Strategic Management’, which has significant values greater than the significance level of .05 in all groups suggest there is no relationship between business incubation performance and ‘Strategic Management’ services at the incubators. Similarly, ‘Financial Management’, and ‘Marketing and Promotion Management’ services also have no significant relationships with business incubation performance. These findings depart from the literature which supports the significance of ‘Strategic Management’ services in incubation performance (Read & Rowe, 2003; McNaughton, 2006).

An interpretation of the non-significant effects of ‘Strategic Management’ services can be offered based on the short span life-cycle of most ICT products, hence a five-year plan developed for the product may not be relevant given their tendency to become obsolete in a short time. Further investigation, as will be discussed in Chapter 6 reveals that it is not that the services are not significant; rather, such services are not provided by the incubators due to lack of expertise and lack of sophisticated management services.
Further discussion on the constructs is presented in conjunction with findings from the qualitative study in Chapter 6.

**Table 5.25: Parameter estimates for Professional Management Services construct**

<table>
<thead>
<tr>
<th>Group 1: Our company has met its break-even and is moving on a path toward profitability</th>
<th>$\beta$</th>
<th>SE $\beta$</th>
<th>Wald's $\chi^2$</th>
<th>$p$</th>
<th>$\beta^e$ (odds ratio)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>1.153</td>
<td>1.838</td>
<td>.393</td>
<td>.531</td>
<td></td>
</tr>
<tr>
<td>Strategic Management</td>
<td>.075</td>
<td>.086</td>
<td>.756</td>
<td>.384</td>
<td>1.078</td>
</tr>
<tr>
<td>Financial Management</td>
<td>-.116</td>
<td>.089</td>
<td>1.687</td>
<td>.194</td>
<td>.891</td>
</tr>
<tr>
<td>Marketing and Promotion Management</td>
<td>-.100</td>
<td>.076</td>
<td>1.732</td>
<td>.188</td>
<td>.905</td>
</tr>
<tr>
<td>Staff and Personnel Management</td>
<td>.035</td>
<td>.065</td>
<td>.290</td>
<td>.590</td>
<td>1.036</td>
</tr>
</tbody>
</table>

| Group 2: Our company is making profit |
|---|---|---|---|---|---|
| Constant | -5.785 | 3.361 | 2.964 | .085 | |
| Strategic Management | -.022 | .096 | .053 | .817 | .978 |
| Financial Management | .040 | .100 | .159 | .690 | 1.041 |
| Marketing and Promotion Management | .050 | .088 | .315 | .575 | 1.051 |
| Staff and Personnel Management | .173 | .076 | 5.199 | .023 | 1.189 |

| Group 3: Our company is highly profitable |
|---|---|---|---|---|---|
| Constant | -7.920 | 7.473 | 1.123 | .289 | |
| Strategic Management | .187 | .183 | 1.043 | .307 | 1.205 |
| Financial Management | .004 | .196 | .000 | .983 | 1.004 |
| Marketing and Promotion Management | -.029 | .182 | .026 | .873 | .971 |
| Staff and Personnel Management | .176 | .147 | 1.426 | .232 | 1.193 |

a. ‘Our company is barely surviving’ is used as a reference category

Table 5.26 presents goodness-of-fit tests for this construct and shows a Deviance statistic value of .997.

**Table 5.26: Goodness-of-fit tests for Professional Management Services construct**

<table>
<thead>
<tr>
<th></th>
<th>Chi-Square</th>
<th>df</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson</td>
<td>310.596</td>
<td>297</td>
<td>.282</td>
</tr>
<tr>
<td>Deviance</td>
<td>235.441</td>
<td>297</td>
<td>.997</td>
</tr>
<tr>
<td>$R^2$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cox and Snell</td>
<td></td>
<td></td>
<td>.217</td>
</tr>
<tr>
<td>Nagelkerke</td>
<td></td>
<td></td>
<td>.239</td>
</tr>
</tbody>
</table>

Finally, the classification table (Table 5.27) for Professional Management Services shows that this model has classified 47.8% correctly, well above the 39.5% criteria for classification accuracy.
Table 5.27: Classification table predicting membership of outcome categories Professional Management Services

<table>
<thead>
<tr>
<th>Observed</th>
<th>Predicted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Our company is barely surviving</td>
</tr>
<tr>
<td>Our company is barely surviving</td>
<td>13</td>
</tr>
<tr>
<td>Our company has met its break-even and is moving on a path toward profitability</td>
<td>7</td>
</tr>
<tr>
<td>Our company is making profit</td>
<td>7</td>
</tr>
<tr>
<td>Our company is highly profitable</td>
<td>0</td>
</tr>
<tr>
<td>Overall Percentage</td>
<td>23.5%</td>
</tr>
</tbody>
</table>

5.6 Summary and Conclusions

This thesis investigates the underlying components of business incubation process and their relative impacts on business incubation performance among Malaysian ICT incubators. As discussed in Chapter 4 regarding methodology, the theoretical and practical understanding of underlying components impacting upon business incubation performance particularly in the Malaysian context remains at a nascent state. In light of these shortcomings regarding the development of our theoretical and practical knowledge, expert opinion in the field of multivariate analysis recommend that an exploratory enquiry is appropriate. The eleven components extracted from the PCA express a range of insights that are rich in nature and detail.

As discussed in Chapter 4, the quantitative analysis was undertaken to bring some sense of order to a diverse and broad scope of factors thought to be associated with business incubation performance. The PCA provided a more manageable combination of factors enabling their natures to be interpreted in previous sections. Results from the multivariate analysis were used to inform development of six case studies presented in the next chapter to further ‘tease out the core characteristics’ of the business incubation process.

The results of the multinominal logistic regression revealed that all four constructs in the business incubation process were statistically significant in predicting two business incubation performance categories, which are ‘Our company is making profit’, and ‘Our
company is highly profitable’. It should be noted that although the regression analysis highlighted the strength of the four constructs in influencing business incubation performance, the strongest predictor came from the interaction of all four constructs (F1, F2, F3, and F4). This suggests that a balanced combination of the four constructs in the framework is more likely to yield significant business incubation performance.

Selection Performance was a strong predictor of the third and fourth outcome categories, which are ‘Our company is making profit’ and ‘Our company is highly profitable’. The findings reveal that the extent Selection Performance being practiced in ICT incubators in Malaysia revolves around three main areas, which are ‘Product’, ‘Market and managerial’, and ‘Financial-based selection’. In particular, ‘Product-based selection’ is the strongest predictor of the outcome “Our company is making profit”, suggesting that incubators that select incubatees based on their product characteristics are associated with more profitable incubatees.

First, ‘Product-based selection’ is viewed as an important criterion in the Selection Performance. The characteristics are measured based on a range of criteria including how inimitable the product is, the rareness of the product, the substitutability of the product, uniqueness of the product, whether or nor the product has patent protection, and the product’s relative advantage over competitor’s product. Many of the ICT incubators tend to go with the product-focused or idea-focused selection approach. This is consistent with Bergek and Norrman’s (2008) findings where there seems to be two schools of thoughts when choosing potential incubatees: idea-focused selection, or entrepreneur-focused selection, as discussed in Chapter 3.

Second, ‘Market and managerial-based selection’ was identified as adopting several guidelines. ICT incubators in Malaysia tend to select their incubatees based on the long-term strategic orientation to market growth. Besides that, the incubators also tend to select their incubatees based on the firms’ potential in creating new markets. Other market characteristics that are used as a guideline to choose potential incubatees include size determination of target market and accessibility of target market. The rationale of selecting future incubatees based on market characteristics by ICT incubators may well be supported in the literature. The information regarding incubatees’ assessment on the potential market is often available in business plans that are submitted to the incubators.
By knowing the kind of market that the product or services may attract, incubators would feel more confident with their selection and could offer networking possibilities for the incubatees.

Third, ‘Financial-based selection’ appears to be an important approach in incubatee selection. Financial aspects of the future incubatees which are examined include having a good cash flow, the likelihood of the company achieving financial break-even in a short period, having multiple, harvestable exit options, profit potential of the company, and lastly, potential to attract investment participation from venture capitalists. Similarly, incubators would seek this information within the business plans submitted by the incubatees.

The extent of Selection Performance’s impact on business incubation performance distinguishes it as a significant factor in the business incubation process. Individual components in the Selection Performance construct further strengthens the relationship between Selection Performance and business incubation performance where ‘Product-based selection, Market and managerial-based selection’, and ‘Financial-based selection’ are all statistically significant. The results suggest that adoption of selection criteria is essential to ensure incubation success. In particular, the results indicate the significance of ‘Product-based selection’, which ultimately conveys that a suitable guideline needs to be in place to select products that are of high quality, innovative, and of profit-potential. This guided selection criteria ought to be developed in order to have unified best practices among the ICT incubators that are easily replicated. Careful selection of potential incubatees will also provide venture capitalists with more confidence in investing in start-up companies, and contribute to the betterment of the incubator performance.

The logistic regression results revealed that Monitoring and Business Assistance Intensity was a strong predictor of the third outcome category, ‘Our company is making profit’. This indicates that incubators that provide monitoring and comprehensive business assistance along with adequate interaction with incubator management are related to having incubatees that are making profit. Specifically, the component ‘Comprehensiveness and Quality’ appears to be a stronger predictor within this construct than the component ‘Time Intensity’. The significance of the
‘Comprehensiveness and Quality’ component suggests that incubators with a range of business assistance and those that seek feedback regarding their services tend to perform better than those without. The second component of the Monitoring and Business Assistance Intensity construct, ‘Time Intensity’ revealed non-significance to predicting business incubation performance. This suggests that the amount of interaction between incubatees and incubator managers could not predict the incubatees’ outcomes. Emphasis should be placed on the range of business assistance that fit to the demands of the incubatees, rather than ensuring on the less significant matters such as the time intensity of incubatee-incubator manager interaction. Incubators would only know what fits the demands of the incubatees if they implemented a feedback system to gauge the quality of their current services.

The third construct, Resource Allocation failed to show any significant relationship to any outcome category suggesting that the impact of incubator resources is not felt by the incubatees. However, individual contributions of the components to the model indicate that the component ‘Resource Availability’ and ‘Resource Utilisation and Quality’ are associated with incubatees meeting their break-even and are moving on a path toward profitability. In comparison, the component ‘Resource Availability’ was less significant than the component ‘Resource Utilisation and Quality’, suggesting the more important aspect in providing resources to incubatees is to ensure that the resources are well utilised and have high standards of quality. Incubators should not solely multiply the resources of the incubators but rather take the time to study the utilisation of resources and improve on the quality of the resources provided.

Finally, Professional Management Services shows strong predicting capabilities to two possible outcomes of the dependent variable, which are ‘Our company is making profit’ and ‘Our company is highly profitable’. Individual components of this construct however reveal differing level of significance on business incubation performance. Of the four components, only one component (Staff and Personnel Management) was significant in predicting business incubation performance, suggesting incubatees need this form of service from the incubators. Other components such as ‘Financial Management’, ‘Marketing and Promotion Management’, and ‘Strategic Management’ were found to be less significant to the incubatees and have little impact on the incubation performance.
The most significant predictor was the combination of all four services which suggests that provision of a range of services is important compared to specific services. This suggests that incubators providing extensive management services apart from basic administrative services are associated with having incubatees that are more successful. Table 5.28 presents a summary of the eleven components and their significant values in order of the most significant to the least significant in predicting business incubation performance. The results indicate that of the eleven components, seven are significant predictors of business incubation performance, while four are non-significant. Discussion on these results will be presented in the following chapter, in line with the qualitative findings as per the concurrent triangulation design approach discussed in Chapter 4.

Table 5.28: Summary of logistic regression analysis

<table>
<thead>
<tr>
<th>Number</th>
<th>Component Label</th>
<th>Chi-Square</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Product-based selection</td>
<td>78</td>
<td>.001</td>
</tr>
<tr>
<td>2</td>
<td>Resources Utilisation and Quality</td>
<td>11.91</td>
<td>.008</td>
</tr>
<tr>
<td>3</td>
<td>Market and managerial-based selection</td>
<td>72.54</td>
<td>.013</td>
</tr>
<tr>
<td>4</td>
<td>Comprehensiveness and Quality</td>
<td>10.59</td>
<td>.014</td>
</tr>
<tr>
<td>5</td>
<td>Financial-based selection</td>
<td>52.37</td>
<td>.017</td>
</tr>
<tr>
<td>6</td>
<td>Resources Availability</td>
<td>8.33</td>
<td>.04</td>
</tr>
<tr>
<td>7</td>
<td>Staff and Personnel</td>
<td>8.12</td>
<td>.044</td>
</tr>
<tr>
<td>8</td>
<td>Financial Management</td>
<td>4.03</td>
<td>.258</td>
</tr>
<tr>
<td>9</td>
<td>Marketing and Promotion Management</td>
<td>3.67</td>
<td>.299</td>
</tr>
<tr>
<td>10</td>
<td>Strategic Management</td>
<td>2.37</td>
<td>.499</td>
</tr>
<tr>
<td>11</td>
<td>Time Intensity</td>
<td>0.66</td>
<td>.881</td>
</tr>
</tbody>
</table>

The factor analysis and multinomial logistic regression have been presented in this chapter and shed light on the incubatees’ perspectives on the business incubation process at their respective incubators. The next chapter presents findings from the qualitative study, beginning with the within-case analysis which details responses from incubator managers on a case-by-case basis, followed by a cross-case analysis which highlights emerging themes coming across from all cases. Discussion of both quantitative and qualitative data sets will ensue in the later part of the cross-case analysis.
CHAPTER 6

QUALITATIVE FINDINGS

6.1 Introduction

This chapter presents findings from the qualitative study which involves interviews with six ICT incubator managers. As previously noted in Chapter 4, a within-case analysis was conducted prior to a cross-case analysis in interpreting the qualitative data. Considering the length of the within-case analysis and effectiveness of presentation, it has been attached in Appendix J for reference. This chapter focuses on key findings from the interviews with the incubator managers highlighting emerging themes from the analysis.

Integration and discussion of the quantitative and qualitative findings are provided following the cross-case analysis in line with addressing the research propositions previously introduced in Chapter 3. A model incorporating components from the quantitative study and emerging themes from the qualitative study will be presented in the final section of this chapter. Chapter 7 then provides conclusions from the study where research questions of this thesis are reviewed, unique methodological and theoretical contributions identified, and limitation as well as directions for future research presented. As previously described in Section 4.6, the qualitative component of the thesis incorporates the case study methodology and aims at answering the second research question:

*Research Question 2:*

*How do Selection Performance, Monitoring and Business Assistance Intensity, Resource Allocation, and Professional Management Services impact on the business incubation performance of ICT incubators in Malaysia?*

The participants of the interviews consist of six ICT incubator managers and were selected based on the criteria detailed in Section 4.6.3. Table 6.1 presents the demographics of the interview participants.
Table 6.1: Demographics of case study participants

<table>
<thead>
<tr>
<th>Case number</th>
<th>Designation</th>
<th>Gender</th>
<th>Age</th>
<th>Education level</th>
<th>Incubator age</th>
<th>Incubator Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Incubator manager</td>
<td>M</td>
<td>21-29</td>
<td>Undergraduate degree</td>
<td>3-5 years</td>
<td>Government incubator</td>
</tr>
<tr>
<td>2</td>
<td>Incubator manager</td>
<td>F</td>
<td>21-29</td>
<td>Undergraduate degree</td>
<td>3-5 years</td>
<td>Government incubator</td>
</tr>
<tr>
<td>3</td>
<td>Incubator manager</td>
<td>M</td>
<td>31-39</td>
<td>Master degree</td>
<td>3-5 years</td>
<td>Government incubator</td>
</tr>
<tr>
<td>4</td>
<td>Incubator manager</td>
<td>F</td>
<td>21-29</td>
<td>Diploma</td>
<td>3-5 years</td>
<td>Government incubator</td>
</tr>
<tr>
<td>5</td>
<td>Incubator manager</td>
<td>M</td>
<td>31-49</td>
<td>Master degree</td>
<td>More than 5 years</td>
<td>Private incubator</td>
</tr>
<tr>
<td>6</td>
<td>Incubator manager</td>
<td>M</td>
<td>31-49</td>
<td>Master degree</td>
<td>More than 5 years</td>
<td>Private incubator</td>
</tr>
</tbody>
</table>

The way in which the cases are presented in the cross-case analysis follows a categorisation based on the incubator generational typology presented in Chapter 2. The evolution of incubators was discussed in Section 2.9 where the first-generation, second-generation, and third-generation incubators were distinguished by their features in terms of service provision and operational characteristics. In summary, the first-generation incubators are characterised by a strong landlord-tenant component (Lalkaka & Abetti, 1999; Scaramuzzi, 2002; Lakshminarayanan, 2004; Aerts, Matthyssens & Vandenbempt, 2007), with affordable office space and shared facilities, and in close proximity to academic and research establishments. Second-generation incubators that emerged in the 1990s had all the characteristics of the first-generation incubators with added services including consultancy services, training sessions, network access, and access to funding such as venture capital (Aerts, Matthyssens & Vandenbempt, 2007).

The third-generation incubators supersede the first and second-generation incubators in many aspects, particularly in their capacity to create high-technology and knowledge-based ventures by synergising and linking the global R&D community, venture capitalists and international joint ventures (Scaramuzzi, 2002; Lakshminarayanan, 2004). Their focus includes enhanced services to knowledge-based enterprises (Lalkaka, 1997), and mobilising ICT in providing a convergence of support towards creating growth-orientated, tech-based ventures (Lalkaka, 2001). The incubator generational typology and characteristics table has been previously presented in Chapter 2.

The findings revealed that the case studies were evenly clustered between first, second, and third-generation incubators, and were labelled as Type 1, 2, and 3 incubators.
respectively for ease of reference in the following sections. Type 1 incubators consist of Cases 1 and 2, Type 2 incubators consist of Cases 3 and 4, while Type 3 incubators consist of Cases 5 and 6. A table summarising characteristics of the case studies mapped against the generational typology is presented in Table 6.2.

Cases 1 and 2 were classified as Type 1 incubators because of the strong resemblance to a landlord-tenant model and reactive nature of services as will be revealed later on in this chapter. Cases 3 and 4 fit the description of second-generation incubators by moving beyond the landlord-tenant model, providing advisory services which are proactive, and extending their services beyond the incubator walls. Cases 5 and 6 were clustered as third-generation incubators for having the most comprehensive range of services including access to funding, technology labs, and a well-established incubation process as will be presented in the following sections.

<table>
<thead>
<tr>
<th>Incubator Generational Typology</th>
<th>Features</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>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type 1 incubators</strong></td>
<td>Shared facilities</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>Reactive support</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Landlord-tenant relationship</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Type 2 incubators</strong></td>
<td>Advisory services</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Proactive support</td>
<td></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Services available within and outside of incubators</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>Consultancy services, training sessions, network access to funding</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td><strong>Type 3 incubators</strong></td>
<td>Access to funding</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>Accelerating progress</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>Mentoring and technology labs</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>Enhanced services to knowledge-based enterprises</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

### 6.2 Cross-case Analysis

As previously mentioned, the cross-case analysis follows the completion of the within-case analysis. Eisenhardt (1989) stated that the purpose of performing a cross-case analysis is to derive conclusions from a set of cases. The use of pattern matching as recommended by Yin (1994) is employed in this section to analyse the data across cases. The cross-case analysis presents emerging themes that emanated from across the cases with regard to the four constructs in the study: i) Selection Performance, ii) Monitoring and Business Assistance Intensity, iii) Resource Allocation, and iv) Professional Management Services. Subsequently, findings from the cross-case analysis
are discussed in parallel with the quantitative results from Chapter 5 forming the basis for triangulation to understand the impacts of the constructs on business incubation performance.

6.2.1 Selection Performance

For the first construct, Selection Performance, criteria used by the incubators to select their potential incubatees were investigated. In doing so, the case participants were asked to share their views of what key factors they believe are important in choosing potential incubatees, and why? The question investigates the approach used by the incubators in selecting potential incubatees. All cases acknowledged they use some form of selection criteria to select potential incubatees into the incubators. As revealed in Table 6.3, the criteria adopted by the incubators differ from case to case.

Whilst Type 1 and 2 incubators, which consist of government-funded incubators, employ fundamental selection criteria that require a business plan, product or working idea, cash at bank, proof of company registration, products with market potential and motivation of the applicants, Type 3 incubators, being for-profit incubators employ a more developed structure of incubatee selection strategy. Their selection criteria take account of all dimensions of Selection Performance found to be significant in the quantitative study that include market, managerial, financial, and product characteristics of the proposed venture. For example, Case 5 incubator manager indicated that incubatees demonstrating sound knowledge of market characteristics of their products or services would have a good stand (sic) to be accepted into the incubator. Further, managerial characteristics of the applicants are sought by Type 3 incubators, where they look for applicants with prior working or research experience including graduates, researchers, start-ups, professionals, subsidiaries of companies, and those applying with an already committed team. In terms of product characteristics, Type 3 incubators consider technology products or services that can be put to practice. As shared by Case 6:

\[\text{Our selection process takes into account the innovation of the business ideas, not just the product per se. Because ICT products tend to get obsolete rather quickly, we look for innovative ideas, and businesses that use or will use technology that is practical for the general public.}\]
Table 6.3: Selection Performance key findings

<table>
<thead>
<tr>
<th>Type 1</th>
<th>Type 2</th>
<th>Type 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Case 1</strong></td>
<td><strong>Case 2</strong></td>
<td><strong>Case 3</strong></td>
</tr>
<tr>
<td>Product and working idea.</td>
<td>Products with market potential.</td>
<td>Idea and passion.</td>
</tr>
<tr>
<td>Cash at bank.</td>
<td>Cash at bank.</td>
<td>Innovative business ideas.</td>
</tr>
<tr>
<td>Priority given to start-up companies.</td>
<td>Priority given to start-up companies.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A marked difference in the Selection Performance between Type 1 and 2 incubators and Type 3 incubators is that the former puts emphasis on financial capability of the applicants while the latter places greater emphasis on product, market, and managerial characteristics. As Case 2 shared:

*We feel that business plans alone are not enough for us to make a decision, so we ask them for additional documents. Formation of the company is essential and therefore we need a copy of their company registration. We also need some kind of assurance that they will be able to pay for their monthly rental ... in this case, we would ask for a statement of their bank account.*
It should be noted that Type 3 incubators incorporate an element of oral presentation in their selection criteria. The following sections present findings that emanated from the cross-case analysis that are unique from components explored in the quantitative study.

6.2.1.1 Motivation of the applicants

Findings revealed that a number of cases look for the level of motivation in their potential incubatees. Cases 3 and 6 appear to appreciate a sense of passion in their applicants and consider it as an important factor in screening incubatees. For example, Case 3 considers applicants that are able to provide short-term targets, and provide a complete set of documents as highly motivated and passionate to become a member of the incubator. He quoted:

_They [the applicants] are passionate if they follow through with all the requirements of this incubator and provide evidence such as milestones that they want to achieve within the incubation period._

Additionally, Case 3 chooses candidates that show keenness to start a business. The incubator manager senses enthusiasm in the applicant through their willingness to start their business even without a grant. Case 3 mentioned that candidates are asked in the application form if they would still be interested to become an incubatee even if they are not awarded a grant. Interestingly, the incubator manager mentioned that he noticed a clear lack of zeal in some of the applicants. He explained:

_I notice a lot of individuals are only looking at the grant. Without the grant, they feel like they cannot start a business. So I would say they don’t have passion. If someone has passion, he or she would still want to start a business even without a grant._

As previously mentioned, Type 3 incubators employs a more comprehensive selection criteria compared to Type 1 and 2 incubators. In seeking the motivational aspect of the applicants, Case 5 even goes to the extent of performing a psychometric test to assess traits like honesty, ethics, intelligence, and motivation. Psychometric tests have been used to help banks in emerging markets to screen loan applicants easily (Winter, 2010). This practice helps distinguish applicants who are genuinely keen on starting up a business and from those who are applying for the sake of getting subsidised office
space.

In addition to being attracted to companies demonstrating a high sense of motivation, Type 3 incubators choose companies that are able to acknowledge their shortcomings. Case 6, for example, chooses companies that are able to foresee the expected challenges and possible ways to remedy such situations; the manager shared:

A lot of companies tend to portray the good side of their business without even acknowledging their weaknesses. To us, if someone is passionate about their business, they would go to the extent of identifying possible shortcomings of their business, and how to overcome them.

The justification for the cases above stressing passion as a critical selection criterion is not unfounded. Cammarata wrote that an effective incubatee selection process “weeds out fly-by-night entrepreneurs from those truly committed to and growing successful businesses” (2004, p. 50). This indicates the necessity for incubator management to possess the ability to distinguish between genuine and dubious applicants, a skill that comes with experience and through incubator management training supported by a structured and comprehensive selection process that seeks evidence indicating the potential strengths and weakness of concept or team.

6.2.1.2 Stage of company development

Cases expressed the stage of the applicant’s company development as another common selection criterion. As a case in point, Case 2 gives priority of the office space to start-up companies, and only opens vacancies to other companies once all start-ups have been considered. Case 4 appears to accept applications from a select group of applicants including early stage growth companies, seed-level businesses, applicants that have been incorporated for less than two years and require funds for proof-of-concept. According to Case 4, a seed-stage business is often referred to as a business that just has a thought or an idea, also known as the conception or birth of a new business. Case 4 also shared that a start-up stage company is a business that is already born and have products or services in production as well as their first customers.

On the other hand, companies in the process of setting up or that have been in business for no more than two years are possible candidates considered by Case 6. These
findings are consistent with the NBIA (2003) benchmarking study whereby they stated that incubatee screening should include companies that are in their early stage, generally within the first two years of business operations when they are not yet profitable and are still growing.

6.2.1.3 Business plan

All cases considered the business plan to be an important selection criterion. The quantitative study did not focus specifically on identifying a business plan as a selection criterion because tested and validated scales found in the literature did not include business plan as an item or construct. Findings from the qualitative study reveal that a business plan is generally required as a standard document for application by all cases. The business plan was used as a financing tool and as an implementation tool back in the 1980s and into the 1990s (Schwartz & Gothner, 2009). According to Hussey (1994), a business plan based on valid assumptions about the future will be a valid plan.

The findings from the interviews with the incubator managers support this approach whereby all cases appear to request business plans as a criterion, although only some of the incubators emphasise the quality of the business plan. The reason to adopt business plan as a mandatory document for application into the incubators could be due to its capacity to portray a comprehensive view about the proposed business. Elements such as market and managerial characteristics, product characteristics, and financial characteristics of the applicant are captured in the business plan. Sahlman (1997) however offers a contradictory view on business plans. He said that new companies that tend to spend too much time crafting the document, with widely optimistic details such as month-by-month projections stretched out for over a year are more likely to be unsuccessful. He further suggested that business plans should instead contain information that really matters to intelligent investors (Sahlman, 1997).

6.2.1.4 Oral presentation

The cross-case analysis revealed that oral presentations are employed by Type 3 incubators to complement the business plan in the selection process. This practice is common in many successful incubators, such as the Austin Technology Incubator (ATI) whereby both written plan and oral presentations provide an opportunity for them to meet the potential incubatees and observe what challenges lie ahead in terms of creating
and communicating the corporate vision and sales materials (O'Neal, 2005).

The present findings reveal that Type 3 incubators request a formal interview with the potential incubatees to gain a better understanding of their business ideas. The motivation for conducting an interview in addition to a written application is that some aspect of the applicants may not be captured in the documents alone. It is during the interviews that the incubator management gains deeper insight to the proposed business ideas and on the applicants. During the oral presentation, incubator management tries to gain potential incubatees’ commitment to achieving revenue, investment, and employment goals. Applicants, on the other hand, use this opportunity to convince the incubator management of the feasibility of their business ideas. They discuss ideas on possible research and development activities of the products or services proposed, while elaborating on the market potential and other inquiries including the prospective team of the applicant. In particular, Case 6 incubator manager cited:

_We have come across many applications and reading their business plans is just not enough for us to make a decision, as sometimes they [business plans] do not tell us clearly the capability of the team. That is why we need to conduct an oral presentation._

All six case study participants indicated that selection criteria are critical in facilitating Selection Performance. However, the differing levels of implementation in the Selection Performance are observed to have divergent impacts on business incubation performance. These deviating impacts will be discussed in parallel with the quantitative results in Section 6.3.

6.2.2 Monitoring and Business Assistance Intensity

Past studies have acknowledged the justification for business assistance by incubators due to the fact that a majority of start-up businesses do not have the necessary resources or critical capabilities for business success (Sheperd & Shanley, 1998; Scarborough & Zimmerer, 2000).

Typically, Type 1 and 2 incubators generally lack in providing consistent monitoring and essential business assistance to the incubatees. There are cases which appear to have an imbalance of assistance between business and technical support, and cases
where monitoring of incubatees is virtually non-existent in Type 1 and 2 incubators. The need for a balanced business and technical support in new technology-based firms (NTBFs) has been stated by Mian (1996) and Hackett and Dilts (2004a) in order to achieve successful development and sustainable growth (Cockburn et al., 2000).

Table 6.4 presents key findings from across the cases with regard to Monitoring and Business Assistance Intensity. There appears to be a dichotomy between provision of Monitoring and Business Assistance Intensity exhibited by the cases. In Type 1 incubators, a marginal array of business assistance and monitoring business assistance is provided in a reactive manner. This means that services are only provided to incubatees upon their request. Case 1 in particular provides more technical assistance than business assistance owing to the lack of experience of the incubator manager in business management. Likewise, the intensity of the assistance provided at Type 1 incubators is low, occurring at most, once a month. The lack of intensity is attributed to the fact that incubatees tend to be more enthusiastic with getting technical assistance to develop their products in their first year than seeking business assistance to manage their products or services.

Case 2 revealed incubatees sometimes find it hard to commit to the arranged monthly meetings or scheduled functions due to reasons that are unknown to the incubator manager. This has been observed to create a barrier between incubator management and incubatees and could lead to sub-optimal incubatee performance due to insufficient monitoring and business assistance. Furthermore, the ineffectiveness of incubation management in these incubators is evidenced by the absence of a system to measure the quality of assistance provided.

*Type 2* incubators offer occasional monitoring and business assistance and interact with the incubatees in accordance to the incubation stage of the incubatees. As shared by Case 3, the level of interaction with incubatees differs with respect to the incubatees’ incubation age. The incubator manager stated that newer incubatees interact more frequently with the incubator management compared to more mature incubatees.
Table 6.4: Monitoring and Business Assistance Intensity key findings

<table>
<thead>
<tr>
<th>Type 1</th>
<th>Type 2</th>
<th>Type 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Case 1</strong></td>
<td><strong>Case 2</strong></td>
<td><strong>Case 3</strong></td>
</tr>
<tr>
<td>Provides more technical consultancy and support than business assistance.</td>
<td>Minimal interaction with incubator management because tenants are not able to commit.</td>
<td>Technical assistance.</td>
</tr>
<tr>
<td>----------------------</td>
<td>----------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>Minimal entrepreneurial and management services support due to lack of expertise.</td>
<td>Monthly meetings for 1-2 hours.</td>
<td>Occasional monitoring and business assistance service and interaction with incubates.</td>
</tr>
<tr>
<td>No fixed time but technician is always available</td>
<td>No way to measure quality of assistance provided.</td>
<td>Newer incubatees interact daily with start-ups.</td>
</tr>
<tr>
<td>No method of measuring quality of services provided.</td>
<td>No post-incubation services provided.</td>
<td>More mature companies interact once to three times a week.</td>
</tr>
<tr>
<td>No post-incubation services provided.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Case 4</strong></td>
<td><strong>Case 5</strong></td>
<td><strong>Case 6</strong></td>
</tr>
<tr>
<td>Outsource most of the assistance from the parent incubator.</td>
<td>Provides coaching, mentoring, and consultancy to better equip incubatee presentation skills.</td>
<td>Team of technical expertise that is available for consult.</td>
</tr>
<tr>
<td>Training, but with the help of a partner.</td>
<td>Invites successful entrepreneurs to share their experiences.</td>
<td>The assistance is proactive, where incubatees are exposed to short courses, training and other workshops on a monthly basis.</td>
</tr>
<tr>
<td>Technical training, entrepreneurial training.</td>
<td>Feedback forms used to get feedback from incubatees on the quality of assistance provided.</td>
<td>Incubatees drop by anytime to seek assistance.</td>
</tr>
<tr>
<td></td>
<td>Incubatees need to submit a monthly progress report.</td>
<td>Specialise in mentoring, consultancy and training programs.</td>
</tr>
<tr>
<td></td>
<td>Meet on a monthly basis.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Customer satisfaction survey to gauge feedback from incubatees.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Business advisory services are also a big part of the incubation program.</td>
<td></td>
</tr>
</tbody>
</table>

Characteristically, Type 3 incubators, provide incubatees with advice and services in both business and technical areas. Incubatees are constantly nurtured with coaching, mentoring, and consultancy. As Case 5 indicates, they make sure that incubatees are provided with business plan writing coaching, preparing documents for grant applications, pitching their business ideas, and getting their IP rights. The incubators
provide a strong source of technical expertise and researchers whereby incubatees are exposed to short courses, training, and workshops on a monthly basis. In addition to the monthly formal events, Type 3 incubator managers meet with the incubatees on a less formal basis to offer support where requested and deemed appropriate. This, according to Case 6, helps to create a relationship that is valuable for both incubators and incubatees. On the one hand incubator management learns about the incubatees’ needs while on the other, incubatees act as a recruitment agent to get new incubatees in. In order to gauge the quality of their assistance the incubators use feedback forms for incubatees to express their level of satisfaction on the services provided. In addition to the key findings discussed above, the following sections present emerging themes originating from this construct.

6.2.2.1 Business Assistance

The sample cases were equally divided in terms of provision of business assistance to their incubatees. Business assistance has been recognised as having a positive impact on a firm’s performance (Pena, 2004) and training on relevant topics can increase a venture’s human capital, impacting on their development and performance (Vaidyanathan, 2008). Cases 4, 5, and 6 appear to provide entrepreneurial services to their incubatees, while Cases 1, 2, and 3 provide more technical training as opposed to business assistance. The business assistance component found in Cases 4, 5, and 6 appears to be similar whereby incubators generally focus on assisting incubatees in developing and improving their business plans at the initial stage. In an effort to provide exposure to the incubatees on becoming more entrepreneurial, Case 4 invites real-life entrepreneurs to share their experience with the incubatees as shared by the incubator manager:

We set up an entrepreneurial focus group. We provide entrepreneurial training, but with the help of a partner. We are also quite selective with who we engage to conduct training. So far, we have had successful entrepreneurs to share their experiences with the incubatees.

Although, according to extant literature, one of the common kinds of business assistance which incubators offer is business-plan writing, it is not generally found to be common in these case studies. However, realising there is a general lack of entrepreneurial skills in many of the accepted incubatees, Case 6 conducts a specific
program to develop their business-plan writing skills. Similarly, Case 5, shares the same view on incubatees’ lack of business skills, where he comments:

_They may be superb in technology, but the missing element is the business skills. This means they lack skills in preparing a business plan, how to prepare bankable documents, grantable documents, how to do pitching. Because they are so technical oriented, they cannot present the business ideas very well. So the investors tend to not understand them. Our role is to help them in terms of coaching, mentoring, and consultancy to make them present their business ideas better. We don’t do it all in-house. We outsource some of the training/coaching._

This sentiment was not shared by incubator managers from Cases 1, 2, and 3 who have been observed to have limited business experience, hence less sensitivity to the needs of the incubatees.

### 6.2.2.2 Post-incubation services

It is interesting to note that only some of the cases provided post-incubation services to the graduated incubatees. This is because Cases 1, 2, and 3 have yet to have any graduated incubatees. Hence experience in providing post-incubation services has not yet materialised in those incubators. However, cases with higher number of incubatee graduates such as Case 4 mentioned they would render services to their graduates at a cost. Case 4 incubator manager cited:

_We don’t have formal post-incubation services, but if they still need our services, they are always welcome and we can support them. We charge them for services rendered. But we have no formal post-incubation services. By right, we should have to keep the database of the incubatees._

Cases 5 and 6 on the other hand provide post-incubation services to graduated companies, and have graduated a significant number of incubatees. The services are aimed to provide graduated incubatees with after-care and outreach services by still providing accessibility to the incubator resources including access to funding. This is a way for them to keep track of the graduated incubatees and create a database in creating networking opportunities for the current incubatees. The impacts of Monitoring and
Business Assistance Intensity on business incubation performance will be discussed in parallel with the quantitative results in Section 6.3.

6.2.3 Resource Allocation

Resource Allocation examines the availability, quality, and utilisation of resources at the incubators. The incubation literature has frequently discussed incubator resources and how incubatees benefit from them (Chan & Lau, 2005; Stevens & Schulze, 2005; McAdam & Marlow, 2008). These studies provide mixed reviews on the importance of resources and their impact on business incubation performance. In particular, Hackett and Dilt (2004a) found that incubators have a systematic approach to controlling resources and reducing costs during the early stages of a venture’s development.

All incubator managers interviewed were of the opinion that their incubators provide the necessary resources needed by the incubatees. Table 6.5 reveals the range of resources available across the cases, from basic administrative services, office space and meeting rooms which are typically found in Type 1 and 2 incubators, to more sophisticated resources such as technology labs found in Type 3 incubators. The utilisation of these resources appears to vary from case to case. As previously indicated, incubatees in Type 1 and 2 rely heavily on the technical expertise provided by the incubator to develop their product designs. However, such expertise consists of technicians, rather than an expert with a higher qualification who is able to offer more than technical advice. The advice provided by the technician may be limited to specific equipment, and therefore lacks in providing a holistic approach to product development.

The emphasis on achieving full occupancy of the incubator space is very strong in Type 1 and 2 incubators and is indicated by the limited office space available to support more incubatees. Furthermore, a lack of strong implementation of an exit policy poses another reason behind the limited space for these incubators. This finding supports Hamdani’s (2006) claim that very high application acceptance rates suggest an exceedingly strong emphasis on recruitment program vis-à-vis admission criteria, which characterises incubators in their early stages of development.
Table 6.5: Resource Allocation key findings

<table>
<thead>
<tr>
<th>Type 1</th>
<th>Case 1</th>
<th>Type 2</th>
<th>Case 3</th>
<th>Type 3</th>
<th>Case 5</th>
<th>Case 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case 1</td>
<td>Administrative services.</td>
<td>Meeting rooms, cafes, presentation facilities.</td>
<td>Market network and access, office space.</td>
<td>Experts in technology and business networking with local and international incubation service providers.</td>
<td>Technology lab.</td>
<td></td>
</tr>
<tr>
<td>Case 2</td>
<td>Product design and use of machine.</td>
<td>Rooms and facilities are well utilised, but the resources facility is not fully utilised.</td>
<td>Office space used to be important but now services are more sought after.</td>
<td>Technology labs.</td>
<td>Objective is to create an ecosystem conducive for new businesses.</td>
<td></td>
</tr>
<tr>
<td>Case 3</td>
<td>Limited office space.</td>
<td>Office space and meeting rooms well utilised</td>
<td>Office space and meeting rooms well utilised</td>
<td>Market access and funding.</td>
<td>Market access and funding.</td>
<td></td>
</tr>
<tr>
<td>Case 4</td>
<td>Machines are well utilised, technicians are utilised quite frequently</td>
<td>The stage for the purpose of knowledge sharing is underutilised.</td>
<td>The stage for the purpose of knowledge sharing is underutilised.</td>
<td>Networking, partnership development, fund raising, legal services, accounting services.</td>
<td>Networking, partnership development, fund raising, legal services, accounting services.</td>
<td></td>
</tr>
<tr>
<td>Case 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Engage other companies to provide the services.</td>
<td></td>
</tr>
<tr>
<td>Case 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>The office space and facilities are well utilised.</td>
<td></td>
</tr>
</tbody>
</table>

In contrast, Type 3 incubators offer more sophisticated resources that include experts in technology and business networking with local and international incubation service providers, technology labs, and an ecosystem that is conducive for the incubatees. The following details emerging themes from the Resource Allocation construct which are distinctive from the components explored in the quantitative study.

6.2.3.1 Infrastructure

Provision of office space has been an incubator’s basic resource to business start-ups since it was first established. The present findings are consistent with the extant literature which postulates that most incubators offer relatively lower rental rates compared to traditional commercial outlets (CSES, 2002; Linder, 2003; vonZedtwitz & Grimaldi, 2006). For example, Case 2 shared:

*Our rental rates are cheaper than what the incubatees would have to pay if they were renting outside. Here, they are even provided with secretarial services and administrative services, to ease the initial problems they might*
Another incubator manager (Case 1) shared that the office space they offer is expandable and at a reasonable price:

*Office space is made available on an affordable but temporary basis with expandable space on a flexible lease all under one roof.*

Flexibility in this context means that the size of rented space can be increased or decreased as clients’ needs change, or the clients can repay the rent in instalments spread over a period of time (Tornatzky *et al.*, 1996). The findings reveal disparate office layouts across the six cases. *Type 1* incubators tended to locate their incubatees on a different floor from the incubator management, causing less frequent interaction with the incubatees. *Type 2* and *3* incubators on the other hand, tended to locate their incubatees on the same level as management, encouraging a more informal type of interaction. The findings tend to concur with Totterman and Sten (2005) who advocate that incubator space and forms of assistance (arranged occasions and services) should be designed to support informal conversation and networking among incubatees.

Likewise, CSES (2002) stated that the open-plan workspace, as practised at Case 5, is a distinct feature of more recent incubators, intended to promote communication and interaction between the incubatees. Case 5 mentioned that it has helped build stronger ties for the incubatees, as they are in the same industry, and share the same contacts and technical know-how.

Besides the office space, meeting rooms are another common resource present in all cases. Case 3 mentioned that the meeting rooms are a valuable resource, as they help to project a professional image of the incubatees to their business clients:

*The meeting rooms are especially useful because it is very nicely done, with wide tables, and presentation facilities that facilitate incubatee meetings with their customers.*

This sentiment was shared by Case 5 who said that the meeting rooms are regarded as an important feature of the incubator, as they provide a business ambience suitable to conduct professional discussions with their clients. He shared:
Sometimes, the incubatees would bring their suppliers, or potential customers and they would come in groups of two to three. The meeting rooms are spacious and provide ample seats for everyone, complete with presentation facilities.

6.2.3.2 Networking opportunities

In line with the literature (Bollingtoft & Ulhoi, 2005; O'Neal, 2005; Becker & Gassmann, 2006) all cases agree that networking is necessary and is one of the core elements of successful incubation. In particular, Case 5 shared that universities are their most valuable linkage:

*The incubator especially values its linkages with universities as they are seen as the best resource for research and development, and provide experts that are useful for the incubatees’ product development.*

Case 1 facilitates networking among its incubatees through awareness of the incubation program during its pre-incubation services phase, which involves both already incubated firms as well as potential incubatees. Their aim is to *introduce the incubatees to peer group networks and create an opportunity to build mutual respect and trust.*

Case 2 on the other hand supports network activities through knowledge sharing and technology-transfer forums, whereby external experts in ICT are invited to share their knowledge of a particular technology. In a more informal setting, Cases 3 and 5 support networking activities through luncheons and incubator road shows to introduce incubatees to potential buyers, business angels, and the business community at large.

The interviews with the incubator managers revealed the existence of extended networks involving mentors, business professionals, funding agents such as business angels, government agencies, successful entrepreneurs, and members of the local business association. Case 5 goes to the extent of leveraging their extended networks to the benefit of the incubatees and *they are appreciative of this and are reflected in how well they have expanded their business to potential buyers.* Through the introduction to their networks and their development programs, Case 5 incubatees have developed strategic partnership with key technology providers and promoters with the likes of Sun Microsystems, Microsoft, Celcom, Time Dotcom, Maxis, Ericsson, and Alcatel.
The findings are consistent with Singh (2000) who advocated that social encounters and network contacts are important factors in recognising opportunities. Case 6 incubator manager stated:

*The incubatees need to know the people who are in their field in order to know the market potential of their product. When they start to know who the people are, then they will begin to see what kind of opportunity they have.*

6.2.3.3 Technology lab

The present findings demonstrate an obvious scarcity in terms of provision of technology labs. This is contrary to evidence in the literature advocating that technology incubators should provide labs which can be used by all incubatees (Chinsomboon, 2000). The labs should ideally provide testing and programming equipment, and the hardware and software required to create ICT products, something which incubatees could not afford. Evidence in the literature asserts that provision of technology labs is characteristic of *third-generation* incubators (MDeC, 2007; InfoDev, 2009).

The findings reveal that Type 3 incubators provide technology labs. These incubators as previously noted are for-profit incubators and are less reliant on government’s funding as Type 1 and 2 incubators. This non-dependence has been observed to be the reason behind the more systematic approach to providing resources that enable incubatees to progress quickly and create return on their investment. Case 5 for example, equips the technology lab to cater the needs of technopreneurs with the required hardware and software. He further adds that the need for technology labs in ICT incubators is to enable incubatees to develop a proof-of-concept and provide a platform for prototype development. The impacts of Resource Allocation on business incubation performance will be discussed in parallel with the quantitative results in Section 6.3.3.

6.2.4 Professional Management Services

The fourth and final construct, Professional Management Services investigates the incubators’ capacity to provide specific management services such as ‘Marketing and Promotion Management’, ‘Financial’, ‘Staff and Personnel’, and ‘Strategic Management’. The construct examines the incubators’ initiative to go beyond basic business and administrative services to extended high-level management services as part of their support system.
The incubation literature established that incubatees need extended forms of support in management services to assist them in their early stages. However, cases generally lack in providing Professional Management Services except for Type 3 incubators. From Table 6.6 below, it is evident that incubators do not entirely share the same stance where the general attitude assumes incubatees associate support with interference (Patton, Warren & Bream, 2009). This has generally created an absence of many Professional Management Services because incubator managers feel that they do not want to be seen as “intruding” in the affairs of the incubatees.

Table 6.6: Professional Management Services key findings

<table>
<thead>
<tr>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3</th>
<th>Case 4</th>
<th>Case 5</th>
<th>Case 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occasional marketing of products at road shows.</td>
<td>Provide contacts and information to get grants.</td>
<td>Showcase incubatee products at annual events.</td>
<td>Marketing services by setting up kiosks.</td>
<td>Basic financial assistance provided.</td>
<td>Outsource all other services besides business assistance them.</td>
</tr>
<tr>
<td>Marketing services by setting up kiosks.</td>
<td>Incubatees to run their own business.</td>
<td>Incubatees hire their own staff; incubator does not give consultation on human resources.</td>
<td>Incubator helps incubatees to get the grant.</td>
<td>Seldom get into their affairs but always there to help as a mentor or coach.</td>
<td>Help them with funding.</td>
</tr>
<tr>
<td>Provide information on getting funds.</td>
<td>Seldom get into their affairs but always there to help as a mentor or coach.</td>
<td>Legal or accountants’ advice is provided by outsourced agents.</td>
<td>Provide IP advice.</td>
<td>Promote incubatee products through incubator website.</td>
<td>Promote incubatee products through incubator website.</td>
</tr>
</tbody>
</table>

However, ‘Marketing and Promotion Management’ services was observed to be present at all incubators but at varied levels of services, which is in line with the case study on Malaysian incubators by InfoDev (2010). Specifically, market research, sales, and marketing of incubatees’ products are generally not available in the incubators that are Type 1 and 2 as they provide services that only involve road shows and exhibitions of incubatee products and services. It is observed that the services are provided in an ad-hoc manner and at times are outsourced to experts in the specific areas. The fact there is no standard provision of Professional Management Services in these incubators raises a
question about the capacity of the incubatees in meeting the basic functions of starting a business such as monitoring cash flow, managing human resources, strategising business goals, and marketing of their product and services. The reason for such fragmented services could be because the incubators are still at a nascent stage and would have limited experience in meeting the demands of the incubatees.

Type 3 incubators on the other hand provide a broader range of Professional Management Services that include assistance with obtaining fund, advice on legal matters, promotion of incubatee products through their websites, technology commercialisation initiative, strategic planning, financial planning, and advice on recruitment of staff for the incubatees. Case 5 outsources most of these services to specialists in the specific areas with whom incubator management have established relationships with.

6.3 Triangulation

The notion of triangulation is common in the literature particularly where qualitative data is analysed (Eisenhardt, 1989; Miles & Huberman, 1994; Yin, 1994; Punch, 1998). Researchers seek to validate data on the basis of confirmation from multiple sources. As noted before, one needs to be mindful of the different position of Grounded Theory (Glaser & Strauss, 1967; Strauss & Corbin, 1998), which takes the view that even a single instance is sufficient to validate a particular observation. In this research, the methodological design solicited responses from incubator managers and incubatees, examined company documentation and websites and compared quantitative data to enable triangulation.

Triangulation is therefore a strong theme of this analysis, largely because of the uncharted nature of non-linear descriptions in the business incubation process in Malaysian incubators. Both Yin (1994) and Eisenhardt (1989) appear to use the word triangulation to represent multiple confirmatory sources. The implication seems to be that even two different sources could be sufficient evidence for case study research.

The following section discusses findings from both the quantitative and qualitative studies based on Research Question 2. The research question is addressed with respect to how the four constructs impact upon business incubation performance. Each construct in the research question will be addressed individually, beginning with
Selection Performance.

6.3.1 How does Selection Performance impact on business incubation performance of the ICT incubators?

Selection Performance is both fundamental and critical to business incubation performance. Firstly, the quantitative results revealed that Selection Performance is a significant predictor of business incubation performance ($p=.005$, $\chi^2 = 13.02$) and is associated with profit-making and highly profitable incubatees (Table 5.9, p.131). Despite the variance in the selection performance across the cases, all incubator managers agree on the importance of devising a selection criteria. Business incubation performance proves to be critical in terms of number of incubatee graduates. Type 3 incubators, having graduated more than 300 incubatees, have the most systematic selection criteria, incorporating aspects such as market, managerial characteristics, and product characteristics. This finding aligns with Aerts, Matthyssens and Vandenbempt (2007) who stated that a more balanced screening strategy consisting of market, team, and financial characteristics of the potential incubatees positively relates to incubatee survival rate.

Case 6 for instance, selects businesses with products or ideas that are innovative, with technology that is practical, and those with an already committed team, suggesting that they seek experience of the incubatees. In addition to conducting an interview, Case 5 even goes to the extent of conducting a psychometric test on the applicants. The incubator, being a for-profit incubator, adopts this approach as they have faced many applicants who are only looking for a subsidised place to start their business and opportunity to obtain a grant. This practice is necessary especially for for-profit incubators that often have to rely on their own initiatives to stay in operation.

Type 1 incubators adopt less stringent criteria; only requiring business plan, financial statement and a working idea. These incubators performed poorly in terms of number of incubatee graduates, having no graduated companies since their inception about 5 years ago and are faced with a significant number of incubatee overstays. The inability to operate without the benefits of subsidised resources of incubators have been acknowledged by Phan, Siegel, and Wright (2005) as a reason for incubatee overstays. The managers’ responses indicated there is not much rigour in the way incubatees are
selected, and the acceptance rate is rather high, as their aim is to achieve full occupancy of the incubators. This exemplifies the first-generation incubator characteristics whereby strong reliance on rental of office space is still evident.

Type 2 incubators adopt a slightly more defined criteria compared to Type 1 incubators, incorporating elements such as motivation of applicants, selecting specific type of business and early stage companies, in addition to the commonly-accepted business plan and innovative products. The performance of Type 2 is superior to Type 1 incubators, having graduated 14 incubatees between the two incubators over a period of five years.

In terms of selecting incubatees based on product characteristics, quantitative results show that it is significant ($p=.001, \chi^2 = 78.0$) and is associated with incubatees making profit (Table 5.13, p.136). The extent of ‘Product-based selection’ being adopted as a critical selection criterion is varied, with Cases 3 and 6 quoting they select products which are innovative yet have no means to judge the innovativeness of the products.

Similarly, quantitative results show that selection based on market and managerial characteristics is significant ($p=.013, \chi^2 = 72.53$). These results are underpinned by the qualitative findings where better performing incubators such as Cases 4 and 6 are inclined to select incubatees based on these two characteristics. Case 4, for instance, selects incubatees that sell specific types of technology, suggesting that they favour applicants who have identified their target market. This incubator has graduated more than 10 incubatees, further providing support to the quantitative results.

Furthermore, Case 6, selects incubatees that show an inclination toward selling technologies that people would be attracted to and those with a committed team. This suggests that this incubator values market characteristics whereby they only select applicants with attractive technologies. Likewise, in terms of managerial characteristics, they look for applicants that belong to a team, suggesting that their experience working in a team carries weight in their evaluation.

The findings pertaining to ‘Financial-based selection’ revealed the component is significant, ($p=.017, \chi^2 = 52.34$), however is not associated with any outcome category,
suggesting there is no direct relationship between ‘Financial-based selection’ and incubatee performance. This is supported by the qualitative study where it was found that Type 1 and 2 incubators, that require applicants to submit a financial statement that includes cash at bank and any lines of credit as part of the application, perform rather poorly compared to Type 3 incubators which put less emphasis on the financial capability of the applicants and more on market, managerial, and product characteristics.

The examination regarding the impact of Selection Performance and its components on business incubation performance confirms that it is a significant factor in the business incubation process as supported in both studies. In particular, the discussion above supports Proposition 1: A systematic approach to selection performance will produce a higher number of incubatee graduates. The impacts of Selection Performance upon business incubation performance can be observed in a number of ways including incubatees making profit, incubatee graduates, firm sustainability, job creation, as well as positive contributions to GDP and local and regional economics. This will be expanded in the following sections.

6.3.2 How does Monitoring and Business Assistance Intensity impact on business incubation performance of the ICT incubators?

Monitoring and Business Assistance Intensity is significant ($p=0.023$, $\chi^2=9.50$) and is associated with incubatees who are making profit (Table 5.9, p.131). This is supported by findings from the qualitative study where Type 3 incubators which provide extensive Monitoring and Business Assistance Intensity, perform better than cases that provide minimal business assistance. Further investigation on the ‘Comprehensiveness and Quality’ component of Monitoring and Business Assistance Intensity shows that it is a significant component ($p=0.014$, $\chi^2=4.39$). Case 6 in particular supports this finding having successfully graduated 45 companies that are still in business and a reasonably high occupancy rate of 80 per cent. The incubator manager believes that it is the constant interaction in both informal and formal ways that has fostered good relationship between incubator management and incubatees. In keeping track of the incubatees’ development, the incubator management requests a quarterly progress report from the incubatees. This practice has enabled the incubator management to provide the necessary services or training required by the incubatees, as well as to avoid any problems they may face during their incubation period.
Alternatively, Type 1 and 2 incubators characterised by irregular monitoring and business assistance have relatively low number of graduated incubatees. This finding is at odds with quantitative results pertaining to the ‘Time Intensity’ of monitoring and business assistance, which was non-significant (Table 5.16, p. 137) suggesting there is no direct relationship between the ‘Time Intensity’ of monitoring and business assistance and business incubation performance. The lack of monitoring and business assistance intensity and lower frequency in interaction between incubatees in Type 1 and 2 incubators have been observed to cause problems including lack of confidence in incubatees, lack of product sophistication, and limited understanding of market environment leading to delayed graduation of incubatees.

The impact of Monitoring and Business Assistance Intensity on business incubation performance is evident in producing profit-making incubatees (Table 5.17, p. 138) and higher number of incubatee graduates. This supports Proposition 2: *Incubatees are more likely to perform when monitoring and business assistance are provided*. This finding is consistent with Peters, Rice and Sundararajan (2004) who highlighted the significance of monitoring, or coaching as factors associated with increasing incubatee graduation rates, and McAdam and Marlow (2007b) who stated that frequent interaction with incubator management results in better relationship and ultimately contributes to the incubatees’ and incubators’ success. This suggests a positive relationship between providing monitoring and business assistance and business incubation performance.

6.3.3 *How does Resource Allocation impact on business incubation performance of the ICT incubators?*

Results show that this construct is significant ($p=.031, \chi^2 = 8.75$) and is associated with incubatees who have met their break-even and on their way to profitability (Table 5.21, p.140). The availability of resources is also significant ($p=.049, \chi^2 = 7.85$) and is supported by cases commonly providing basic incubator resources such as administrative services, affordable office space, meeting rooms, presentation facilities, café. More sophisticated incubator resources essential for ICT incubators such as technology and multimedia labs were found in Type 3 incubators.

The quantitative study has shown that the quality and utilisation of resources is significant. Furthermore, in the qualitative study, it has been observed that the incubators with more sophisticated resources such as technology lab, research facilities,
have higher number of incubatee graduates, produce more jobs, list more companies, positively impact local and regional economies, and more strongly add to GDP of the economy.

It has been observed that the performance of incubators having more sophisticated resources (Cases 4, 5, and 6) is higher than those with scarcer resources such as Cases 1, 2, and 3. As a case in point, Case 5 has successfully created 7,360 jobs since its inception 14 years ago and listed 28 companies. Total number of graduated companies has reached 300, with 75 per cent of these companies still in business. The incubator manager shared that it is important that they create an ecosystem that is conducive to nurture and develop the incubatees. The incubator incorporates a broad range of resources including an information resource centre, an auditorium, conference rooms, seminar and training rooms, video conferencing facilities, recreation centre, gymnasium, restaurants, banks, retail outlets, a clinic, and e-library. These facilities provide a convenient ambience for the incubatees who are faced with the pressure and demands of developing cutting edge ICT products and work-life balance. Additionally, the incubator’s technology labs offer state-of-the-art facilities which are conducive to incubatees’ nature of work. Contrastingly, as has been noted earlier, Type 1 incubators offer only basic incubator resources including administrative services, office space, and meeting rooms. The availability of web promotion for their incubatees and for the incubators themselves seems to be non-existent. This will be discussed further in the following section.

Findings pertaining to ‘Resource Quality and Utilisation’ showed significance in predicting business incubation performance ($p=.008, \chi^2 =11.91$). Utilisation of resources such as administrative services, office space, and meeting rooms appears to be high across all cases, suggesting that incubatees value the resources that project the professional image to their clients. In particular, Case 2 regards their most critical and highly utilised resource is the meeting rooms, as incubatee office spaces are relatively small and not suitable to host meetings. In contrast, Cases 4, 5 and 6 reportedly experience high utilisation of more sophisticated resources such as technology labs. As indicated by Case 6, incubatees need a considerable amount of time to develop a technology and we facilitate this by providing them with the best environment. It can be directly observed that Type 3 incubators that offer technology labs, access to research
facilities, enable interaction with internal and external key players, and advocate web site promotions have more outstanding performance compared to Type 1 and 2 incubators. Interestingly, and this will be further discussed in Section 6.3.4, these ICT incubators particular Type 1 offered no website promotion of incubatee products and services. This finding aligns with Mian (1997), Philips (2002) and Chan and Lau (2005) who stated that technology incubators have to typically offer access to advanced-technology laboratories, equipment, and other research and technical resources. These incubators offer a significant level of networking activities conducted both internally and externally.

Cases 1 and 2 although advocating networking opportunities at the incubators are rather limited in their approach where incubatees are not exposed to external networks such as business angels and venture capitalists. Cases 4, 5 and 6 on the other hand, demonstrate a higher level of resourcefulness in stimulating networking activities for their incubatees through luncheons and incubator road shows to introduce incubatees to potential buyers, business angels, and the business community at large. This further supports the significance of Resource Allocation and its impact on business incubation performance, supporting Proposition 3: Incubates are more likely to perform when appropriate incubator resources are allocated. This finding concurs with Todorovic and Moenter (2010) who stated that incubatees maximise the opportunity presented through the introduction to the incubator’s network contacts.

6.3.4 How do Professional Management Services impact on business incubation performance of the ICT incubators?

Professional Management Services are critical to business incubation performance, a finding supported by both quantitative and qualitative studies. Firstly, the quantitative results show the significance ($p =.041, \chi^2 = 4.16$) of the interaction of all four components within this construct, associating it with incubatees which are highly profitable (Table 5.9, p.131). This suggests that Professional Management Services are critical to the performance of incubatees. Provision of such services however, appear to significantly differ between Type 1, 2 and 3 incubators contributing to divergent performances of the incubatees in the number of graduated companies, jobs created, and companies listed.
Type 1 incubators for instance offer minimum Professional Management Services, where only ‘Marketing and Promotion Management’ services are offered to the incubatees. Further exploration reveals that marketing services appear to merely involve exhibition of incubatee products at incubator kiosks during incubator road shows. Findings reveal that ‘Staff and Personnel Management’ advice is rarely provided in Type 1 and 2 incubators because incubator management assumes that incubatees appreciate the ‘freedom’ to ‘run’ their own business without being subjected to constant supervision by the incubator management. With such minimal exposure and rudimentary assistance provided, the impact on the performance of incubatees is likely to be negligible, and this is supported by the non-graduation of incubatees from Cases 1, 2, and 3.

Type 2 incubators appear to provide more services compared to Type 1 incubators offering basic ‘Financial Management’ advice and providing information on obtaining grants whilst however overlooking other equally important management services. The absence of ‘Strategic Management’ services such as advice regarding IP or legal matters appears as one of the barriers for the incubatees to protect their product design. This sentiment was shared by Case 4 incubator manager who stated:

“We would like to offer them (the incubatees) services on how to protect their designs, but at the moment, we have no experts in that area and are still looking for agents who can provide their assistance.”

Likewise, ‘Staff and Personnel Management’ services are offered at a minimal level, on account of not wanting to intervene with the incubatee operations.

Type 3 incubators provide more widespread Professional Management Services and are evident in the case studies where incubators take great measures in ensuring incubatee needs are met. As a case in point, Case 5 undertakes promotional activities by devising and managing marketing strategies, promoting incubatee products and services on their websites, as well as obtaining media opportunities for the incubatees. In particular, Case 5 incubator manager stated that while it is common practice to showcase the incubatee products at the incubator’s events, it is the follow-up initiatives that ultimately have an impact on incubatee performance. These initiatives include identifying forward linkages opportunities in related industries and backward linkages where incubator
management assists incubatees to find potential buyers. In addition, the incubators advertise their incubatees’ products on their respective websites and engage professional marketing services to conduct market research and opportunity analysis for the incubatee products.

In terms of ‘Financial Management’ services, Case 5 goes to the extent of coaching incubatees with how to monitor budgets and preparing annual operating and capital budget, skills which have been found in the literature as lacking in new incubatees. Case 6 acknowledged the need to extend their services beyond business assistance to accommodate the lack of business acumen in many new incubatees. The incubator meets the needs of the incubatees by engaging specialists in human resource management to provide advice on preparation of job description, managing employment, establishing staff appraisal and performance systems, and setting and reviewing of salary structures. In strategising the growth of the incubatees, Case 6 recognises the need to undertake feasibility studies and becoming the liaising unit with stakeholders, policymakers, and key players in the industry.

The performance of the incubators across the generational typology as previously noted differs significantly. Type 1 and 2 incubators have considerably low number of incubatee graduates and have yet to produce any jobs within the incubators. In contrast, Type 3 incubators have an impressive number of incubatee graduates, high number of jobs created, numerous public listed companies, and a high percentage of incubatee graduates that are still surviving.

The findings reinforce the significance of Professional Management Services on incubatee performance on many levels hence supporting Proposition 4: Incubatees are more likely to perform when targeted Professional Management Services are provided where incubators committing to a suite of management services perform far better than those offering a disjointed form of services found in Type 1 and 2 incubators.

6.4 Conclusion
The cross-case analysis and triangulation of findings from both studies provided substantial insights on the impacts of Selection Performance, Monitoring and Business Assistance Intensity, Resource Allocation, and Professional Management Services on
business incubation performance. In particular, the cross-case analysis reinforced a majority of the quantitative results by providing support from the interviews. Further, the triangulation technique enabled the identification of several issues from the study that call for pertinent recommendations.

Firstly, we observed there was a marked difference in the selection strategy amongst the incubators. Results show that Type 3 incubators being for-profit incubators differ significantly from Type 1 and 2 incubators which consist of government-funded incubators in terms of Selection Performance. Type 3 incubators deploy a stricter and more systematic selection performance in line with typical technology incubator’s benchmark (CSES, 2002). The systematic procedure adopted has been observed as advantageous where higher number of graduates was recorded, along with creation of jobs, public listed companies, contribution to GDP, and the sustainability of graduated incubatees. Evidence regarding Type 1 and 2 having less strict selection criteria is observed as being the reason behind non-graduating incubatee, non-performance regarding job creation, and problem of incubatee overstay.

The qualitative findings highlighted the importance of business plan as a mandatory requirement, yet only few of the cases emphasised the need for the business plan to have a certain standard of quality. This raises the question of the significance of the business plan for ICT-based businesses, where as some studies highlighted, business plans merely presents an embellishment of projected figures and charts which may have little relevance with respect to the short life span of the ICT products, dynamic market forces, and sophisticated consumer demands. Incubator management should consider these factors when evaluating business plans submitted by the potential incubatees.

Furthermore, qualitative findings show that cases have a loose and ad-hoc method of assessing products’ capabilities and market potential of products and services. Product assessment should be made based on a set of criteria to determine the innovativeness, market acceptance, and profit potential of the product. The development of such criteria requires the knowledge of an expert in technology. Factors that need to be considered in devising such criteria include the inimitability, rareness, substitutability, uniqueness, and relative advantage of the product over those of the competitors. In addition to a technology expert, perspectives from a focus-group consisting of prospective users of
the technology could be engaged. This practice could reveal the true capability of the product based on the acceptance of the product by the focus group.

Likewise, the significance of ‘Financial-based selection’ should not be overemphasized as evident in Type 1 and 2 incubators. While these incubators perceive that financial security in the form of cash at bank and ability to pay rent are forms of assurance that the incubatees will perform, case studies indicate that those indicators do not guarantee monthly rentals and in some cases could even lead to problems such as incubatee overstay. Instead, incubators should consider selecting incubatees that are able to produce a rapid-prototype of their business, an idea advocated by Gilbert (2012) who stated that the shift beyond the business planning paradigm has a positive impact upon self-confidence and self-efficacy of the entrepreneurs.

Secondly, the difference in providing monitoring and business assistance is evident amongst the cases where Type 1 and 2 incubators provide less dedicated assistance and interact less frequently with incubatees compared to Type 3 incubators. The source of difference may be attributable to the differing levels of incubator managers’ experience. Incubator managers in Type 1 and 2 have far less incubation experience, were appointed to merely manage the selection of incubatees and whose involvement in subsequent incubation process appears to be lacking. The limited experience in the incubator managers has led to the incubator manager often relying on the state government directives to run the incubator. This is consistent with findings from the literature (Jusoh, 2006; Mohd Saffar, 2007) where many incubator managers in Malaysia have been deemed not to have adequate entrepreneurial skills to run the incubators.

Contrastingly, Type 3 incubator managers who have considerable number of years in the incubation industry prove to be more sensitive and resourceful in assisting the incubatees, and well-informed with regard to incubatees’ needs and progress. This is a result of a systematic approach in monitoring and providing business assistance and relationship forged between the incubator managers and incubatees. Studies have shown that business assistance is critical for incubatees because many of them lack business knowledge, yet the Type 1 and 2 incubators are side-tracked by stressing technical assistance more than business assistance services. Incubatees on the other hand, are uninformed and may think that developing their products first would be
the most essential thing to do. The negative impact of incubators that solely focus on assisting incubatees with their technology is said to not provide any measureable benefits to the incubatees, as described by Studdard (2006). Incubators should implement a more systematic monitoring and business assistance practice seeking progress feedback of the incubatees on a regular basis, as well as obtaining feedback on the business assistance provided to continually improve their services. Alternatively, incubators’ performance should be monitored by a governing body (i.e. government, stakeholders,) to ensure all ICT incubators have qualified management teams and are able to improve business advisors to provide business assistance to the incubatees.

Thirdly, it is observed that incubator resources are generally common amongst the incubators with the exception of technology labs and opportunity for external networking which were only found in the Type 3 incubators. Type 1 and 2 incubators are limited to offering resources which are standard for any kind of incubator. The importance of providing resources that aid in the sophistication of technology, i.e. technology labs can be seen in the diversity of knowledge and knowledge spill-overs amongst incubatees along with interaction with external key players which could be key towards the products and services being successful.

Furthermore, there is evidence of low utilisation of certain resources in Type 1 and 2 incubators where despite the incubator’s initiative to stimulate a knowledge sharing environment, the response from the incubatees has been disappointing. Case 2 shared that incubatees are not open to sharing their ideas, knowledge, or experience with other incubatees or in public because they are afraid that their ideas may get stolen and lose its novelty. This response is typical of incubatees as pointed out by Patton, Warren and Bream (2009) who stated that it is often difficult for incubatees to accept the probability of sharing ownership and control of the prospective business and can be a source of anxiety exhibited by incubatees new to the incubator. Likewise, strong evidence showing the absence of web promotion of incubatee product and services provides another example of poorly utilised resources at Type 1 and 2 incubators. The fact that the incubators themselves do not have functional websites raises a very alarming question about the incubator management experience. The need for an experienced incubator manager should not be underestimated, as many incubatees fail to meet their goal of launching a successful business due to the lack of experience of the incubator
manager. Regular evaluation on utilisation of incubator resources is critical to ensure incubatees’ needs are matched. The evaluation and feedback obtained from the incubatees will avoid underutilisation of resources, and performance will in all likelihood improve with better, more personalised incubator resources that match the needs of the incubatees.

Finally, the significance of Professional Management Services revealed from the quantitative study confirms the need to provide services beyond business assistance in ICT incubators. Qualitative findings support this need as it was found *Type 1 and 2* incubators barely provide these services which have been observed to limit the progress of the incubatees. Greater importance in providing staff and personnel management advice to incubatees should not be regarded as intervening in the operations of the incubatees as was evident in the case studies. Studies have shown that human resource management advice should be provided to incubatees as they often lack many business and management skills (Hannon, 2004; Clarysse *et al.*, 2005; O'Neal, 2005).

The lack of financial management services evidenced in the case studies of *Type 1 and 2* proves to be a factor that needs immediate consideration. As has been iterated throughout this thesis, incubatees especially technology-based incubatees have limited business and management skills. Financial management is a critical service which incubatees need and can prevent them from failing in their business (Beng Hui, Fernandez & Sio, 2011). The availability of sound financial management services in the ICT incubators could help incubatees maintain their financial control system and allow them to focus on developing their products or services.

Strategic management services for the incubatees are largely lacking across the incubators as evidenced from the case studies. Strategic management services that have been found offered in incubators in the literature include strategic business planning, strategic partnering, attracting financing investors and corporations, and advice regarding intellectual property rights. These services are virtually non-existent in the incubators in the case studies especially in *Type 1 and 2* incubators, and as indicated by Case 4 incubator manager, there is no access to an expert in the IP area. Despite evidence from the quantitative study suggesting non-significant relationship between Strategic Management and business incubation performance, one should be cautious in
disregarding such services. It is be noted that the non-significance could be caused by low-level ‘Strategic Management’ services, which, as revealed in the qualitative study, may or may not be present at the incubators.

The findings showed that efforts with regard to promoting incubatee product and services in the ICT incubators are at most very basic in Type 1 and 2 incubators. More meticulous initiatives beyond product exhibition at road shows as found in Type 3 incubators have been observed to not only attract potential buyers but also extend the external network of the incubators. Type 1 and 2 incubators should address incubatees’ needs by providing marketing services that help them identify potential buyers, develop suitable packaging for their products, and appropriate pricing strategies.

It should be noted that the age of the incubator and the type of the incubator play a significant role in how the various constructs impact upon business incubation performance. It was observed that Type 1 and 2 incubators are not able to distinguish between potentially promising incubatees and weak ones from the limited selection criteria, provide little business assistance and monitoring, have less high-technology resources, lack external networks, and capacity to offer beyond basic incubator resources because they are relatively new in age, hence are deprived of a full incubation cycle experience leading to incubatee graduation. Evidence from the qualitative study shows being government-funded incubators; Type 1 and 2 are more laissez-faire in the way the incubators are managed, and have a lower motivation to produce independent ICT SMEs compared to Type 3.

The qualitative findings in this chapter presented an in-depth explanation of the role of each construct in the incubation process and their impacts on business incubation performance through the triangulation of cross-case analysis and quantitative results. The cross-case analysis was instrumental in classifying and identifying the emerging themes across the case studies which are incorporated into the conceptual model integrating findings from both methodologies. Figure 6.1 displays the developed framework consisting of all components deriving from the quantitative and qualitative studies. The following chapter concludes this thesis and presents discussion regarding theoretical and methodological contributions of the study, limitations, and directions for future research.
Figure 6.1: Composite model integrating elements from both methodologies that impact on business incubation performance
CHAPTER 7

CONCLUSION AND FUTURE RESEARCH

This thesis set out to investigate the underlying components that have an impact upon business incubation performance in ICT incubators in Malaysia. In doing so, a comprehensive set of variables from the literature on business incubation and small business development has been pre-tested in designing the quantitative and qualitative studies. The quantitative study revealed the underlying components that have an impact on business incubation performance, while the qualitative study provided additional insights on the role of the components. This dual analytical methodology enabled a new depth of understanding of the components and their impacts on business incubation performance.

This final chapter presents the methodological and theoretical contributions of the study, its key findings, and their implications for theorists, policymakers, and practitioners. The study’s limitations and directions for future research are discussed, along with the final conclusions reached as a result of the research. The interest in researching the business incubation phenomenon in the Malaysian ICT incubator context was the combined result of both an academic and a practical impetus. Initially, the theoretical understanding of the business incubation process is acknowledged as fragmented. In a practical sense, it has been observed that there is a lack of research that enables us to understand the factors underlying the business incubation process, and especially the impact of these factors on business incubation performance in Malaysia. This study provides a response to the sentiments of the Government of Malaysia (Malaysia Plan, 2006; InfoDev, 2010), concerning incubator operators, and incubatees who could benefit from improved knowledge and practices concerning the incubation process and management.

7.1 Methodological Contributions

As was previously noted, study of the business incubation process and its impact on business incubation performance has in general been somewhat fragmented, with factors such as selection criteria, business assistance, resources, and management
services being studied in various combinations or independently with limited examination of their impacts on business incubation performance. The tendency to study such factors without reference to their influence on business incubation performance has been challenged by authors such as Autio and Klofsten (1998) and Hackett and Dilts (2004b).

Analysis of results presented in Chapters 5 and 6 indicates that the multidimensional development of the research design in this thesis has produced a comprehensive view of the components of the business incubation process. As well, the high response rate attained in the quantitative study combined with the case study results provides powerful insights into the underlying components of the business incubation process.

The mixed-methods research design involving the use of an extensive quantitative study and qualitative study is scarce in this field of enquiry. The mixed-methods approach enhances the interpretation of significant research findings as exemplified in the previous chapter where triangulation of quantitative and qualitative findings resulted in an improved understanding of the ICT incubation process and its impact on business incubation performance.

Study 1 which utilises the quantitative approach, aimed to answer the first research question: *To what extent do Selection Performance, Monitoring and Business Assistance Intensity, Resource Allocation, and Professional Management Services impact on the business incubation performance of ICT incubators in Malaysia?* The pilot study and the PCA conducted for this research proved an appropriate technique to reduce 86 variables to a more manageable eleven components. This goes beyond current developments in theoretical contributions, providing a more comprehensive, recent, and deeper understanding of the underlying components of business incubation process. More importantly, the study contributed an additional scale in the business incubation process; where Professional Management Services was found to be robust and statistically significant in predicting business incubation performance.

The use of mixed-methods has become an increasingly recognised research approach that is effective in addressing complex research issues. The quantitative component of the research design enabled conceptual development, which guided the crafting of an extensive series of questions seeking to further our understanding of business
incubation process. Multinomial logistic regression proved to be a powerful tool in predicting the impact of the underlying components on business incubation performance. The statistical procedure enabled identification of individual impacts of each component on specific categories of business incubation performance.

The quantitative method alone, however, would not have explained some of the results obtained. For that, the use of a qualitative method complements the quantitative method by providing examples and specific explanation to quantitative results that required further elaboration. Study II utilised the qualitative approach to answer the second research question: *How do Selection Performance, Monitoring and Business Assistance Intensity, Resource Allocation, and Professional Management Services impact on the business incubation performance of ICT incubators in Malaysia?*

The within-case analysis sought opinions from six ICT incubator managers forming the cases studies, which offer a deep understanding of incubation practices in the six incubation set-ups. Subsequently, the cross-case analysis provided additional themes emerging from the constructs that extended our understanding of the phenomenon investigated. The utilisation of both quantitative and qualitative methods in this research thus produced a broad appreciation of the business incubation phenomenon. These were not just alternative methods of approaching the same issue, rather, they complemented each other as a result of asking different types of questions (Creswell & Maietta, 2001).

The mixed-methods design enabled the researcher to overcome many of the limitations that constrain mono-method studies. For example, quantitative approaches to data collection and analysis are viewed as remote and clinical in nature, yet their results are able to be generalised to the whole population. The MLR results distinguished relationships between the underlying components and their impacts on business incubation performance. The opinions of the six incubator managers were collected and analysed in conjunction with the MLR results using the *concurrent triangulation design* approach discussed in Chapter 4. The case studies developed for this research allowed an extended interpretation of the quantitative results, while the multivariate analysis technique provided the structure and form necessary to guide an exploration of the significant issues associated with business incubation. In this sense the study extends the methodological approach of previous business incubation research by providing an
empirical analysis consisting of both quantitative and qualitative data from incubatees and incubator managers.

7.2 Theoretical Contributions

The literature provided various incubation models that described a typical incubation process but included limited research on how incubation outcomes occur. The present research makes a positive contribution to fill that gap and contributes to the development of theory in powerful ways. In particular, this thesis presents a composite model (Figure 6.1, p.182) of the business incubation process and the impacts on business incubation performance which is valuable to researchers, policymakers, and practitioners.

The conceptual design of the study (Figure 3.1, p.52) provided an appropriate exploratory framework for the investigation of the under-researched phenomenon of business incubation performance in Malaysia. The conceptualisation of the research design was guided and adapted from a previously developed framework by Hackett and Dilts (2004a, 2008).

The results of the quantitative and qualitative studies provided useful insights that support four research propositions introduced in Chapter 3. The findings from the quantitative study revealed the extent of the underlying components’ impacts on business incubation performance where associations between the components and categories of business incubation performance were analysed. Additionally, the qualitative study provided meaningful insights in explaining how the underlying components impacted on business incubation performance and offered additional findings that were unique from the quantitative research results.

In exploring the relationships, marked differences in terms of business incubation practice and performance were revealed across the cases. The differences can be traced back to the level of implementation of each component. In terms of Selection Performance, better performing incubators were observed to have a more methodical way of choosing potential incubatees, seeking a more rounded and comprehensive evaluation of the applicant.
The significant influence that Selection Performance has on enhancing business incubation performance is a key finding of this thesis. In particular, pre-incubation services in the form of innovation workshops, entrepreneurial readiness training, and introduction to peer group networks are seen as crucial prior to accepting applications from incubatees as this practice prepares potential incubatees with the knowledge and expectations required of the incubation process. Consistent with the literature, incubatee selection performance showed strong associations with incubatees’ profitability, as revealed in the quantitative study. Caution regarding reliance on business plans as a mandatory and ‘solve-all’ document for incubatee selection should be noted. As previously discussed in Chapter 6, business plans may not be the most effective tool where ICT-based businesses are concerned due to the static nature of the figures that say very little about the feasibility of the product or services. Furthermore, Gilbert (2012) advocates the use of rapid prototyping where cycle times are short, innovation a necessity, and factors such as market share largely unpredictable, as it enables incubators to have a better look and feel of the proposed business, as opposed to aspirational assumptions in a business plan. This is not to say that business plans should be completely disregarded, for they are useful when sales and costs can be accurately predicted, however given the nature of the ICT industry many new businesses are built on innovation where market parameters become at best ‘guestomates’. Thus an approach that requires proof-of-concept and design-driven innovation with potential customers engaged in the process becomes a powerful approach in developing businesses that are able to fast-track the survival or the fail-fast tipping point.

‘Product-based selection’ should be assessed around a more structured and thorough evaluation guided by a set of metrics to gauge the innovative capabilities of the product. The development of such metrics can be proposed for future incubation research and should not only measure the innovativeness of the product, but also its competitiveness. The benefit of developing such metrics could lead to prepositioning of the products in terms of identifying open market segments or in identifying areas where existing products would be vulnerable to new product introductions by competitors (Rondeau & Bhatt, 1994).

In place of a disjointed approach to incubatee selection, it is proposed that incubators select potential incubatees using a broader and more systematic approach consisting of
clearly defined product attributes and financial prerequisites that include sufficient start-up capital, on-going operational capital, cash flow management ability, and the capability to prioritise and leverage limited finance in scaling the business. Likewise, selection criteria should also include a clear understanding of the potential market opportunities, prior work, or entrepreneurial experience, motivation of the applicants, and a commitment to rapid-prototyping products or services using customer engagement, user experience, underpinned by the business model articulating channels to market. The screening activity should be conducted using standardised procedures and forms, and managed by a team of professional evaluators comprising of external and internal experts that could serve as an advisory board. This advisory board should be made up of largely external experts who will be able to offer their expertise to the incubator managers and be able to promote a far better suite of services.

ICT incubators would do well to note the nature of the results with regard to Monitoring and Business Assistance Intensity. Results indicate that providing incubatees with comprehensive business assistance is warranted. Challenges faced by incubators such as incubatee overstay and lack of confidence in incubatees largely result from inadequate monitoring by incubation management and lack of meticulousness in incubatee screening. Incubators can take precautionary measures to avoid these challenges by ensuring that potential incubatees are well-informed of the expectations of the incubators through the pre-incubation services and through careful incubatee selection. Incubator management should also immediately recognise the needs of the incubatees and provide sufficient monitoring to follow pre-incubation services.

Although frequency of interaction between the incubator management and incubatees was found not to be significant in its impact on business incubation performance, incubators that regularly interact with their incubatees were seen to foster a more positive relationship, leading to better understanding of incubatees’ needs and concerns. The case studies revealed the lack of interaction between incubator management and incubatees and this is attributable to a number of factors. Firstly, the design of the incubators is not conducive to promoting frequent interaction among the incubatees and incubator management. Most of the incubator management’s offices were found to be located at a distance or another level from the incubatees where the chances of them
encountering one another are low. Secondly, the incubatees’ stage of development requires them to spend more time working on the technical side of their products inhibiting their ability to interact with the incubator management.

One of the positive outcomes of frequent interactions with incubator management from both formal and informal contact is increased understanding of incubatee needs and in return, incubators are able to provide improved and tailored business assistance to the incubatees. The interaction, based on results of the case studies, is best done in an informal manner, and more formal interaction may take place in the form of training workshops and seminars. A method to gauge the progress of incubatees should also be implemented, as it is seen as clearly lacking in some incubators in the study. The results suggest there is an absence of targeted goals for the incubatees and the incubator themselves. Incubators should clearly define these goals at the beginning of the incubation process and set realistic milestones in order to scale the progress of the incubatees. Subsequently, incubatees need to produce performance reports to the incubators on a quarterly basis to ensure that they are meeting the agreed milestones. Likewise, incubators’ performance should also be monitored by the respective stakeholders and authorities. This recommendation comes in view of the lack of governance in the incubators as indicated in the case studies. An advisory board that consists of diverse representation from the business community such as entrepreneurs, business assistance professionals, technology experts, and potential investors is essential and recommended. Accordingly, financial support should therefore be extended to incubators that show significant progress.

In promoting better incubator management-incubatee relationship, this study suggests incubators be creative in designing the workspace to encourage incubatee networking as well as interaction with the incubator management. As indicated by the cases studies, the incubators are generally a multi-level unit. The incubatees should be placed in a consolidated floor or floors where they would see each other more frequently. Facilities such as conference rooms, break rooms, business service centres that house the incubator’s shared copier, printer, and fax equipment should be strategically located where incubatees usually pass by to encourage interaction among the incubatees. More importantly, incubators should initiate peer-to-peer workshops to facilitate knowledge
spill-overs and network leverage. This could lead incubatees to talk about the obstacles they face and promote solution-based problem solving. This avenue will give them the opportunity to share those problems and work toward a common, galvanised effort.

Incubators should leverage on ICT to consolidate the resources in the incubators. Evidence shows that some of the incubators and many of the incubatees do not have fully functioning websites. Incubators should make it mandatory for incubatees to host their own websites. ICT incubators should form a network amongst other ICT incubators in order to pool their resources and share ideas on what technologies, software or trends in the industry are critical in achieving best practices. Indirectly, this will also promote networking amongst incubatees within the same incubator and other incubators, which will lead to possible collaborations, and shorten time to market for their products. These resources should also be extended to companies that do not incubate within the incubators to have a better spill-over of the most advanced R&D facilities on the regional economies. Non-incubating companies should be charged at an appropriate fee and this would provide an additional income stream for the incubators.

The significance of ‘Staff and Personnel Management’ is one of the key findings of this thesis, as the quantitative results revealed, yet the case studies indicate that it is an uncommon service provided at incubators. The need for basic human resource management knowledge amongst the incubatees should not be underestimated. Literature has shown that new businesses often lack many business and management skills despite being at the top of their game in the technical field. With help from the incubator management on human resource management, incubatees gain benefit by shortening the time to decide on type of structure it should have, to how many and what type of employees they need to hire, along with their respective remuneration and performance-based packages. Based on the findings of this research, it is suggested that incubatees are afforded access to human resource expertise to enable them to have a smooth start to their first years of establishment.

Evidence from the case studies revealed that operational and strategic ‘Financial management’ services are absent in almost all incubators. Quantitative results suggest that it is not a significant component to business incubation performance, perhaps
because such services are not generally offered in Malaysia. Yet, literature states that providing incubatees with financial management advice would support the regeneration of regions and the development of incubatees. Incubation process should include this as part of the service (Gilloti & Ziegelbauer, 2006) as it has been shown in the literature to be a major cause for incubatee failure. Incubators should provide financial management services that include educating incubatees regarding managing start-up capital, operational capital, cash flow, and prioritising and leveraging on limited finance in scaling the business.

Likewise, quantitative results show that ‘Marketing and Promotion Management’ is not a significant component in predicting incubation performance, yet, case studies reveal that it is a common service provided to the incubatees. The reason for the non-significance may be a function of marketing services provided by most incubators being quite basic, failing to result in increased sales for the incubatees. In order to increase significance of the marketing component in the incubation process, incubators could offer services that include strategising the products or services marketing plan, leverage of an enterprise social network such as Yammer where incubatees could share with other incubatees and people in the industry about their products, hence extending their networks and opportunities.

This research offers researchers, policymakers, and practitioners a framework for understanding the underlying components in the business incubation process that impact on business incubation performance. Government agencies such as MSC Malaysia, MDeC, SIRIM, or the various state governments may benefit from the research findings regarding the importance of developing more systematic approaches to incubatee selection, enhancing business assistance, allocation of resources, and designing a more robust suite of professional manage services across all ICT incubators.

**Implications for research**

This thesis has resulted in four implications for research. First, this study extends previous research by examining business incubation process constructs and their relationship with three metrics of business incubation performance. The framework promises valuable opportunities for research to be undertaken within the context of
business incubation. Researchers can utilise present findings from the thesis to examine further relationships between the components and extend performance measures of incubators to include for example producing sustainable ICT incubatees.

Second, further research is necessary to assess the framework developed in this thesis across different types of incubators (i.e. biotechnology incubators, university incubators, and general type incubators). Development of the framework for specific incubator sectors could present opportunities for further understanding of the complex phenomenon providing mechanisms for uncovering processes related to business incubation performance. The newly developed frameworks could enrich and prompt formulation of new research questions.

Third, the examination of business incubation process and performance should be undertaken in a longitudinal study. Longitudinal studies will afford deeper understanding of the impacts of business incubation process over time.

Finally, further research is required to address the inefficiencies in existing business incubation process in order to ensure that incubators are all operating in the third-generation model. Significant consideration has been focused to establishing incubators in the country, yet less attention has been paid in designing an incubation program that not only accelerate the growth of incubatees, but also ensures the sustainability of the incubatees.

**Implications for policy**

Implications for policymakers are as follows. First, policymakers are encouraged to revise current goals, mission, and vision of the incubation programs. Based on the findings of this thesis, it is suggested that policymakers consider revising the criteria used for incubatee selection in ICT incubators. A stricter and more systematic selection performance as presented in Chapter 6 should be the basis for formulating a more effective incubatee selection strategy that produces outstanding incubation outcomes.

Second, the appointment of incubator managers should be made with careful consideration requiring some years of business experience. Incubator managers need to fully understand that operating an incubator is analogous to running a business; hence, business knowledge and experience are paramount. Incubator managers’ role in
facilitating incubatees with business services is crucial to the incubator reaching its goals. In terms of governance, the lack of power in managing the incubatees has clearly posed an impediment to the incubator’s operations. This is further aggravated by an appointment of an incubator manager who has limited experience in the industry. Studies have shown that management experience in terms of strategic planning for small enterprises and having established a business development network are crucial in assisting incubator clients to launch and grow their businesses (Duff, 2000; Maital, Ravid, Seshadri & Dumanis, 2008). Lalkaka (2000) concurred with this by stating that careful selection of managers with entrepreneurial experience is a reason that explains incubator success. Incubator managers need to continuously up-skill themselves to keep abreast with the current best practices of incubation management. Additionally, it should be noted that performance and evaluation of the incubator managers should also be monitored through incubatees’ perception of the incubator manager in terms of the manager’s understanding of incubatees’ business problems, frequency of interaction, approach and intervention skills of incubator management (Abduh, D’Souza & Burley, 2011) in keeping track of the incubator goals and visions. Similarly, rewards and recognition of the incubator managers should duly be acknowledged.

Third, results from this research suggest that the funding model needs to be re-evaluated, where policies regarding distribution of funds to incubators should be made based on a performance-based appraisal. Government incubators seem to have a better prospect at obtaining grants compared to the private incubators. However, results show that being less reliant on government funding, more creative at raising sources of revenue, as characterised by the private incubators prove to have a far more superior performance compared to the government incubators. This leads to a finding in the literature which revealed that set-up funds for the incubators are not properly disbursed, which entails transparency of the application process, funds issued to non-deserving incubatees, and higher importance over ‘know-who’, rather than ‘know how’ (Mohd Saffar, 2007). Despite past setbacks, the government continues to fund the establishment of technology incubators and technology parks and has increased the venture capital fund from AUD 195 million to AUD 455 million. To justify this sizeable investment, policies regarding disbursement of funding should be carefully revised and improved based on accountability, performance-based, and against a set of benchmark.
Fourth, exit policy for incubatees should be strictly observed to avoid problems of incubatee overstays. An approach to ensure the execution of an effective exit policy is to gradually increase the rental rate, as promoted by Allen and McCluskey (1990). This is also consistent with Philips (2002) who argued from his study that a similar method was used by more than 60 per cent of incubators to encourage timely graduation. Another suggested method is to implement a year-by-year or month-by-month tenancy after the initial period of either two or three years (Allen & McCluskey, 1990). The implementation of a stricter payment of rental is necessary to ensure that incubatees consistently pay their monthly and equipment rentals. Further, the provision of aftercare services and networking with firms that have left an incubator is regarded by CSES (2002) as critical to ensure sustainable incubator impacts.

**Implications for practice**

Several implications for practice are recognised in this thesis. First, the development of best practices for incubator management such as pre-screening, selection performance involving product innovation, knowledge on potential market, managerial characteristics, and professional management services is acknowledged, which extends beyond current findings in incubation literature. Incubator managers can use the model developed to devise inspection points and audit their incubation processes.

Second, the findings provide potential incubatees with a clearer picture of the business incubation process and what to expect when they become part of the incubators. This heightened understanding provides potential incubatees with the knowledge to consider the advantages that an incubator brings in terms of adequateness of facilities, appropriateness of services, and any trade-offs they may experience by becoming an incubatee as compared to a establishing their business the traditional way.

Third, the inconsistencies in Professional Management Services call for a more intensive effort on the incubator’s side in order to provide incubatees with fundamental entrepreneurial skills such as market scoping, rapid prototyping of products and services, preparing a business plan, managing the finance of their business, managing and sustaining growth, building brand in the market place, and developing channels to market (Papulova & Mokros, 2007). The incubators should look into providing more robust financial management services that include connections to business angels,
venture capital firms, or public subsidies to help launch and grow their business. Such connections are important means of providing financial resources during the early stages of incubatees’ development (Crabtree & Miller, 1999). One way that venture capitalists help new businesses is by covering their financial needs as well as ‘professionalising’ their organisational structure and managerial processes (Hellman & Puri, 2002).

7.3 Limitations

This research is limited to a specific type of business incubator, that is ICT incubators, and the implications from this study may not be generalisable for three reasons. First, the small sample size prevented the use of confirmatory factor analysis techniques (Hair et al., 2010). Second, the incubation industry will continue to evolve at different rates and along different paths depending on the local business conditions and cultural variances. Finally, the population of business owners in this study is variable in terms of their experience, academic qualifications, and age. This suggests that despite good reliability statistics, their responses may not be reflected in other contexts.

The Hackett–Dilts incubation model adapted in this study delved deeply into the operational setting of business incubators and the incubation process to investigate propositions regarding the process of incubating ventures, as well as to reveal an underlying set of factors that have received little attention in the literature. Going forward, the causal relationship between selection performance and the performances of incubator firms could well be examined at a later stage, where a confirmatory structural model could be developed. Future research could also extend this research to a wider sample, and could include other sectors of incubators besides ICT.

From a theoretical perspective, the factors identified and the scales that were developed have helped to display some key factors for the facilitation of the entrepreneurial process in Malaysia: it is possible to identify and measure the factors of the business-incubation process. From a practical standpoint, the scales developed in this study could be used to test hypotheses related to the development of new ventures; they could provide guidance for researchers, venture capitalists, incubator managers, and entrepreneurs in facilitating the business start-up process.
7.4 Directions for Future Research

Conducting a mixed-methods research design to explore an unclear area of research such as the business-incubation process in Malaysia produced a considerable amount of data which required intensive effort and time for analysis. The results are testament to the rigorous standards adopted in carrying out the research and the analysis, as well as to the strong support received from the study participants and the research supervisors. The results of the multinomial logistic regression provide a basis for future research to be undertaken.

As an initial step, the survey instrument can be improved by adding other dimensions of Selection Performance found in the qualitative study, such as an oral presentation, stage of company development, motivation, and a requirement to produce a rapid-prototype of the proposed business. This would extend existing research and provide a significant research opportunity in this field of enquiry. In particular, further research is worthwhile to examine the non-significant components yielded in this study. As a case in point, the ‘Strategic Management’ component of the Professional Management Services construct provides an exciting area for future research in examining the need for strategic management services in ICT incubators.

The case studies could also undergo continuing development, as interview participants indicated their interest in being part of further research efforts. This would provide a more progressive focus for the research which would allow the current underlying components of the business incubation process to be examined in greater detail.

Future research should focus on the strategic value-added of ICT incubators to their incubatees and the impacts on local and regional economics, in particular to examine this in combination with developing and fine-tuning ICT incubator services. Once ‘best practice incubator management’ is developed, we will be one step closer to defining a benchmark model for ICT incubators and subsequently to be able to learn systematically from incubators and their respective stakeholder groups.

The incubator industry is evolving like any other industry, and research is essential to observe any common themes and patterns that eluded our investigation based on cross-sectional perspective research. Long-term studies are required within defined systems of ICT incubation that will allow incubation theory to be further progressed. As the
industry matures, novel methods of ICT incubation will continue to emerge that will strengthen the current approaches bringing about even greater value to the stakeholders and communities that the incubators serve.
References


InfoDev (2010). *Global Good Practice in Incubation Policy Development and Implementation: Malaysia Incubation Country Case Study*


Appendices

Appendix A: Survey questionnaire for incubatees

RMIT University
Business College
School of Management

PART I: GENERAL QUESTIONS
Please respond to all the questions in this section by placing a tick (✓) at the most appropriate answer.

1. Your position in the organisation
   - Managing Director
   - General Manager
   - CEO
   - Deputy Managing Director/Deputy General Manager
   - Other (please specify) _______________

2. How long have you been in the current position? _________
   - Less than 1 year
   - 1-3 years
   - More than 3 years

3. What is your age group?
   - 18 – 29 years old
   - 30 - 39 years old
   - 40 - 49 years old
   - 50 - 59 years old
   - >59 years old

4. Female ○ Male ○

5. Please select your highest academic qualification:
   - Masters/Postgraduate
   - Undergraduate Degree
   - Diploma
   - Other (please specify) ______________

6. How old is your organization?
   - Less than 1 year
   - 1-3 years
   - More than 3 years
7. Which of the following does your company provide?
   - Mobile and wireless communication
   - Business application software development
   - Internet-based business applications in the financial sector
   - Digital content development
   - E-commerce for networking and outsourcing
   - Bio-informatics
   - E-government

8. Please select the incubator-type you are in:
   - Government incubator
   - Private incubator
   - University-linked incubator
   - Other (please specify) _____________

PART II: SELECTION PERFORMANCE (F1)

9. To what extent do you perceive the following managerial characteristics to be important in the selection process into the incubator? (1=Strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 4=Agree, 5=Strongly agree)

<table>
<thead>
<tr>
<th>Managerial characteristics (S1)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Prior work experience in the field</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>2. Prior management experience</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>3. Technical expertise within the management team</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>4. Entrepreneurial experience</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

10. To what extent do you perceive the following market characteristics to be important in the selection process into the incubator? (1=Strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 4=Agree, 5=Strongly agree)

<table>
<thead>
<tr>
<th>Market characteristics</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Long-term strategic orientation to market growth</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>2. Size determination of the target market</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>3. Accessibility of the target market</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>4. Incubatees’ potential in creating new markets</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

11. To what extent do you perceive the following product characteristics to be important in the selection process into the incubator? (1=Strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 4=Agree, 5=Strongly agree)

<table>
<thead>
<tr>
<th>Product Characteristics</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The uniqueness of the product</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>2. Patent protection of the product</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>3. Having a technological edge to the product</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>4. Having a relative advantage over competitor’s product</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>5. Rariness of the product</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>6. Inimitability of the product</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>7. Substitutability of the product</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>
12. To what extent do you perceive the following **financial characteristics** to be important in the selection process into the incubator? (1=Strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 4=Agree, 5=Strongly agree)

<table>
<thead>
<tr>
<th>Financial characteristics</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Profit potential of the company</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>2. The strong likelihood of achieving financial break-even in a short period of time</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>3. The potential to attract investment participation from venture capitalists</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>4. Having multiple, harvestable exit options</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>5. Having a good cash flow</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

**PART III: MONITORING AND BUSINESS ASSISTANCE INTENSITY**

13. To what extent do you agree **time intensity** to be an important part of monitoring and business assistance?

<table>
<thead>
<tr>
<th>Time intensity</th>
<th>Please tick one</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. On average, our company receives appropriate time in assistance</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>(1=Strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 4=Agree, 5=Strongly agree)</td>
<td>O O O O O</td>
</tr>
<tr>
<td>2. On average, our company spends appropriate time interacting with other incubatees in the incubator</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>(1=Strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 4=Agree, 5=Strongly agree)</td>
<td>O O O O O</td>
</tr>
<tr>
<td>3. On average, our company receives sufficient time working directly with the incubator manager</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>(1=Strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 4=Agree, 5=Strongly agree)</td>
<td>O O O O O</td>
</tr>
<tr>
<td>4. Our company reduces the likelihood of making expensive business mistakes through the interactions with incubator manager and other incubatees</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>(1=Strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 4=Agree, 5=Strongly agree)</td>
<td>O O O O O</td>
</tr>
</tbody>
</table>

14. To what extent do you agree **comprehensiveness & quality** to be an important part of monitoring and business assistance? (1=Strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 4=Agree, 5=Strongly agree)

<table>
<thead>
<tr>
<th>Comprehensiveness &amp; quality</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Our company receives business planning assistance from the incubator</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>2. Our company receives business feasibility analysis assistance from the incubator</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>3. Our company receives administrative assistance and services from the incubator</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>4. Our company receives production-related advice from the incubator</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>5. Our company receives operations-related advice from the incubator</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>6. The incubator regularly validates quality of potential new strategic service providers</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>
7. Our incubator ensures the quality of its services by regularly reviewing them  
8. The incubator manager actively seeks ways to continuously improve the level of customer service satisfaction inside the incubator  
9. The other incubatees teach alternate or new strategies for achieving business success  

PART IV: RESOURCE ALLOCATION

15. Our incubator excels at making the following resources available for the incubatees: (1=Strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 4=Agree, 5=Strongly agree)

<table>
<thead>
<tr>
<th>Resource availability</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Access to administrative support services</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>2. Access to managerial expertise</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>3. Access to sources of capital</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>4. Access to lawyers</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>5. Access to accountants</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>6. Access to consultants</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>7. Access to marketing specialists</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>8. Access to funding</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>9. Access to local university contacts</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>10. Access to intellectual property advice</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>11. Access to technology labs</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

16. Please rate the quality of the following characteristics of the incubator: (1=Strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 4=Agree, 5=Strongly agree)

<table>
<thead>
<tr>
<th>Resource quality</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Our company is offered flexible lease agreements to meet our changing space needs</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>2. Our reputation is enhanced because of our association with the incubator</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>3. Our incubator is pleasant</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>4. Our incubator is nurturing</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>5. We receive business-related information from the incubator in a way that is easy to understand</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>6. We receive information on sources of smart capital from our incubator</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

17. Please rate your company’s utilisation of the following resources provided at the incubator: (1=Strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 4=Agree, 5=Strongly agree)

<table>
<thead>
<tr>
<th>Resource utilisation</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Our company makes full use of the administrative services offered at the incubator</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>2. Our company utilises advice obtained from the incubator manager</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>3. Our company utilises the knowledge obtained from other incubatees</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>4. Our company acts upon the advice we receive from the incubator manager</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>5. Our company acts upon the advice we receive from fellow incubatees</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>6. We maximize our opportunities from the introduction to the incubator’s network contacts</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>
PART V: PROFESSIONAL MANAGEMENT SERVICES

18. Our incubator excels at providing professional management services in terms of the following 
marketing and promotion management aspects: (1=Strongly disagree, 2=Disagree, 3=Neither 
agree nor disagree, 4=Agree, 5=Strongly agree)

<table>
<thead>
<tr>
<th>Marketing and promotion management</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Devising and managing marketing strategies</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>2. Preparing press releases</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>3. Undertaking promotional activities</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>4. Preparing marketing materials (e.g. brochures, newsletters, ads, website)</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>5. Planning special events/media opportunities</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>6. Representing the incubator (giving speeches, attending community events, etc.)</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>7. Developing media contacts</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>8. Maintaining media contacts</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

19. Our incubator excels at providing professional management services in terms of the following 
financial management aspects: (1=Strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 
4=Agree, 5=Strongly agree)

<table>
<thead>
<tr>
<th>Financial management</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Writing grant proposals</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>2. Preparing annual operating and capital budgets</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>3. Evaluating and reporting on financial performance</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>4. Monitoring budgets</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>5. Establishing a financial control system</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>6. Maintaining a financial control system</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>7. Making major purchasing decisions</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

20. Our incubator excels at providing professional management services in terms of the following staff 
and personnel management aspects: (1=Strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 
4=Agree, 5=Strongly agree)

<table>
<thead>
<tr>
<th>Staff and personnel management</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Preparing job descriptions and personnel specifications</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>2. Managing the hiring and firing of staff (e.g. interviews and selection)</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>3. Establishing staff appraisal and performance systems</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>4. Supervising staff</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>5. Dealing with staff grievance issues and disciplinary action</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>6. Setting and reviewing salary structures</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>7. Assigning work, duties and responsibilities</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>8. Developing staff training programs</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

21. Our incubator excels at providing professional management services in terms of the following strategic management aspects: (1=Strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 
4=Agree, 5=Strongly agree)

<table>
<thead>
<tr>
<th>Strategic management</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Writing and refining strategic plans for the incubator</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>2. Defining/refining mission statement</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>3. Acting as a staff liaison with the incubator board</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>4. Liaising with stakeholders, policy makers and other key players</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>5. Identifying income generation opportunities</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>6. Undertaking feasibility studies</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>7. Identifying resource requirements and cost implications</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>
**PART VI: INCUBATEE GROWTH**

22. How would you evaluate your company’s growth? Please tick ONE only.

<table>
<thead>
<tr>
<th>Incubatee growth</th>
<th>Please tick one</th>
</tr>
</thead>
<tbody>
<tr>
<td>Our company is barely surviving</td>
<td>O</td>
</tr>
<tr>
<td>Our company has met its break-even and is moving on a path toward profitability</td>
<td>O</td>
</tr>
<tr>
<td>Our company is making profit</td>
<td>O</td>
</tr>
<tr>
<td>Our company is highly profitable</td>
<td>O</td>
</tr>
</tbody>
</table>

23. If you would like to receive a summary of the results of the study, please provide your contact address (including e-mail) below.

____________________________________  ______________________________________
____________________________________________________________________________
____________________________________________________________________________

**THANK YOU FOR YOUR TIME AND COOPERATION**
Appendix B: Letter of support from the President of NINA

15 June 2000

Faridah Abdul Khalid
School of Management
Building 108, Level 16
259 Melbourne Street
VIC 3001
Australia

Attn: Mdm Faridah Abdul Khalid

Dear Mdm,

Re: Business Incubation Process in Malaysia

In reference to your letter dated 30 October 2000, we are pleased to hear about your current research on business incubation in Malaysia. Your interest in the development of business incubators in Malaysia could not have occurred at a more opportune time. Malaysia is progressing steadily with its incubation programmes and is heading toward more sophisticated incubation management. Despite that, we are appreciative to have you conduct a research on business incubation in Malaysia and welcome your research initiatives. Your research topic on the process of business incubation is a very important issue not only in Malaysia, but also in other countries that are still grappling with the elements vital to the incubation process. I believe your research outputs will be valuable for us and for other ICT incubators in this country.

Thank you.

Yours sincerely,

Andrew T F Wong
President

NATIONAL INCUBATOR NETWORK ASSOCIATION
Appendix C: Plain language statement of Questionnaire Survey

RMIT University
Business Portfolio
School of Management

Invitation to Participate in a Research Project
Project Information Statement
Plain language Statement of Questionnaire Survey

Project Title: An empirical analysis into the underlying factors impacting upon the Malaysian Information Communication Technology (ICT) Incubators

Investigators:

Fararishah Abdul Khalid (PhD candidate, fararishah.abdulkhalid@rmit.edu.au)
Dr. David Gilbert (Principal supervisor, david.gilbert@rmit.edu.au)
Dr. Afreen Huq (Second supervisor, afreen.huq@rmit.edu.au)

Dear Participant,

You are invited to participate in a PhD research project being conducted by RMIT University, which will take approximately 25 minutes to complete. These two pages are to provide you with an overview of the proposed research. Please read these pages carefully and be confident that you understand its contents before deciding whether to participate. If you have any questions about the project, please ask one of the investigators identified above.

I am currently a research student in the School of Management at RMIT University. This project is being conducted as a part of my PhD degree. My principal supervisor for this project is Dr. David Gilbert. The project has been approved by the RMIT Business College Human Ethics Advisory Network.

This study is designed to explore underlying factors impacting upon the performance of ICT incubators in Malaysia. This research will distribute up to 250-500 questionnaires. In the questionnaire the participants would need to answer the questions which are related to how they perceive incubation management within the ICT incubators in Malaysia.

If you are unduly concerned about your responses or if you find participation in the project distressing, you should contact my supervisors as soon as convenient. My supervisors will discuss your concerns with you confidentially and suggest appropriate follow-up, if necessary. You can examine the questionnaire before deciding whether you want to participate. You will be provided with a Prescribed Consent Form.

Participation in this research is entirely voluntary and anonymous; you may withdraw your participation and any unprocessed data concerning you at any time, without prejudice. There is no direct benefit to the participants as a result of their participation.
However, I will be delighted to provide you with a copy of the research report upon request as soon as it is published.

Your privacy and confidentiality will be strictly maintained in such a manner that you will not be identified in the thesis report or any publication. Any information that you provide can be disclosed only if (1) it is to protect you or others from harm, (2) a court order is produced, or (3) you provide the researchers with written permission. Interview data will be only seen by my supervisor and examiners who will also protect you from risk.

To ensure that data collected is protected, the data will be retained for five years upon completion of the project after which time paper records will be shredded and placed in a security recycle bin and electronic data will be deleted/destroyed in a secure manner. All hard data will be kept in a locked filling cabinet and soft data in a password protected computer in the office of the investigator in the research lab at RMIT University. Data will be saved on the University network system where practicable (as the system provides a high level of manageable security and data integrity, can provide secure remote access, and is backed up on a regular basis). Only the researcher will have access to the data. Data will be kept securely at RMIT University for a period of five years before being destroyed.

You have right to withdraw your participation at any time, without prejudice. You have the right to have any unprocessed data withdrawn and destroyed, provided it can be reliably identified, and it does not increase the risk for the participant. Participants also have the right to have any questions, in relation to the project and their participation, answered at any time.

I am assuring you that responses will remain confidential and anonymous. The findings of this research could be used to have a better understanding on how to enhance performance of ICT incubators and incubatees in Malaysia.

If you have any queries regarding this project please contact me at +61 3 99251688 or +61 414496866 or email me at fararishah.abdulkhalid@rmit.edu.au. You may also contact my principle supervisor, Dr. David Gilbert, RMIT University, at +61 3 9925 5196 or by email at david.gilbert@rmit.edu.au

Thank you very much for your contribution to this research.

Yours Sincerely,
Fararishah Abdul Khalid
PhD Candidate
Management school
RMIT University,
Level 13, 239 Bourke Street,
Melbourne, VIC 3000

Any complaints about your participation in this project may be directed to the Executive Officer, RMIT Human Research Ethics Committee, Research & Innovation, RMIT, GPO Box 2476V, Melbourne, 3001.
Details of the complaints procedure are available at: http://www.rmit.edu.au/research/hrec_complaints
Appendix D: Letter of invitation and consent form to incubatees

RMIT University

30th October 2009

Re: Ph.D. research by Fararishah Abdul Khalid on
‘The Business Incubation Process in Malaysia’

Dear

This letter serves to introduce Fararishah Abdul Khalid. I am seeking your assistance with her PhD research on a subject most critical to Malaysia’s economic development and long-term economic health. I am Fararishah’s PhD research senior supervisor and am confident that Fararishah will produce important research that will be of enormous benefit to Malaysian policy-makers, the business community and academics alike. Fararishah is an experienced academic and researcher, previously holding a lecturer’s position at the Universiti Teknikal Malaysia Melaka (UTeM) as well as serving on the editorial board of her university’s journal, the Journal of Technology Management and Entrepreneurship. We seek to investigate the underlying factors in the business incubation process as well as highlight best practices and strategies to enable such practices to be operationalized in the Malaysian business context.

With any important piece of research it is vital to engage with and have the support of key players who can offer an informed perspective of the phenomenon under investigation and this is why we seek your knowledgeable opinion on business incubation in Malaysia. Your esteemed role as the President of the National Business Incubation Association is highly recognized and I would kindly entreat you to afford Fararishah your assistance and knowledge so that business incubation processes in Malaysia may become better understood and indeed more effective in producing successful outcomes for all stakeholders in the business incubation process.

Yours sincerely

Dr. David Gilbert - Ph.D; B.Bus (Hons 1); B.Mgt
Associate Head of School (Industry Engagement)
RMIT University
School of Management
Level 16, 239 Bourke Street
Melbourne Vic 3001 Australia
Tel: +61 3 9925 5196
Fax: + 61 3 9925 5960
Email: david.gilbert@rmit.edu.au
Appendix E: Interview protocol for incubator managers

RMIT University
Business Portfolio
School of Management

PART I: GENERAL QUESTIONS

Please respond to all the questions in this section by placing a tick (√) at the most appropriate answer

1. Your position in the incubator
   - Manager
   - Director
   - Other (please specify) _____________

2. How long have you been in the current position? ________
   - Less than 1 year
   - 1-3 years
   - More than 3 years

3. What is your age group?
   - 21 – 29 years old
   - 30 - 39 years old
   - 40 - 49 years old
   - 50 - 59 years old

4. Female ○ Male ○

5. Please select your highest academic qualification:
   - Diploma
   - Undergraduate Degree
   - Masters/Postgraduate
   - Other (please specify) _____________

6. How long has the incubator been in operation?
   - Less than 3 years
   - 3-5 years
   - More than 5 years

7. Please select your incubator type:
   - Government incubator
   - Private incubator
   - University-linked incubator
   - Other (please specify) _____________
8. What are the roles played by the incubator? Please provide in order of importance.

<table>
<thead>
<tr>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercialise research outputs</td>
</tr>
<tr>
<td>Invest in tenants firms</td>
</tr>
<tr>
<td>Create jobs</td>
</tr>
<tr>
<td>Provide diversity in local economy</td>
</tr>
<tr>
<td>Contribute to the community</td>
</tr>
<tr>
<td>Utilise vacant property and rent it to tenants</td>
</tr>
</tbody>
</table>

9. Occupancy rate:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 50%</td>
<td>50% - 80%</td>
</tr>
<tr>
<td>More than 80%</td>
<td></td>
</tr>
</tbody>
</table>

10. Pre-incubator services: State 3 services you currently provide

| Business counselling to help the incubatee understand the idea and its potential |
| Training in basic business skills and requirements |
| Preparation of a business plan, refinement of the product or service to a ‘market ready’ stage |
| Help for the entrepreneur with the formalities of establishing a new company. |

11. State 1 or 2 more services you would like to provide

________________________________________________________________________
________________________________________________________________________

12. Post-incubator services:

- Outline 3 services you currently provide
- State 1 or 2 more services you would like to provide

| Re-align policies and practice to optimize growth |
| Consider alternative long-term financial support |
| Develop avenues for un-exploited innovation |

13. Average incubation period:

<table>
<thead>
<tr>
<th>1 - 2 years</th>
<th>2.5-3 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than 3 years</td>
<td></td>
</tr>
</tbody>
</table>

14. Formal graduation policy?

<table>
<thead>
<tr>
<th>Yes – What is it?</th>
<th>No</th>
</tr>
</thead>
</table>

PART II: SELECTION PERFORMANCE

15. In this section, we would like to gauge your opinion on the importance of selection criteria for incubatees. Could you indicate what factors you believe are important in selecting incubatees and why? Please discuss in order of importance.

**i. Managerial characteristics:**

| A1: Prior work experience in the field |
| A2: Prior management experience |
| A3: Technical expertise               |
| A4: Entrepreneurial experience        |
| A5: Others:                          |

**ii. Market characteristics:**

| A6: Long-term market strategic focus |
| A7: Size determination of the target market |
| A8: Accessibility of the target market |
| A9: Incubatees’ potential in creating new markets |
| A10: Others:                          |

**iii. Product characteristics:**

| A11: The uniqueness of the product |
| A12: Patent protection of the product |
| A13: Technological edge of the product |
| A14: Relative advantage over competitor’s products |
| A15: Rareness of the product        |
| A16: Inimitability of the product   |
| A17: Substitutability of the product |
| A18: Others:                        |
iv. **Financial characteristics:**

<table>
<thead>
<tr>
<th>A19: Profit potential of the company</th>
<th>A20: The strong likelihood of achieving financial break-even in a short period of time</th>
</tr>
</thead>
<tbody>
<tr>
<td>A21: The potential to attract investment participation from venture capitalists</td>
<td>A22: Having a multiple, harvestable exit options</td>
</tr>
<tr>
<td>A23: Having a good cash flow</td>
<td>A24: Others:</td>
</tr>
</tbody>
</table>

**PART III: MONITORING AND BUSINESS ASSISTANCE INTENSITY**

16. In this section, we would like to know about the assistance provided at the incubator in terms of the time intensity and comprehensiveness & quality.

i. **Time intensity**

<table>
<thead>
<tr>
<th>Time intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3 hours per week</td>
</tr>
<tr>
<td>4-6 hours per week</td>
</tr>
<tr>
<td>7-10 hours per week</td>
</tr>
<tr>
<td>More than 10 hours per week</td>
</tr>
</tbody>
</table>

ii. **Comprehensiveness & Quality**

17. What business assistance is available?

<table>
<thead>
<tr>
<th>B7: Business planning assistance</th>
<th>B8: Business feasibility analysis assistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>B9: Administrative assistance and services</td>
<td>B10: Production-related advice</td>
</tr>
<tr>
<td>B11: Operations-related advice</td>
<td>B12: Regularly validates quality of potential new strategic service providers</td>
</tr>
<tr>
<td>B13: Regularly review quality of services</td>
<td>B14: Actively seeks ways to continuously improve the level of customer service satisfaction</td>
</tr>
<tr>
<td>B15: The other incubatees teach alternate or new strategies for achieving business success</td>
<td>B16: Others</td>
</tr>
</tbody>
</table>

18. How do you ensure quality assistance is provided?

| B13: Regularly review quality of services | B12: Regularly validates quality of potential new strategic service providers |
| B14: Actively seeks ways to continuously improve the level of customer service satisfaction |

**PART IV: RESOURCE ALLOCATION**

19. In this section, we would like to know about the resources made available to the incubatees in terms of their availability, quality, and utilization.

i. **Availability:**

a. What resources do you provide?

b. What resources would you like to provide in the future?

| C1: Access to administrative support services | C2: Access to managerial expertise |
| C3: Access to sources of capital | C4: Access to lawyers |
| C5: Access to accountants | C6: Access to consultants |
| C7: Access to marketing specialists | C8: Access to funding |
| C9: Access to local university contacts | C10: Access to intellectual property advice |
| C11: Access to technology labs | C12: Others: |

ii. **Quality:**

a. On what terms would you gauge the quality of the resources you provide?

b. Identify three of your top quality services and those that need improvement

| C13: Flexible lease agreements to meet with incubatee changing space needs | C14: Association with the incubator enhances incubatees’ reputation |
iii. Utilisation:
   a. How would you assess how well the resources provided are utilised?
   b. Identify three of your top utilised services and those that need improvement

| C20: The incubatee makes full use of the administrative services offered at the incubator | C21: The incubatee utilises advice obtained from the incubator manager |
| C22: The incubatee utilises the knowledge obtained from other incubatees | C23: The incubatee acts upon the advice they receive from the incubator manager |
| C24: The incubatee acts upon the advice they receive from fellow incubatees | C25: The incubatee benefits from the introduction to the network contacts |
| C26: Others: |

PART V: PROFESSIONAL MANAGEMENT SERVICES

20. What services do you identify as being important in enhancing the incubator’s performance?

   i. Level of guidance for marketing and promotion management

| D1: Devising and managing a marketing strategy for the incubatees and their activities | D2: Undertaking promotional activities |
| D3: Preparing press releases | D4: Preparing marketing materials (e.g. brochures, newsletters, ads, website) |
| D5: Planning special events/media opportunities | D6: Representing the incubator (give speeches, attend community events, etc.) |
| D7: Developing and maintaining media contacts | D8: Others |

   ii. Level of guidance for financial management

| D9: Raising funds for the incubatee | D10: Writing grant proposals |
| D11: Preparing annual operating and capital budgets | D12: Evaluating and reporting on financial performance |
| D13: Monitoring budgets | D14: Establishing and maintaining a financial control system |
| D15: Making major purchasing decisions | D16: Others |

   iii. Level of guidance for staff and personnel management

| D18: Preparing job descriptions and personnel specifications | D19: Managing the hiring and firing of staff (e.g. interviews and selection) |
| D20: Establishing staff appraisal and performance systems | D21: Supervising staff |
| D22: Dealing with staff grievance issues and disciplinary action | D23: Setting and reviewing the salary structure |
| D24: Assigning work, duties and responsibilities | D25: Developing a staff training program |
| D26: Others |

   iv. Level of guidance for strategic management

| D27: Writing and refining strategic plans for the incubator | D28: Defining/refining mission statement |
| D29: Acting as a staff liaison with the board | D30: Liaising with stakeholders, policy makers and other key players |
| D31: Identifying income generation opportunities | D32: Undertaking feasibility studies |
| D33: Identifying resource requirements and cost implications | D34: Others |
PART VI: INCUBATOR GROWTH

21. What are the indicators that you use to measure incubator success?

<table>
<thead>
<tr>
<th>Incubator measure of success</th>
</tr>
</thead>
<tbody>
<tr>
<td>E4: Number of clients</td>
</tr>
<tr>
<td>E5: Number of business trading independently (‘graduating’)</td>
</tr>
<tr>
<td>E6: Meeting targets</td>
</tr>
<tr>
<td>E7: Continued operation/success</td>
</tr>
<tr>
<td>E8: Growth in expertise/experience of staff</td>
</tr>
<tr>
<td>E9: Recognition by enterprise support community</td>
</tr>
<tr>
<td>E10: Continued support from stakeholders</td>
</tr>
<tr>
<td>E11: Internal evaluation based on needs of incubatees</td>
</tr>
</tbody>
</table>

22. Indication of current success

PART VII: INCUBATEE GROWTH

23. What indicators do you use to measure incubatee success? What else needs to be used?

<table>
<thead>
<tr>
<th>Incubatee growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Companies are barely surviving</td>
</tr>
<tr>
<td>2. Companies have met their break-even and moving on a path toward profitability</td>
</tr>
<tr>
<td>3. Companies is making profit</td>
</tr>
</tbody>
</table>

24. For each category below, identify the total number of all your tenants that grew in terms of revenues from the end of 2008 to the end of 2009.

Number of tenants

- Negative or zero growth
- 10% growth or less
- 10% - 25% growth
- 26% - 50% growth
- More than 50% growth
- TOTAL number or tenants

25. How many graduates has your incubator had since inception?

26. How many are still in business?

THANK YOU FOR YOUR TIME AND COOPERATION
Appendix F: Plain language Statement of interview to incubator managers

RMIT University
Business Portfolio
School of Management
Invitation to Participate in a Research Project
Project Information Statement

Plain language Statement of Interview

Project Title: An empirical analysis into the underlying factors impacting upon Malaysian Information Communication Technology (ICT) Incubators

Investigators:

Fararishah Abdul Khalid (PhD candidate, fararishah.abdulkhalid@rmit.edu.au)
Dr. David Gilbert (Principal supervisor, david.gilbert@rmit.edu.au)
Dr. Afreen Huq (Second supervisor, afreen.huq@rmit.edu.au)

Dear Participant,

You are invited to participate in a PhD research project being conducted by RMIT University, which will take approximately 30-45 minutes to complete. These two pages are to provide you with an overview of the proposed research. Please read these pages carefully and be confident that you understand its contents before deciding whether to participate. If you have any questions about the project, please ask one of the investigators identified above.

I am currently a research student in the School of Management at RMIT University. This project is being conducted as a part of my PhD degree. My principal supervisor for this project is Dr. David Gilbert. The project has been approved by the RMIT Business College Human Ethics Advisory Network.

This study is designed to explore underlying factors impacting upon the performance of ICT incubators in Malaysia. This research will distribute up to 250-500 questionnaires. In the questionnaire the participants would need to answer the questions which are related to how they perceive incubation management within the ICT incubators in Malaysia.

If you are unduly concerned about your responses or if you find participation in the project distressing, you should contact my supervisor as soon as convenient. My supervisor will discuss your concerns with you confidentially and suggest appropriate follow-up, if necessary. You can examine the questionnaire before deciding whether you want to participate. You will be provided with a Prescribed Consent Form.

Participation in this research is entirely voluntary and anonymous; you may withdraw your participation and any unprocessed data concerning you at any time, without prejudice. There is no direct benefit to the participants as a result of their participation. However, I will be delighted to provide you with a copy of the research report upon request as soon as it is published.

Your privacy and confidentiality will be strictly maintained in such a manner that you will not be identified in the thesis report or any publication. Any information that you provide can be disclosed only if (1) it is to protect you or others from harm, (2) a court order is produced, or (3)
you provide the researchers with written permission. Interview data will be only seen by my supervisor and examiners who will also protect you from risk.

To ensure that data collected is protected, the data will be retained for five years upon completion of the project after which time paper records will be shredded and placed in a security recycle bin and electronic data will be deleted/destroyed in a secure manner. All hard data will be kept in a locked filling cabinet and soft data in a password protected computer in the office of the investigator in the research lab at RMIT University. Data will be saved on the University network system where practicable (as the system provides a high level of manageable security and data integrity, can provide secure remote access, and is backed up on a regular basis). Only the researcher will have access to the data. Data will be kept securely at RMIT University for a period of five years before being destroyed.

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I am assuring you that responses will remain confidential and anonymous. The findings of this research could be used to have a better understanding on how to enhance performance of ICT incubators and incubatees in Malaysia.

If you have any queries regarding this project please contact me at +61 3 99251688 or +61 414496866 or email me at fararishah.abdulkhalid@rmit.edu.au. You may also contact my principle supervisor, Dr. David Gilbert, RMIT University, at +61 3 9925 5196 or by email at david.gilbert@rmit.edu.au

Thank you very much for your contribution to this research.

Yours Sincerely,

Fararishah Abdul Khalid
PhD Candidate
Management school
RMIT University,
Level 13, 239 Bourke Street,
Melbourne, VIC 3000

Any complaints about your participation in this project may be directed to the Executive Officer, RMIT Human Research Ethics Committee, Research & Innovation, RMIT, GPO Box 2476V, Melbourne, 3001.

Details of the complaints procedure are available at: http://www.rmit.edu.au/research/hrec_complaints
Appendix G: Consent form

Prescribed Consent Form for Persons Participating In Research Projects Involving Interviews, Questionnaires, Focus Groups or Disclosure of Personal Information.

<table>
<thead>
<tr>
<th>PORTFOLIO OF</th>
<th>School of Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCHOOL/CENTRE OF</td>
<td></td>
</tr>
<tr>
<td>Name of Participant:</td>
<td></td>
</tr>
<tr>
<td>Project Title:</td>
<td>An empirical analysis into the underlying factors impacting upon Malaysian ICT incubators</td>
</tr>
<tr>
<td>Name(s) of Investigators:</td>
<td>Fararishah Abdul Khalid Phone: 03 9925 1688</td>
</tr>
<tr>
<td></td>
<td>Dr. David Gilbert Phone: 03 9925 5196</td>
</tr>
<tr>
<td></td>
<td>Dr. Afreen Huq Phone: 03 9925 5198</td>
</tr>
</tbody>
</table>

1. I have received a statement explaining the interview/questionnaire involved in this project.
2. I consent to participate in the above project, the particulars of which - including details of the interviews or questionnaires - have been explained to me.
3. I authorize the investigator or his or her assistant to interview me or administer a questionnaire.
4. I give my permission to be audio taped: ☐ Yes ☐ No
5. I give my permission for my name or identity to be used: ☐ Yes ☐ No
6. I acknowledge that:
   (a) Having read the Plain Language Statement, I agree to the general purpose, methods and demands of the study.
   (b) I have been informed that I am free to withdraw from the project at any time and to withdraw any unprocessed data previously supplied.
   (c) The project is for the purpose of research and/or teaching. It may not be of direct benefit to me.
   (d) The privacy of the information I provide will be safeguarded. However should information of a private nature need to be disclosed for moral, clinical, or legal reasons, I will be given an opportunity to negotiate the terms of this disclosure.
   (e) If I participate in a focus group I understand that whilst all participants will be asked to keep the conversation confidential, the researcher cannot guarantee that other participants will do this.
   (f) The security of the research data is assured during and after completion of the study. The data collected during the study may be published, and a report of the project outcomes will be provided to _____________ (researcher to specify). Any information which may be used to identify me will not be used unless I have given my permission (see point 5).
Participant’s Consent

Name: _____________________________ Date: ________________

(Participant)

Name: _____________________________ Date: ________________

(Witness to signature)

Where participant is under 18 years of age:

I consent to the participation of _____________________________ in the above project.

Signature: (1) _____________________________ (2) _____________________________ Date: ________________

(Signatures of parents or guardians)

Name: _____________________________ Date: ________________

(Witness to signature)

Participants should be given a photocopy of this consent form after it has been signed.

Any complaints about your participation in this project may be directed to the Executive Officer, RMIT Human Research Ethics Committee, Research & Innovation, RMIT, GPO Box 2476V, Melbourne, 3001. Details of the complaints procedure are available at: http://www.rmit.edu.au/rd/hrec_complaints

Any complaints about your participation in this project may be directed to the Chair, Portfolio Human Research Ethics Sub-Committee, Business Portfolio, GPO Box 2476V, Melbourne, 3001. The telephone number is (03) 9925 5594 or email address rdu@rmit.edu.au. Details of the complaints procedure are available from: http://www.rmit.edu.au/rd/hrec_complai
Appendix H: Ethics approval letter

Ref: Ethics Appl. 1000068

Monday, November 16 2009

Farrahah Abdul Khalil
36 Bamhaste Ave
Tuggerah
Vic 2029

Dear Farrahah,

I am pleased to advise that your application for ethics approval for a Research Project has been approved by the Chair of the Business College Human Ethics Advisory Network. Approval has been granted for the period from 16 November 2009 to 21 July 2012.

The RMIT Human Research Ethics Committee (HREC) requires the submission of Annual and Final reports. These reports should be forwarded to the Business College Human Ethics Advisory Network Secretary. Annual Reports are due in December for applications submitted prior to September the year concerned. I have enclosed a copy of the Annual/ Final report form for your convenience. Please note that this form also incorporates a request for extension of approval, if required.

Best wishes for your research.

Yours sincerely,

[Signature]

Prue Lamon
Secretary
Business College Human Ethics Advisory Network

Encl.
Appendix I: Items loading on multiple factors and were deleted

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<thead>
<tr>
<th>Items deleted after the factor analysis</th>
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<tr>
<td>11c [Having a technological edge to the product]</td>
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<td>15a [Access to administrative support services]</td>
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<td>15g [Access to marketing specialists]</td>
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<td>18a [Devising and managing marketing strategies]</td>
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<td>18f [Representing the incubator (giving speeches, attending community events, etc.)]</td>
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<td>18g [Developing media contacts]</td>
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<td>18h [Maintaining media contacts]</td>
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<td>19a [Writing grant proposals]</td>
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<td>19b [Preparing annual operating and capital budgets]</td>
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<td>21e [Identifying income generation opportunities]</td>
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Appendix J: Within-case Analysis

The within-case analysis presents a thorough review of each ICT incubator, encompassing all constructs of the conceptual framework mentioned in Chapter 4. Each case study report begins with an incubator profile, followed by the incubator’s insights on all criteria listed in Research Question 2. More specifically, the case studies investigate the extent of the constructs’ impact on incubation performance. They also detail challenges faced by the incubators, and conclude with a brief summary.

The objective of the within-case analysis is for researchers to become familiar with each case before making comparisons and drawing conclusions (Eisenhardt, 1989). Within-case analysis involves detailed case study write-ups for each case; and may be purely descriptive. The format for a within-case analysis follows specific questions in the interview protocol using data displays to organise, compress, and assemble information in a way that allows researchers to draw conclusions (Miles & Huberman, 1994).

This section presents the case studies of all six incubators based on the responses provided by the incubator managers during their interviews. The case participants were asked several open-ended questions pertaining to the constructs developed in the research design.

Case 1

Case 1 is a government-owned incubator located in the state of Melaka and is a member of the NINA. This incubator is in the vicinity of an industrial area comprising industrial plants and factories. This five-year old incubator fulfils the study’s requirements for an incubator with a specific focus on ICT and high-level technology. It is a satellite incubator with its parent incubator located near the Kuala Lumpur International Airport (KLIA), about 120 kilometres away from Melaka. The high-security two-storey incubator houses its incubatees on the lower level, while the management of the incubator is on the upper level of the facility.

The incubator provides for basic incubatee needs such as office space and facilities, secretarial services, and meeting rooms. A prominent feature of this incubator is its training provision using sophisticated equipment for product-development purposes. The training is conducted by a qualified technician who assists incubatees when they
require help with the machines. The core activities include research and technology development, development of standards and quality, intellectual property services, consultancy and training, and SME development. Specifically, the incubation program at this incubator assists new entrepreneurs to seek the sophisticated technology required to develop their products.

The incubator manager of this facility holds a degree in Operations Management. He previously managed another incubator prior to joining Case 1 incubator where he has served for more than three years. Apart from him, the incubator is manned by an assistant incubator manager, two administrators, and two technicians who assist in providing technical advice to the incubatees.

Selection Performance

This incubator has a lenient approach to selecting potential incubatees. Applicants are only required to provide a business plan detailing their business idea. Incubator management then evaluates the business plan and considers the feasibility of the product or idea proposed. However, there appear to be no clear parameters in assessing the products or ideas. There is a strong emphasis on the financial capability of the incubatees, and an assurance they will be able to pay the monthly office space and equipment rental is required. This supports the landlord-tenant model of a first-generation incubator model.

It appears that this incubator tends to select applicants with a complete business plan and cash at bank statement. Inadequacy in providing information in any of the documents insinuates non-commitment on their side, resulting in a likely rejection of the application. Rejection of applicants is also likely due to the space constraint faced by the incubator, as there are only three offices available at any time.

Most of the incubatees in the Case 1 are aged 30 to 35 and have several years of work experience. The incubatees undergo an incubation cycle which typically lasts for two years. The following section presents elements of business monitoring that emanated from this case.

Monitoring and Business Assistance Intensity

This incubator appears to offer minimal monitoring and business assistance to their
incubatees. The business assistance is largely technical, rather than entrepreneurial. The advisory services emphasise supervision and advice on technicalities and the high-technology equipment in the laboratory monitored by a technician. The incubator manager elaborated:

*We survey for the latest technology in selected industries and try to provide them to the SMEs. It’s like giving out training on new technologies for incubatees.*

The advice given to the incubatees is in line with adjusting, adapting, and improving their product designs. Occasionally, external experts in specific technologies are invited to give a seminar to the incubatees. It is observed that the incubator is lacking in a number of aspects, including experts in providing business assistance to the incubatees.

The incubator leverages on their position as a government incubator to provide links to funding. Subsequently, incubatees in the present case sometimes return to the incubator to seek linkages that are potentially useful in creating a network. This includes contacts from the state government, other SMEs within the same field, and potential buyers. The incubator manager admits to not having a clear policy detailing their after-care services, but he insists that the incubator welcomes graduated companies to continue using the equipment.

The interaction between the incubator manager and incubatees at this incubator is at a bare minimum, both formally and informally, and this is attributed to a number of reasons. First, because the services are offered on a needs basis, incubatees are inclined to spend more time in their own offices on the lower level of the incubator. Second, the need to work on their products with the high-technology equipment in the laboratory minimises the time they have to interact with the manager. Instead, more time is spent in developing their products with the technician at the laboratory.

There appears to be a lack of quality assurance in the services rendered. The incubator does not employ regular validation approach in gauging the quality of the services provided, such as the use of service feedback forms. Rather, the quality of service is measured based on improvements achieved by the incubatees, and this is based on the incubator management’s perception. The incubator manager further commented:
We can see the difference in our incubatees, based on the training that they have obtained. But we don’t have a way to measure the quality of services provided. There is no system. It all depends on the incubation manager. Incubation managers should have the passion to help. You are there all the time.

Resource Allocation

The present case offers administrative services, office space, computers, telephones, and fax machines. It appears that office space provided is not being fully utilised, and the lack of entrepreneurial activity in the ambience of the incubator is clearly evident. In addition to the office space, the incubator also provides access to a laboratory. The incubatees spend a majority of their time developing their product designs there. As previously mentioned, the incubator also provides expert advice for specific technologies from time to time in the form of workshops and training sessions. This is well received by the incubatees, and positively contributes to the product-development process. The incubator management uses this as an indication that the resources provided to the incubatees are well utilised.

Professional Management Services

This incubator provides minimal additional management services apart from the basic administrative support. Marketing services are occasionally offered in the present case, although the involvement appears to be quite limited. The incubator management introduces and promotes incubatees’ products during road shows and exhibitions, but is rarely involved in the market-development process. The reason for such minimal participation in the marketing of the products appears to stem from a lack of expertise in this area in the management team. The incubator is not engaged in staff and personnel management, strategic management, or the financial management of the incubatees. The incubatees appear to perform their day-to-day operations with minimal support from management. This is confirmed by the incubator manager who emphasised that they are not consulted about who the incubatees hire, what kind of organisational structure they implement, and how they manage their accounts. Despite sharing their set milestones with the management, there appears to be no evidence of keeping track of the incubatees’ strategic plans.
Incubation performance

The incubator utilises four indicators to measure its performance: number of graduates, number of sales by incubatees, monthly rentals from office space and equipment, and number of products obtaining intellectual property rights. The manager was cautious in sharing the incubator’s performance with the researcher and only provided the number of graduates as an indicator of incubation performance. Number of sales made by the incubatees is used as an indicator for performance measurement and is divulged to the incubators, even though the incubator does not have an equity stake. Apart from that, the incubator also uses collection of monthly rentals of office space and equipment as a performance indicator. The incubator is ‘doing well’ if it can sustain its operations without major glitches. In addition, the incubator adopts the number of intellectual property rights filed by the incubatees as an indicator of incubation performance. To date their biggest success was to see an incubatee successfully win a tender to supply their product to the state government. In terms of incubatee graduation, there has only been one graduated company over the last four years. Apart from graduation, the incubator also gauges the incubatees’ performance based on their ability to afford their own production system consisting of equipment and sophisticated laboratories.

After all six cases have been interviewed; the researcher decided that number of graduates will be used as a standardised measure across all cases.

Challenges

This incubator faces several problems including financial constraint, incubatee overstay, and lack of entrepreneurial expertise. Despite being a government-owned incubator, it still faces occasional financial constraints mainly caused by a high non-collection of facility and equipment rentals. Although the financial statement provided by the incubatees at the time of their application is a form of guarantee for rental payments, some incubatees still face difficulty in paying their rental. The situation is worsened when the funds from the government are insufficient, compared to the costly nature of maintaining high-technology equipment. To counter this, the incubator management would send reminders to the incubatees and at the same time apply for extra government funding. It appears that these measures are not effective, as non-performing incubatees have trouble paying their monthly rents. Extra funding from the government
is not easy to obtain, as there are many bureaucratic issues involved.

The issue concerning incubatee overstay is (reportedly) caused by the lack of enforcement in the exit policy; generally, the incubator sets two years as the incubation period. The incubator manager commented:

*The incubatees are supposed to vacate their space after two years, but if they still need to be in the incubator, we do not stop them.*

Although the manager insists that the length of stay is two years, incubatees tend to extend their stay until they are ready to be independent. The incubator does not take any action against incubatees that overstay, unlike in studies such as one conducted by the European Commission (2002), which revealed that 24 per cent of the incubator sample increased rentals above market rates after a given period to encourage tenant firms to leave.

Additionally, the lack of entrepreneurial expertise to assist new entrepreneurs is felt as another major challenge by this incubator. Most of the assistance provided is technically related, which is only helpful during the design stage.

*Case Study 1 summary*

The incubation performance in the present case in terms of graduated companies appears to be low with no graduated company since its inception 4 years ago. Additionally, the poor performance in this case is contributed by the low rate of rental collection by the incubatees. The low graduation rate is explained by the lack of confidence in the incubatees and the lack of enforcement of their exit policy. As a result of receiving more technically related advice than entrepreneurial assistance, incubatees appear to be in their comfort zone in developing their products, and are dormant in bringing their products to market. The effects of this can be seen in the lack of confidence in these entrepreneurs and their reluctance to depart from the incubator.

In terms of evidence supporting the generational typology of Case 1, the findings reveal that this incubator is, at most, still emulating the *first-generation* incubator model, despite having expertise to assist incubatees with their product designs. The landlord-tenant component is to a certain extent still evident, as the incubator relies on monthly
rentals and equipment rentals to sustain operations.

The reactive nature of support services provided by incubator management corroborates the claim that this incubator mirrors the *first-generation incubator* model. As previously reported, incubatees rely heavily on the technical expertise provided by the incubator for their product design. However, such expertise consists of technicians, rather than someone with a higher qualification who is able to offer more than technical advice. The advice provided by the technician may be limited to specific equipment, and therefore may lack in providing a holistic approach to product development. Technical consultation and use of high-technology equipment may be the driving factors of this incubator; incubator management should consider enhancing their program to include other support such as entrepreneurial assistance.
**Case 2**

Case 2 is a state-owned incubator located in the southern part of the Malaysian Peninsula and is the state’s centre for start-up ICT companies. The incubator is in the locality of a technical university, a biotechnology research centre, the state’s International Trade Centre, and other small local businesses. This incubator has been in operation for 5 years and has since been an attraction for the local community through its ability to assist new businesses and create employment. This incubator was classified by the researcher as a *first-generation* incubator based on evidence discussed later in this section.

This four-storey incubator has the capacity to accommodate 50 incubatees at any one time and currently operates to full capacity. It has common incubator facilities such as office space, basic administrative services, and a cafeteria. Besides providing the ease of transition from setting up a new business to acquiring basic office facilities, and assisting them to become entrepreneurial, this incubator offers ICT training for schools and companies which are not incubated there. The facility is also used by researchers aiming to commercialise their ideas within the next few years.

The incubator manager is female and is comparatively younger than the other case participants in this study. Prior to her current position, which she has been in for over a year, the incubator manager graduated with a bachelor’s degree in IT. Her responsibility as an incubator manager includes configuring an incubation program that meets the state’s objective to promote the growth of ICT companies within the region. The existing incubation program consists of a range of business assistance, workshops, training, and consultancy offered (upon request) to the incubatees.

*Selection Performance*

The process of selecting potential incubatees in this incubator is somewhat lenient, as ascertained by the researcher. Start-up companies are given priority to become incubatees above other applicants. Other applicants are researchers and companies already established for more than a year but that do not have premises. The applicants are required to submit a business plan, proof of company registration, and a financial statement. The business needs to be specifically ICT-related, with a potential target market. The incubator manager explained the necessity for the additional documents:
We feel that business plans alone are not enough for us to make a decision, so we ask them for additional documents. Formation of the company is essential and therefore we need a copy of their company registration. We also need some kind of assurance that they will be able to pay for their monthly rental ... in this case, we would ask for a statement of their bank account.

Due to the huge availability of vacant office space in the incubator, the management tends to accept applicants that can provide the basic requirements. The incubator manager admits to practising a less stringent Selection Performance approach.

**Monitoring and Business Assistance Intensity**

The incubator offers a minimal business assistance to its incubatees, where it lacks in regular supervision or in monitoring the incubatees’ progress. The incubator management organises a session each month to meet the incubatees and to distribute information regarding the incubator, funding opportunities, and their latest services. This session is used as an opportunity for incubatees to network with other incubatees in the incubator. The meetings usually last for an hour or two, depending on the events arranged for the day. However, the appeal of this to the incubatees is not entirely encouraging, as reflected by low attendance at such events. The poor acceptance of such sessions is for two main reasons: first, some incubatees work at their customers’ premises on the day the event is scheduled, and second, some of the incubatees are only registered on paper as an incubatee but are physically conducting their business in other premises. The reason for this is that some of the companies apply for MSC Malaysia Status Company which bears a whole range of benefits. One of the requirements to obtain this status is by having business premises located within a science park or an incubator, and this is confirmed by having an address within an incubator.

The incubation program at this incubator includes entrepreneurial assistance provided at workshops consisting of help in basic accounting, business plan write-up, and product development. However, this assistance is outsourced to other agencies as they do not have relevant in-house expertise. The incubator helps incubatees to apply for grants and funding by providing them with information. However, the actual application for grants or funding is made by the incubatees.
In terms of the level of interaction between the incubator manager and incubatees, the manager admits that there is not much besides the monthly events. Incubatees tend to make enquiries when the need arises, and this happens randomly. Consequently, there appears to be a lack of a feedback system which gauges how well-received and useful the business assistance is. The assistance provided in Case 2 appears to be reactive in nature, as they are largely entrepreneur-initiated as opposed to incubator-initiated. This evidence is supportive of the *first-generation* model of incubators.

*Resource Allocation*

Case 2 provides administrative services, office space, meeting rooms, cafeteria, presentation facilities, and a post office within the grounds of the incubator. The most critical resource is the meeting rooms, because their office space is relatively small and is not suitable to host meetings. In addition, the incubator provides an opportunity for incubatees to share their knowledge with other incubatees in the incubator, where forums are sometimes organised. However, the acceptance of such opportunities remains low, as incubatees may not be ready or comfortable to share their knowledge with other incubatees. The incubator manager explained:

*The rooms and facilities are well-utilised. They make use of the meeting rooms and the wireless facility a lot. The stage is underutilised. The stage is for the purpose of knowledge sharing. Maybe they are not interested to share their knowledge or feel that they do not want to share their experiences.*

This incubator does not have a technology lab, a resource that is essential in a *third-generation* ICT incubator (Barrow, 2001; Mohd Saffar, 2008). The absence of high-technology labs and the reliance on office space in this ICT incubator underscores another characteristic emulating the *first-generation* incubator.

*Professional Management Services*

This incubator appears to offer minimal Professional Management Services to its incubatees. The management’s involvement in the incubatees’ day-to-day operations in areas of management services is not usually sought. Despite that, the incubator management offers marketing and promotion services for the incubatees’ product and
services at their road shows scheduled several times a year. During the road shows, banners and samples of the incubatees’ products or services are displayed, and incubator staff seeks potential buyers for the products or services. Although this may not be the most effective marketing practice, the incubator manager claims that contacts established during the road shows tend to lead to potential buyers. In addition, the road shows serve as a way to attract possible new incubatees. Provision of marketing services has been reported as being an uncommon practice among the incubators in Malaysia, although there are a few that facilitate this service through external arrangements (InfoDev, 2010).

**Incubation performance**

Case 2 appears to lack any formalised performance assessment. There are no clear guidelines as to how this incubator evaluates the performance of the incubator and its incubatees. The lack of guidelines in evaluating the incubator as well as the incubatees’ performance has evidently resulted in the incubator not being able to generate the projected number of ICT SMEs as per the state’s expectations. There has been no graduation since the establishment of the incubator, and incubatees tend to overstay their agreed incubation period. The incubator manager relates the inability of incubatees to graduate on time to their lack of confidence to be independent. She also feels that improvements can be made to the incubation program to stimulate the incubatees’ development. However, there appear to be some bureaucratic issues that may hinder the incubation program in benefitting the incubatees fully.

**Challenges**

This incubator faces a number of challenges that hindered its ability to develop independent SMEs. A major problem is the lack of clarity and implementation of their current policies regarding selection and exit criteria for incubatees. It appears that a core part of this problem is that the management is running the incubator under state government directives. The incubator managers lack the authority to perform any decision making or policy resolution. This type of problem has been discussed in the literature where overdependence of incubators on the government comes with strings attached (Barrow, 2001).

Subsequently, the lack of authority of the incubator management presents issues such as
the non-existence of a robust exit policy. This has resulted in many incubatees overstaying. This problem is partly caused by their lack in monitoring incubatees’ progress. The incubator management rarely requests the incubatees to submit progress reports, and as mentioned earlier, the lack of interaction between incubator management and incubatees further aggravates the relationship between the two parties.

*Case Study 2 summary*

Case 2 appears to demonstrate characteristics that lean towards the *first-generation* incubators such as reliance on payment for office space. This dependence is evident in the requirement to submit financial statements in the application. The ability to pay rent was listed as an admissions policy by Allen and McCluskey (1990), and it suggests the incubatees' ability to achieve high growth potential in technology-intensive incubators.

This incubator does not provide constant supervision of them and lacks in providing entrepreneurial assistance. Although there are monthly meetings to stimulate interaction between management and incubatees, this effort appears to be unsupported by the incubatees, who are often absent from these events. This creates a barrier between incubator management and incubatees and could lead to further detriment to the incubatees’ performance. Rice (2002) suggested that positive and collaborative relationships between incubator manager and incubatees is of some importance to the development of the business proposal.

The level of interaction and the reactive nature of support services are areas that evidently need to be improved in this incubator. Rothschild and Darr (2005) suggested that networking—conducted both formally and informally—is crucial in an entrepreneurial environment. Singh (2000) further added that social encounters and network contacts may be important factors in recognising opportunities; McAdam and McAdam (2008) stated that empirical evidence has shown that access to networks, particularly the university, is critical for the development of tenant companies. This accords well with findings from Davidsson and Honig (2003) and Colombo and Grilli (2005) who stated that training sessions on relevant topics can contribute to increasing the ventures’ human capital and therefore make a potential impact on their development and performance. Pena (2004) also commended training in business education and assistance as having an ability to enhance the chances of new firm survival and growth.
Case 2 offers a range of resources to the incubatees but are limited to office space and meeting rooms, lacking essential facilities such as a technology lab. The absence of a technology lab classifies this incubator as a *first-generation* incubator. Further, the lack of expertise in the management team supports the claim that this incubator is behaving as a *de facto* real-estate facility. The emphasis on real estate is very strong and is indicated by the occupancy rate achieving its full capacity. It suggests that the rental fees imposed on incubatees are affordable. This finding supports Hamdani’s (2006) claim that very high application acceptance rates suggest an exceedingly strong emphasis on recruitment program vis-à-vis admission criteria, which characterises incubators in their early stages of development.
**Case 3**

Case 3 is a government incubator located within the MSC Malaysia boundaries. The incubator’s office is of modest size space with a reception area, meeting room, and three other rooms on the same floor for the incubatees. The incubator fits the study’s requirements for an ICT-specific incubator and has been established for four years. It has been classified by the researcher as a *second-generation* incubator based on findings discussed in later sections.

The Case 3 incubator manager has been in the industry for more than five years and previously managed a different incubator. He is well versed with incubation best practices, and strives to make this incubator the best in the country. He shared that the main objective is to provide entrepreneurial support and development, which consists of providing access to market networks, market access, funding access, and business facilities. For this, they provide for the incubatees’ fundamental need for ample office space to conduct their day-to-day operations. Second, they provide them with services that help build their businesses and for potential applicants, the incubator provides pre-incubation services. These services include a program that helps entrepreneurs turn their business ideas to modelling, a business plan write-up, and innovation workshops. The acceptance of such programs has been positive and the incubator plans to expand the portfolio of services to attract incubatees in the future.

**Selection Performance**

The process of selecting potential incubatees in this incubator is guided by a set of criteria. However, two vital criteria are given emphasis by management: idea and passion. Business ideas that are often picked up are those that are viable, investable, and innovative, while the incubator management also tends to choose applicants displaying a high level of passion in their business. Passion in the applicants is usually perceived in the meticulous preparation of their business plan and also by their speed in furnishing additional documents required by the management. The incubator manager elaborated:

*I notice a lot of individuals who are just looking for grants. Without the grant, they feel like they cannot start a business. So I would say they don’t have passion. If someone has passion, they would still want to start a business even without a grant.*
The decision to accept an incubatee is made by the management panel, based on the viability of the business idea and its potential to respond to market demand. Applicants are normally those who have worked for about five years and are between 25 and 35 years old. Over the years, the incubator management accumulated substantial experience to distinguish applicants with genuine interests in setting up a business from those who are just looking for a short cut to establish a business.

The incubation model for Case 3 comprises of three stages: acceleration, escalation, and expansion, each taking about one year to complete. In the first year, the incubatees are assisted in accelerating their business proposal, with incubator management supporting them in terms of setting up their goals and an action plan. The second year involves escalation of the business ideas and reviewing the milestones set in the first year. The third and final year is largely aimed at expanding the business to regional markets and the global market. By the end of the third year, incubatees will gain the necessary knowledge and skills to leave the incubator and sustain their business. Selection of incubatees is critical to the success of this incubator, which is explained in subsequent paragraphs through their performance. The incubator manager shared this based on his experience; applicants with a genuine interest in business tend to do well, while others tend to drop out halfway.

*Monitoring and Business Assistance Intensity*

This incubator offers a range of services that consist of workshops targeted to hone the innovative skills of the incubatees and to assist in writing up their business plan. The incubator management finds these services useful for all entrepreneurs, especially those who are still in the idea-development stage of their products.

In terms of its incubator manager-incubatee relationship, the manager promotes an open-door policy where incubatees are welcomed to the management’s office at any time to seek assistance. This has enabled the manner of interaction between incubatees and incubator manager to be less formal and to occur more frequently. Additionally, the close proximity between the incubatees’ offices and the management office also promotes daily interaction. The bond that is created between them has helped in understanding the incubatees’ concerns better. The incubator manager elaborates:

...*that is the reason why we have to be accessible every day. Trust has to be*
there. They have to have some trust in you, then they will share with you their stories. In return, we provide them with advice. It is not formal. A lot of things that we do are informal. It should be informal.

Subsequently, incubator management is aware of the incubatees’ progress and through this informal relationship they are able to recognise and address incubatees’ needs better. This relationship has benefited the incubator management in terms of recruiting new incubatees, whereby promotion of the incubator is done by the incumbents through word of mouth and is extended to their networks of business colleagues.

The frequency of interaction between incubatees and management tends to decline with the level of maturity of the incubatees. Furthermore, the size of the incubator also influences the level of interaction with the incubatees:

*It is a constant service. Because we are small, we interact with each other every day. They come to us, and we also offer our assistance. I think it should be daily. If you are talking about start-up, services should be daily. For more mature companies, once to three times a week is adequate.*

Despite the good rapport established with the incubatees, incubator management has shortcomings in providing a wide range of business and entrepreneurial services. At the moment, the services are limited to basic entrepreneurial skills, business plan write-up, and business pitching workshops. The incubator management has plans for providing a broader range of training programs for the incubatees; however, due to the lack of funds and expertise in supervising such programs, their plans are on hold.

*Resource Allocation*

Resources provided at Case 3 appear to be typical of a business incubator, consisting of office space, office facilities, and meeting rooms. The incubator does not have a technology lab or a multimedia lab, which are essential resources for an ICT incubator. The unavailability of the labs was partly due to the size as well as the adolescent age of the incubator. Plans are underway to build a technology lab aimed at keeping abreast of current ICT incubation practices. However, the time frame is unknown, because they are still revising the portfolio of services and face a lack of funds.
The inability to host more than three incubatees at the incubator at any time does not hinder this incubator in extending its services to other businesses. In addition to assisting the in-house incubatees, the incubator also provides services to businesses operating outside, much in resemblance to the second-generation incubators. Incubatees that utilise the allocated office space are mostly those in their first year of incubation, while the mature incubatees tend to work from outside the incubator. The provision of office space in incubators used to be essential, but Case 3 is an example of how enhancement in services and assistance justify the incubator’s existence.

Case 3 focuses on providing entrepreneurial support for new incubatees, equipping them with skills and knowledge on how to access their target market and ways to get funding. Training sessions are a big part of the resources provided there and are extended to the public. The sessions are offered in conjunction with other service providers at a fee to the participants, while incubatees are exempt from the charges. The incubator manager explained:

_We provide training, but with the help of a partner. Training sessions are conducted quite regularly throughout the year and apart from the incubatees, the incubator also opens the participation to such sessions to the public. We would get successful entrepreneurs to talk to the incubatees as part of the entrepreneurial training. We are also quite selective with who we engage to conduct training. We get successful entrepreneurs to share their experiences._

Apart from organising the training sessions, this incubator also collaborates with industry, engaging various sponsors to fund activities which are mostly toward building entrepreneurial skills among the incubatees. The incubator manager insisted that this practice is essential for private incubators, as their operations largely rely on office space rental, and additional capital has to be obtained through other means.

_Professional Management Services_

Case 3 provides minimal Professional Management Services due to the small number of incubatees enrolled. Nevertheless, the incubator tries to meet with the incubatees’ requests when necessary. For example, there have been times when incubatees have asked for legal and accounting advice from the incubator, and subsequently their
enquiries were met by the engaged experts. The incubatees are comfortable in running their operations with minimal intervention from incubator management. The incubator manager describes this:

*We normally let the incubatees run their own business. We seldom get into their affairs but we are always there to help as a mentor or coach.*

**Incubation performance**

This case has not had any graduated companies so far, as the incubator is only going into its fifth year of establishment. The incubator manager admits that the first two years were challenging in terms of recruiting incubatees, as well as setting up the entrepreneurial programs that were to be offered. Subsequently, the incubator managed to build its capacity through programs offered to both incubatees and non-residing entrepreneurs. The incubator manager explained that it may take a few more years for them to have a robust incubation program and to establish clear performance indicators. They are presently gauging their performance based on their ability to sustain the incubator operations through the income generated from the entrepreneurial programs offered to the public.

**Challenges**

As a private incubator, Case 3 shared that funding was their biggest challenge and to alleviate this problem, the incubator has to be creative to raise their own funding. Aside from relying on the monthly rental fees, they constantly organise entrepreneurial activities and training sessions to attract budding entrepreneurs. Although financial support from the government is open to all types of incubators, Case 3 shared that based on their experience, the time taken to obtain the funding is long and they need it to be quick to maintain their operations. They focus on linking themselves with angel investors to assist incubatees in getting funding for their businesses too.

**Case Study 3 summary**

The Case 3 approach to Selection Performance, Monitoring and Business Assistance Intensity, Resource Allocation, and Professional Management Services appears to influence their business incubation performance to some extent. The existence of selection criteria helps identify incubatees who are genuinely interested in being their
incubatees. The informal relationship between incubator manager and incubatees is seen as the strength; it influences the dynamic organisation of the programs. The incubator remains creative in sustaining its operations through promotion of entrepreneurial training programs. They take advantage of providing outsiders with entrepreneurial training to sustain and to improve their incubation program. Concurrently, new markets and potential incubatees are captured through the strategic application of these programs.

Case 3 illustrates the ability of a second-generation incubator by rendering services outside the incubator, besides servicing the in-house incubatees. Even although there is still much to be improved in terms of providing proactive support and high-technology resources, the findings are that the limitations are mostly due to the age and size of the incubator. In short, while this incubator is considered too ‘young’ to produce any successful graduates, it is evident that they are on the right track.
Case 4

Case 4 is government incubator operating under the MSC Malaysia flagship. The incubator is located in Kuala Lumpur within the city’s train terminal, alongside a thriving business area and hotels. The incubator mainly provides office space for the incubatees, while the parent incubator provides other business assistance such as pre-incubation services. To allow space for other applicants, the incubation duration has been set at a minimum of six months and a maximum of two years. Their strategic location has ensured a high occupancy rate throughout the year. Subsequently, there have been no cases of incubatee overstay, as the incubator imposes an increase on rental fees on incubatees that stay beyond their agreed period. The incubator has been operating for almost five years. The manager is a female in her late thirties who has held her position for over three years. Her experience in the incubation industry and in business in general is limited; a high school diploma is her highest academic qualification, with several years of work experience in a different industry.

Selection Performance

The selection criteria of Case 4 appear to be well established, admitting only specific types of business. The types that are given preference include creative multimedia products, developers of games, animation, mobile content, and post-production or visual effects. Applicants must not be a Malaysia Status Company, as this will impede the opportunity for other start-ups that are just about to begin their business venture. Hence, the application is open to early-stage growth companies with annual sales turnover of not more than RM 500K (AUD 161K). Apart from that, the incubator also looks for companies that have the potential to display their products or services in the Creative Innovation Symposium which is held annually by the incubator. Additionally, the incubator requests a business plan, a copy of their company registration, and a financial statement as part of their application. They also request that applicants present their business ideas to incubator management as part of the application process. This practice, as well as selecting only ICT-focused companies, has contributed to the incubator’s smooth operations, as explained by the incubator manager:

Our strategy in selecting companies in specific areas of ICT has given us a lot of edge, especially in terms of configuring the right set of services and
resources. Hence, we do not waste resources and [we] focus on what is needed by our incubatees collectively. This has saved us from hiring experts from a range of backgrounds, purchasing unnecessary resources. At the end of the day, we feel that we have a solid team in these ICT areas.

Monitoring and Business Assistance Intensity

As previously mentioned the space constraint at the premise means that the incubator relies on the parent incubator to provide business assistance to the incubatees. However, monthly gatherings with incubatees are periodically arranged to disseminate news and updates about the incubator’s services. The case study points out that meetings are not well received due to time conflicts:

*We conduct monthly meetings to inform our incubatees about any new and updated services as well as any funding opportunities. These meetings would usually go for about 1 to 2 hours. Because most of the tenants are busy attending to their businesses, the attendance is not that many but we still keep our office open for any inquiries.*

The services are rendered to the incubatees upon their request—in resemblance to a second-generation incubator—with the satellite incubator acting as a broker. The incubatees would seek assistance in obtaining funding for their businesses and consequently, the incubator management would arrange a meeting with prospective investors or business angels. Alternatively, incubatees have the option of seeking assistance directly from the parent incubator and so interaction with the management team at the satellite is likely to be minimal.

Resource Allocation

The resources available at Case 4 appear to be quite sophisticated with a multimedia lab, office space, and meeting rooms provided at an affordable rate to the incubatees. The meeting rooms are perhaps their most utilised facility where incubatees often arrange their meetings with prospective buyers or suppliers due to the strategic location of the incubator. The number of rooms available for rent is few, as only 10 incubatees can be accommodated at any time.
In keeping track of the incubatees’ needs and utilisation of resources, the incubator management practises a feedback system where incubatees offer their opinions and suggestions on the resources provided. The feedback system, which is relayed via email, face-to-face, or in a feedback form, informs management on areas of improvement that can be considered. Incubatees expressed their feelings about the multimedia lab, which still lacks some important software and equipment. As it is, the lab is underutilised and is currently being upgraded with the necessary enhancements suggested by the incubatees.

*Professional Management Services*

There appear to be no services other than administrative support at this incubator. All services are offered by the parent incubator and are provided upon inquiry from the incubatees. The incubator manager explained:

*Many of the standard incubator services are available for our incubatees but are not directly accessible here at this incubator. We basically get requests from the incubatees and direct the requests to the parent incubator. Most of the time, the incubatees’ needs are met this way.*

This somewhat imposes upon the ability of the incubatees to perform their operations, as they face many difficulties that are not dealt with immediately. For instance, when they require assistance regarding IP or legal matters, the issue is communicated to the parent incubator through the satellite incubator’s management. The process to fulfil such requests involves finding the right people; it may take from two to seven business days.

*Incubation performance*

This incubator appears to follow a set of performance indicators that enable them to gauge how well they are doing. One of the indicators used is the occupancy rate, where currently all of the office space is being rented out: a 100 per cent occupancy rate. Another indicator used in Case 4 is the number of graduated companies and, to date, it has successfully graduated 12 companies, all of which are still in business. The incubator manager relates a success story of an incubatee that had signed a contract with an international broadcasting company on a local television station. This particular
incubatee was among the 12 that graduated and has since been a symbol of the incubator’s success. The incubator manager believes that the success of this company was possible because of the right combination of the services and facilities that the incubator offers. Additionally, she thought that a good relationship between incubator management and incubatee was vital to ensure the success of incubatees, and ultimately the success of the incubator. A distinct approach taken by this incubator in keeping track of its incubatees’ advancement is through an ‘Incubation Acceleration Impact Survey’ that tracks incubatees’ accomplished milestones. Through this survey, management is able to assist each incubatee with specific concerns and preferences.

Challenges

A common challenge that faces this incubator and other private incubators in this study is in acquiring funding. The incubator manager admits that they rely on the office space rental to maintain their operations, but they need additional funds to run the incubation program. The program expenditures include costs for hiring experts to train incubatees in entrepreneurial and business management courses. They often find it difficult to conduct scheduled courses through insufficient funds and they wait a long time to obtain additional funding. Alternatively, they seek out opportunities from business angels and venture capitalists for financial support and sponsorship for some of the programs that have been arranged for the incubatees. The incubator manager observed that this exercise is common practice among private incubators.

Case Study 4 summary

Case 4 demonstrates the ability to accommodate incubatees with office facilities, including office space, meeting rooms, and a multimedia lab. However, there appears to be a limitation in providing first-hand business services and monitoring, as the incubator relies heavily on the assistance of the parent incubator for such services. As a result, incubatees often have to cope with delays in receiving assistance. Although the resources prove to be adequate for a third-generation incubator, there are areas in the incubation process which mirror the first and second-generation incubator model. For example, they greatly rely on the rental fees from the incubatees to sustain their operations, which suggest a very strong landlord-tenant model. Second, assistance is limited to administrative and secretarial support, and basic business assistance places
them in the *second-generation* model. Perhaps with more robust services provided directly by the incubator, and the improvements in the multimedia lab, this incubator will develop to become a *third-generation* model.
Case 5

This case is a private incubator located within MSC Malaysia’s radius and it pioneered incubator establishment in the country. A member of NINA, this incubator is situated in the vicinity of another incubator, a national broadcasting company and two universities. The incubator fulfils the study’s requirement for incubators by focusing on ICT and high-technology businesses. The incubatees are located in open-concept cubicles on the same floor as incubator management. Here, they share basic office amenities such as printers, presentation equipment, fax machines, and so forth. Besides newly established firms, this incubator provides space for multinational companies that wish to open a branch at the facility. Rather than incubatees, these companies are known as tenants as they are only there for the use of office space, and not for the facilities and assistance offered by the incubator.

The incubation program aims at providing a one-referral centre for start-up companies and ‘technopreneurs’ with a specific focus on ICT and high-technology products and services. The incubator is furnished with modern facilities and fully supports its incubatees with secretarial and administration services. In addition, incubatees are provided with comprehensive and integrated entrepreneurial coaching, mentoring, consultancy, and training programs. It is evident from the researcher’s observations that the incubator offers an ecosystem conducive to nurture and develop technopreneurs.

The incubator began its operations in 1996 and has since evolved through three incubator generations. In its early years, the incubator mainly functioned as a landlord-tenant entity, providing only physical office space for its incubatees. It then progressed to adding services including secretarial and administrative services. At present, the incubator has extended its range to include business and entrepreneurial services as well as providing high-technology labs to fulfil the needs of the incubatees.

The incubator manager has been in his current position for more than three years and previously worked in a business-developing firm as a business trainer. His extensive experience and qualifications—that include a Master degree in Business Administration—have been valuable in assisting new businesses to develop in their early stages and in running the incubator. The researcher was given a brief site tour of the incubator facility and a booklet detailing information regarding the incubator and
Selection Performance

Case 5 appears to have the most well-defined and structured selection process among all cases presented. Applicants are put through a rigorous selection process consisting of three main components: a background survey of the entrepreneurs, a psychometric test, and finally, an interview with the incubator management. The background survey is aimed to solicit information including academic qualifications, financial capabilities, and the development stage of the applicants’ products. Additionally, the incubator also requires a business plan to gauge the applicants’ abilities and commitment to their business ideas.

Potential incubatees undergo the psychometric test to assess traits like honesty, ethics, intelligence, and motivation in the entrepreneurs. Similarly, psychometric tests have been used to help banks in emerging markets to screen loan applicants easily (Winter, 2010). This practice helps distinguish applicants who are genuinely keen on starting up a business and those who are applying for the sake of getting subsidised office space. Applicants use the opportunity to be interviewed to convince incubator management of their capabilities and interest in developing their products. Below is an excerpt from the interview regarding the selection process of the present case:

Our selection criteria are very comprehensive. When we talk about selection, we look into what are they, who are they? Through the questionnaire, we will know what they are in terms of financial stage. At what stage are they at the product cycle?[sic] When they are selected, they will sit for a psychometric test to gauge their entrepreneurship interest. We do not want them to come in if they are not interested to become an entrepreneur. Then they go for interview sessions. That is when we try to understand more about them, about their financial capabilities, their R&Ds.

Monitoring and Business Assistance Intensity

This incubator offers a wide range of business support services, as its accepted incubatees tend to have limited business and management skills. It is common to find incubatees struggling with the preparation of a business plan or grant application and
business-pitch presentations at the beginning of their incubation period. Many business ideas were turned down by potential business angels and venture capitalists, as they were not well presented. The incubator management has seen many examples of this and added necessary services to address this issue. As such, incubatees are first given assistance in acquiring essential business skills through coaching, mentoring, and consultation sessions. These services are provided both in-house as well as through agencies appointed by the incubator. The incubator manager explained:

*We enhance their chances of success. They may be superb in technology, but the missing element is the business skills. So, they lack skills in preparing business plans, how to prepare bankable documents, grantable documents, how to do pitching, because they are so technical oriented, they cannot present the business ideas very well. So the investors tend to not understand them. Our role is to help them in terms of coaching, mentoring, and consultancy to make them present their business ideas better. We don’t do it all in-house. We outsource some of the training/coaching.*

Throughout their tenancy at the incubator, the incubatees are offered a set of business modules, including a Technopreneur Mind Setting module. The incubator manager explained that the modules are designed to equip entrepreneurs with the right business and entrepreneurial skills to a point where they will be comfortable to leave the incubator and sustain the business independently. These modules are conducted by qualified business trainers and are scheduled throughout the year.

Interaction between incubator manager and incubatees is informal and formal. Informal interaction takes place daily, while formal interaction occurs during workshops and training sessions arranged monthly by the incubator management. Management sees that fostering a good relationship with incubatees is essential to the incubator and to incubatees’ growth and success. Accordingly, incubatees’ progress is monitored by incubator management with the guide of a set milestones prepared by the incubatees at the beginning of the incubation period. The incubator management mainly looks at the incubatees’ development from ideation, to proof-of-concept, and to putting the product or service to market. The incubator management also keeps track of the incubatees by way of their financial statements, which are submitted at the end of every quarter.
However, Case 5 participant insisted that while it is important that the incubator keep a close watch on their progress, they do not prescribe solutions. Rather, their main goal in providing services to the incubatees is to create a system which is conducive to new businesses.

Resource Allocation

Case 5 provides a broad range of resources to its incubatees including an Information Resource Centre, an auditorium, conference rooms, meeting rooms, seminar and training rooms, video conferencing facilities, recreation centre, gymnasium, restaurants, banks, retail outlets, a clinic, and an e-library. The incubator’s technology labs offer state-of-the-art facilities and are frequently utilised by the incubatees. Training for use of the high-technology equipment is also available, and is aided by an on-site certified engineer. Additionally, access to markets and funding are equally valuable resources offered by this incubator. The incubator promotes incubatees to establish networks both within and outside the incubator. Internal networking with fellow incubatees occurs on a frequent basis owing to the open-plan concept of cubicles, while external networking usually involves government agencies, experts and researchers, as well as intellectual property agencies. The incubator manager elaborated:

We will link them to experts and researchers. We also help them with the IP matters. Start off with IP minding, IP drafting and filing, IP management and IP strategies.

The incubator especially values its linkages with universities, as they are seen as the best resource for research and development, and they provide useful experts for the incubatees’ product development. Based on the incubator manager’s experience and observations, the incubatees appreciate the connections introduced to them, and this is seen in how well they have expanded their business to potential buyers.

Professional Management Services

Some form of Professional Management Services is present at this incubator, including marketing the incubatees’ products. The incubator manager stated that the products are often showcased at the incubator’s events where potential buyers are identified:

Towards the end of the cycle, we help them with the marketing practices.
either forward linkages, or backward linkages. Backward linkages, we will work with potential buyers.

Display of products to the public has enabled the incubatees to attract possible buyers and thus widen their external network. Additionally, information about the incubatees and their business is also made available to the public through the incubator’s website as part of the promotion and marketing exercise.

The incubator provides assistance in obtaining funding for its incubatees. Leveraging on the incubator’s connections with government agencies, incubatees are likely to have a better chance in acquiring government grants as opposed to incubatees in private incubators. The incubator management limits its involvement in other affairs of the incubatees, such as recruitment and strategic planning for their companies. The incubator manager insisted that the companies should be able to perform those matters themselves and that the incubator should focus on helping the entrepreneurs in acquiring entrepreneurial and business skills.

Other management services such as legal advice, financial planning, and accounting services are outsourced to other agencies on a needs basis. The manager explained that the incubator’s most important goal is to create a system that is favourable to the incubatees and that they don’t simply encroach into their (the incubatees’) affairs.

Incubation performance

This incubator has a clear means of assessing incubation performance both in terms of the occupancy rate of the incubator as well as economic impacts on the country’s GDP. In terms of occupancy rate, the incubator currently has a 98 per cent rate. The incubator has successfully created 7,360 jobs since its inception and 28 listed companies. Total numbers of graduated companies so far is 300, with 75 per cent of these companies still in business. Other measures of success include the number of technopreneurs or incubatees in the incubator, the number of entrepreneurial development programs created, the amount of funding arranged, and the number of business pitches arranged.

Challenges

Despite the number of achievements thus far, the incubator faced challenges over the last few years. The biggest challenge was to obtain sufficient funding which is needed
to create more space for the incubatees and to enhance the existing facilities. The funding received tends to be inadequate to accommodate the demands of the incubatees and for the incubator to run its programs. To counter this problem, management relies on external networks such as business angels and venture capitalists to invest in the incubatees’ businesses. The need for incubators to ensure that incubatees are provided with financial resources is supported by Wiggins and Gibson (2004) and ultimately ensures the incubator’s success.

The incubator faces another challenge in terms of a shortage in human resources, particularly those with experience in the incubation industry. The need for more human capital with incubation-industry experience is vital to accommodate the growth of this thriving incubator; this is supported by Read and Rowe (2003) who identified understanding and experience as among the skills, abilities, and personal qualities necessary in incubator managers.

**Case Study 5 summary**

Based on the findings, it is evident that Case 5 epitomises the *third-generation* incubator model. Many good practices in the case contribute to its performance. For example, the thorough process in incubatee selection supports the incubator’s emphasis on its long-term outcomes. This concurs with Wiggins and Gibson (2004) who note that developing a selection process is vital in ensuring incubator success. This is supported by Hackett and Dilts (2004a) where selection and monitoring of incubatees are seen as equally critical success factors of incubators.

The extensive and proactive nature of Monitoring and Business Assistance Intensity at this incubator has shown positive outcomes of the incubation program. Incubatees are well supported with advice and services in both business and technical areas by the incubator management team. Furthermore, the layout plan of the incubator encourages interaction among incubatees, as well as with incubator management.

The findings from the case suggest that a combination of thorough selection performance, proactive support, availability of resources including the opportunity to establish networks, and provision of management services beyond administrative services contribute to the success of this incubator. The evidence supports the classification of this incubator as a *third-generation* incubator.
Case 6

The final case is a private incubator and is one of the earliest incubators established in the country. Case 6 is located within the MSC Malaysia zone and it is characterised as a third-generation incubator based on its services, features, and facilities which are discussed in the following sections. Case 6 was established in the late 1990s and incorporates high-tech facilities, business advisory services, and mentoring for the incubatees. Two years after this incubator was established, a program to promote, manage and develop the value of business incubation and its acceleration was launched and was named the National Incubator Development Program (NIDP). This program aims to create a dynamic incubation industry to catalyse technopreneurship and accelerate the growth of ICT SMEs.

The incubator manager has been in the incubation industry for more than six years and is actively involved in the international incubation scene. He has been in the incubator development team since the beginning of the incubation phenomenon in the country, and is perhaps the most well-versed incubator manager in comparison to the other five managers.

Selection Performance

Case 6 personnel said that Selection Performance is an important element in their business incubation process. The incubator accepts applications from a select group of businesses including seed-level businesses involved in ICT and multimedia, entities that have been incorporated for less than two years and that require funds for proof-of-concept, start-ups, and lastly entities that may be in the process of setting up or have been in business for no more than two years and require a first round of funding capital for commercialisation. The incubator manager was adamant that selection of incubatees needs to consider the innovativeness of the business idea and businesses with technologies that can be put to practice. He added:

*Our selection process takes into account the innovation of the business ideas, not just the product per se. Because ICT products tend to get obsolete rather quickly, we look for innovative ideas, and businesses that use or will use technology that is practical for the general public.*

Applicants stand a higher chance if they are a part of a committed team that requires the
right resources to develop their idea, turning it into a potentially viable business. A seed-stage business is often referred to as a business that just has a thought or an idea, also known as the conception or birth of a new business, whereas a start-up stage company is a business that is already born and legally exists. Start-up companies already have products or services in production as well as their first customers.

Additionally, applicants are required to give an oral presentation of their business plan to a panel from incubator management. It is during this time that applicants try to convince management of the feasibility of their business ideas. He added:

*We have come across many applications and reading their business plans is just not enough for us to make a decision, as sometimes they [business plans] do not tell us clearly the capability of the team. That is why we need to conduct an oral presentation ...*

Some of the things that the panel is interested to know more about from the applicants during the presentation include the figures and milestones that are in their business plans. They also tend to look for limitations that the companies have or foresee themselves having, as this gives them a more realistic picture of the business. The incubator manager expressed that acknowledging any shortcomings or constraints in the business reflects a careful thought process on an applicant’s side. It gives the impression that the company is aware of the risks involved in building a business, and this is one of the characteristics that this incubator looks for in an applicant.

*Monitoring and Business Assistance Intensity*

Case 6 is an example of an incubator that provides services to its incubatees in a proactive manner. By this, it means that the services are offered even if they are not sought by the incubatees. The case participant related that the incubator assesses the needs of the incubatees on a constant basis to help them improve on the services offered. The assessment is done using evaluation forms which seek what kind of services the incubatees require, as well as the incubatees’ evaluations of the services rendered. This is also done through informal conversation between incubatees and incubator management. Based on the feedback gathered over the years, it appears that incubatees respond well to training sessions and workshops organised by the incubator; the incubator management admits to having a better understanding of the incubatees’
Incubator manager and incubatees interact in both informal and formal ways in this incubator. The incubator manager felt that frequent interaction with incubatees has made them understand their needs better and in return they are able to render services that fulfil the incubatees’ needs. He elaborated:

*Here at the incubator, we interact with the incubatees on a frequent basis, because we feel that this is the way we could actually understand them and their business needs. We would ask for their feedback on our services in both formal and informal ways, and they in turn feel comfortable to share their needs with us.*

Consequently, the incubator manager felt that the formal sessions with the incubatees should be conducted monthly. The incubatees are kept informed of any upcoming training sessions and any updates concerning the incubator and its services during this gathering. Participation from the incubatees in these sessions has been encouraging and they appear to make full use of such gatherings to network with other incubatees. The reason for such positive acceptance of the workshops is undoubtedly due to the success shown by the program in previous years, as well as the incubator’s reputation as being among the earliest incubators established in the country.

Additionally, they also organise functions a few times a year to acquaint management better with the incubatees. To keep track of the incubatees’ development at the incubator, the management requests a quarterly progress report. This practice has enabled the incubator management to provide the necessary services or training that is required by the incubatees, as well as to avoid any problems that they may face during their incubation period. Additionally, information pertaining to available grants or funding is also shared with the incubatees from time to time. The incubator manager said that their ability to obtain funds for the incubatees has so far been commendable.

This case provides more than just landlord-tenant facilities to its incubatees, surpassing characteristics of first and second-generation incubators. In addition to providing basic shared facilities such as meeting rooms, reception service, and audio-visual systems, the incubator also provides Internet access, extensive business advisory support, and
modern technology and multimedia labs. As Case 6 observed, the incubatees are happy with the ambiance of the incubator and utilise the facilities and services provided frequently.

Resource Allocation

Case 6 offers a wider range of resources than the other cases in this study. They include office space, meeting rooms, office facilities including fax machine and telephone, and technology and multimedia labs. The technology labs at this incubator provide the incubatees with a proof-of-concept and prototype development platform which are still not commonly found in other incubators in the country.

The office space is available at an affordable rate, however on a temporary basis for up to two years. The space is also expandable, offered with a flexible lease, and allows an extension of one year after the incubation period ends. The incubator manager recognises networking as an important element in the business incubation process and would often organise activities among the incubatees with the local community. These activities have proven to be beneficial, as incubatees are able to widen their group of contacts and open up opportunities for obtaining venture capital and access to seed funding. To keep track of the graduated companies, aftercare and outreach services are made available to graduate incubatees. The incubator manager promotes that the incubator emulates international incubation best practice as far as they can, and he believes they have the range of standard resources that an ICT incubator should have.

Professional Management Services

Case 6 offers a variety of management services to its incubatees. Unlike the first and second-generation incubators, this case provides these services proactively, and management is readily available to the incubatees. For instance, services concerning legal, accounting, and human resources are available through engaged agencies. The incubator manager said these are not usually areas which require constant supervision, however they are still provided for the incubatees when they need them. The incubator manager said that engaging experts in the specific areas of concern has been reasonably effective and has been well received by the incubatees.

Apart from that, the incubator also provides technology commercialisation services by
offering advisory and consultancy services in technology-transfer facilitation, project management, strategic management advice, market research and opportunity analysis, and professional development programs. The incubator manager felt that these additional services are seen as necessary for ICT incubators, particularly due to the fast-paced nature of the ICT business. He also insisted that proprietary protection of products and services is something that ICT incubators need to have. He explained:

We recognise our incubatees’ needs to protect their products and services. Therefore we have added Intellectual Property Management as part of our management services. Our incubatees find this service valuable and feel confident that their ideas will be protected.

Additionally, secretarial support, hands-on business counselling with regard to business planning, training in management skills, as well as access to specialised assistance such as R&D support and venture capital are accessible at this incubator.

*Incubation performance*

The practices adopted by Case 6 have so far been the most comprehensive among all the case studies. It is interesting to note that this incubator is the first to assume the third-generation incubator model in Malaysia, and it has become a role model to new incubators. The incubator’s comprehensive development programs for ICT SMEs and technopreneurs have produced graduated companies that are now still in business. Their key strategy lies in developing strategic partnerships with key technology providers and promoters such as Sun Microsystems, Microsoft, Celcom, TimeDotCom, Maxis, Ericsson, and Alcatel. The present incubator assesses their performance on a number of indicators including the number of incubatees, number of graduates, and number of business ideas that go to market. To date, they have successfully graduated 45 companies that are still in business and they have a reasonably high occupancy rate of 80 per cent.

*Challenges*

The incubator manager felt that good incubation practice is still unclear and is absent in the incubation scenario. Business development strategy is still lacking in many incubators and should be integrated as a key element in the incubation process to add
value to the existing management-assistance programs. Another challenge that they tend to face is the lack of a viable and sustainable incubator industry that supports the acceleration and growth of ICT SMEs. However, the incubator manager expressed that with the distribution of knowledge and experiential sharing amongst incubators, the challenges can be overcome.

*Case Study 6 summary*

It is evident that the present case exemplifies the most advanced model of incubator among all cases in the qualitative study. The ability to graduate 45 companies is testimony that the incubation practices adopted by this incubator have been effective. The existence of a clear selection guideline has proven to generate quality SMEs that are sustainable even after graduating from the incubator. The incubator management’s initiative to review the range of business services frequently ensures that incubatees’ needs are constantly met. This is made possible by the close relationship they foster with the incubatees, both informally and formally. Further, with the combination of technology and multimedia labs, and services beyond the usual administrative services, this incubator epitomises an incubator with the most resourceful and useful range of services.

*Summary of within-case analysis*

Analysis of the data regarding case participants’ views on business incubation elements indicates just how broad these elements are in practice. The opinions of the six case participants are representative of the selection criteria, services, resources, and performance indicators of the incubators. While it appears to be an accepted notion that the four elements influence incubation performance, understanding of the underlying components remains unexplained. Further investigation into the nature of the underlying components, through the opinions of the case participants, provides more understanding of the complex amalgamation that constitutes business incubation performance.