**Success Factors for Business Incubators:
An Empirical Study of Canadian Business Incubators**

by

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ABSTRACT

Small businesses are the single largest job-creation segment, representing 60%, of employment growth in Canada. Hence, promoting the start-up and growth of small businesses is crucial for economic development. Business incubators have emerged as a recent innovation in economic development. Incubators are facilities that support new and small firms by offering affordable space, shared office services, and management assistance. They provide assistance that fills the knowledge gaps, and reduces early stage operational costs such as rent and services fees. Though business incubators are seen as a viable economic development tool, yet its success has not been determined. Nearly two thirds of North American incubators surveyed were not financially self-sustaining. Further, there is a lack of research to understand the factors that contribute to the success of business incubators, as few studies have tried to evaluate incubators.

The focus of this thesis is to fill this research gap by identifying factors that affect the performance of incubators. An a-priori model of incubator success factors is developed and empirically tested with data collected from 31 incubators across Canada. The conclusions offer suggestions directed towards officials interested in initiating or improving incubator operations. Additionally, this research also opens up new opportunities for academicians in studying cross-linkages among the various factors, affecting incubators performance.

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CHAPTER 1 Introduction

In a rapidly changing global economy, small and medium scale enterprises (SMEs) are increasingly a force for enhancing national economic growth. Many national planning regimes contain policies and programmes addressing SMEs. Past studies have shown that job creation and small and medium enterprises are closely linked to each other (Birch, 1987). The findings of a study by Birch (1987) conclude that as many as two-thirds of the new jobs created in the U.S. economy were created by firms with 20 or fewer employees, and that 80% were created by businesses with fewer than 100 employees. These findings and those from similar studies have prompted a good deal of interest in nurturing small businesses as an effective method of economic development.

In Canada, small businesses¹ are the single largest job-creation segment of our economy, and have become a dynamic backbone of the Canadian economic system. In the period between the second quarter of 1998 and the second quarter of 1999, more than 175,000 net new jobs were created in employer businesses (those with at least one payroll employee, not including self-employed) in Canada (Entrepreneurship and Small Business Office, 2000).

Data from Statistics Canada's *Survey of Employment, Payrolls and Hours* (SEPH) indicate that more than 127 000 net new jobs were created between the fourth quarter of 2000 and the fourth quarter of 2001.

¹ Small businesses are firms with up to 99 employees

Small and medium-sized enterprises (SMEs) represent 60 percent of this employment growth (Entrepreneurship and Small Business Office, 2000). Hence, as small business is good for economic development, the nurturing of small business should be an appropriate focus.

According to the Business Register Division, the number of employer businesses in Canada continues to rise, reaching 1,833,005 in June 1999 (Entrepreneurship and Small Business Office, 2000). Of all established businesses in Canada, 78 percent have fewer than 5 employees, 97.6 percent have fewer than 49 employees, and almost 99 percent have fewer than 100 employees. There are only 2337 establishments in Canada with more than 500 employees. Despite this interesting fact, the survival rate of very small businesses (fewer than five employees), between 1989 and 1996, was much lower than that of larger businesses. Of businesses with fewer than five employees, 72 percent survived the first year, 44 percent were still alive after three years and only 32 percent were still in business after five years (Entrepreneurship and Small Business Office, 1999). In comparison, of businesses with between 5 and 99 employees, 90 percent survived the first year, 67 percent survived three years and 54 percent were still alive after five years. In 1996, 37 percent of all employer businesses in Canada had fewer than five employees and had been active for no more than three years in general. Thus in most cases, only 50 percent of business created will survive the first three years and only 25 percent will still be in business five years after their start-up in Canada (Gasse, 1995).

What may be the most accessible, and potentially the most effective local economic development strategy, is also very risky. High failure rates among small businesses have many explanations such as: under capitalization, poor management, technological obsolescence, fads, recession, competition, labor problems, and scarcity of raw materials. Management problems and under-capitalization are frequently cited as general reasons for small business failure (Allen and Rahman, 1985). Small firms are often created to exploit a market segment not catered to by other firms. Entrepreneurs may have considerable knowledge about such market niches because their previous experience in larger firms involves related products, technologies, or markets. However although entrepreneurs may have specialized knowledge, they often lack the full array of business skills. This is where the business incubator facility plays a key role.

The term “incubators” describes a variety of methods that are used in economic development to nurture new, small businesses (Young, 2001). Business incubators may be defined as an organization, which offers a range of business development services, and access to small space on flexible terms, to meet the needs of new firms. The package of services offered by a business incubator is designed to enhance the success and growth of new enterprises, thus maximizing their impact on economic development.

Though business incubators are seen as a viable economic development tool, yet their success has not been determined. A report from NBIA (1992) showed that nearly two thirds of North American incubators surveyed were not financially self-sustaining. Further, several incubators subsequently failed or were

closed by their sponsors. There is a lack of research in understanding the factors that contribute to the success of business incubators, as few studies have tried to evaluate incubators.

The focus of this research is to bridge this research gap by identifying the factors that affect the performance (success) of business incubators. Hence, an a-priori model of incubator success factors is developed and empirically tested.

The thesis is divided into six chapters. The second chapter details the literature related to incubators and its success factors. The research objective proposed for this study is also presented in this chapter. In the third chapter the proposed model and the variables are described. The fourth chapter presents the research methodology used in the study, and chapter five presents a discussion on the results. Finally, conclusions, findings, scope for future research, benefits and limitations of the study are outlined in the sixth chapter.

CHAPTER 2 Literature Review and Research Objective.

The business incubator is a recent innovation, and has become a useful tool in economic development. They attempt to increase the chances of success for emerging companies (Smilor and Gill, Jr., 1986). Business incubators are generally oriented towards addressing problems of economic development through improving the entrepreneurial base.

In the following sections literature in the area of business incubators and success factors has been discussed. Section 2.1 reviews the evolution of the business incubator model. Literature suggests that incubators appear to have risen largely from universities and corporations recognizing the benefits of commercializing high and medium technology developments through new start-up enterprises.

Section 2.2 introduces the definitions of incubators that are cited in the literature. This section also discusses the classification of different types of incubators based on: physical space, management support vs. technology level, and the primary objectives of sponsors. Further, the concept of facility life cycle is discussed in this section. The life cycle concept envisages incubators moving from real-estate focus to a business development focus over time. Section 2.3 defines success, and presents a discussion on complexity involved in evaluating business incubators. This section also discusses the limitations of previous studies to develop a consolidated measure of success. Section 2.4 cites sixty-four variables identified as factors leading to the success of business incubators.

These variables are categorized into six factors as follows: shared services, facilities and location, funding and support, incubator governance, tenant entry and exit criteria, and mentoring and networking. Finally, section 2.5 presents the research objective of this thesis, with the intention to empirically measure the success of business incubators in Canada.

2.1 History of Incubators

The incubator concept has been around since at least 1959, when Batavia Industrial Center in Batavia, New York was opened (McKee, 1992). However, the earliest business incubators, in their modern form, appeared in the United Kingdom. In effect, industrial incubators (managed workshops) and shared office incubators (business centers) sprang up in the United Kingdom in the 1970s, in response to: the redevelopment and reuse of historic buildings as workshops for artisans and crafts persons; the subdivision of older vacant buildings by architects into “working communities” of design-related firms with shared accommodations; services and management; and to help create jobs in steel closure areas where thousands of former steelworkers had been idled (Campbell and Allen, 1987). These early incubators provided space and were collectively managed to create an optimal working environment for individuals in these trades. “Industrial incubators” is a term often used to describe a variety of short-term starter business premises (Jackson, 1989). An industrial incubator accepts

businesses that are already in existence, and will have a graduation policy based on the firm deciding when it wants to leave.

Between early 1980s and 1990s, other types of incubators appeared such as business centres, science parks and business incubators. These types of incubators emerged from two broad strategies. One approach was to renovate older or vacant buildings, such as schools, factories, or warehouses, and lease space at relatively inexpensive rates. The strategy focused more on providing entrepreneurs with access to space than on building companies – that is, on expanding operations, personnel, and markets for tenants firms (Smilor, 1987). Success was defined in terms of lease space and in terms of the entrepreneur's ability to meet monthly expenses (Smilor, 1987). Business Centres and Science Parks are examples of this type of strategy. These types of incubators focused on providing flexible space and basic shared services to tenant firms. They generally had a non-selective intake and had no special criteria with regard to business activities and technology content.

The second strategy was a more conscious attempt to build companies – that is, to leverage resources to help companies grow. With this strategy, some incubators sought an equity position in tenant companies. Although providing space was still important, the focus was on developing firms (Smilor, 1987). Success was defined in terms of tenant company expansion and its ability to eventually stand on its own (Smilor, 1987). Business incubators are examples of incubators attempting to build companies. The business incubators of the early 1990s had highly selective admission criteria, provided hands-on management

support and focused on building companies by leveraging resources. The primary goal of incubators until the early 1990s, was to facilitate economic development by promoting entrepreneurship, innovation, employment opportunities and growth. Thus the majority of them were operated directly by national, local, or public authorities (Smilor, 1987).

In the mid 1990s, specialized incubators focusing either on specific industry sectors (software, hardware, data storage, etc) or specific types of technologies (semiconductors, microprocessors, etc) appeared because of opportunities presented by the advent of the Internet. These types of incubators had a highly specialized technology focus and were mostly established by universities or private sector organizations (Malan, 2002).

In the late 1990s, as a consequence of the dot.com era, incubators without walls, new economy incubators, or virtual incubators were formed. These types of business incubators are often primarily virtual and usually funded by venture capital companies, or set up by large multidisciplinary consultancies that are able to offer a complete range of technological, advisory, and other business support services to tenant firms. The majority of these incubators are for-profit private sector funded entities, with payback coming from equity investment, rather than from rental income. Job creation is not their principal goal and they mainly tend to focus on high technology and internet-related firms. Financial and business services are at the core of their offerings and they have a virtual presence (Malan, 2002).

(Lalkaka 2001), sums up the evolution of the incubator concept as follows: *“the ‘first generation’ incubators in the 1980s were essentially offering affordable space and shared facilities to carefully selected entrepreneurial groups. In the 1990s the need was recognized for supplementing the work space with counseling, skills enhancement and networking services to access professional support and seed capital, for tenants within the facilities and affiliates outside. This has led to the ‘second generation’ incubator. Starting in 1998, a new incubation model emerged in parallel. This is intended to mobilize start-ups and provide a convergence of support, towards creating growth-potential, technology-based ventures.”*

Figure 2.1 illustrates the evolution of the business incubator concept.

Figure 2.1: Evolution of the Business Incubator Model

Source: (Malan, 2002)

Having discussed the history and evolution of the industry, some definitions of business incubators as discussed in the literature are put forth, and a preferred definition of incubators is proposed for the purposes of this study.

2.2 Business Incubators defined

In describing incubators, researchers have confronted the need to define the incubation system, and classify different types of incubators. Researchers have also proposed a life-cycle model of incubators, recognizing that incubators are not static, but evolve over time. Defining incubation system dictates defining incubation; and suggesting a preferred definition of incubation for this study, thereby laying the foundation for this research.

2.2.1 Defining Incubation

The definitions of incubation proposed by researchers over the period 1985 to 2001 are included in Table 2.1

Table 2.1: Definitions of Incubation

Author(s)	Definitions
Allen (1985)	<i>Business incubators are facilities that promote the early stage growth of companies by providing rental space, shared office services, and business consulting services.</i>

Author(s)	Definitions
NBIA (1985)	<i>A business incubator is an economic development tool designed to accelerate the growth and success 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 network of contacts.</i>
Smilor and Gill, Jr (1986)	<i>A technology-incubation program is an innovative system designed to assist entrepreneurs in the development of new technology-based firms, both start-ups and fledglings. It seeks to effectively link talent, technology, capital and know-how to leverage entrepreneurial talent in order to accelerate the development of new companies, and thus speed the commercialization of technology.</i>
Allen and McCluskey (1990)	<i>A business incubator is a facility that provides affordable space, shared office service, and business development assistance in an environment conducive to new venture creation, survival, and early-stage growth.</i>
Sherman and Chappell (1998)	<i>Business incubator programs are defined as those that were current</i>

Author(s)	Definitions
	<i>members of the NBIA and had been in operation for a period of at least 5 years. In addition, these programs had management on-site; provided management guidance, technical assistance, rental space, and consulting services to their clients; shared basic business services and equipment; and had a stated graduation policy.</i>
Hansen, et al. (June 2000)	<i>Incubator is defined as, "any organization that helps start-ups develop in an accelerated fashion by providing them with a bundle of services, such as physical space, capital, coaching, common services, and networking connections."</i>
Manan and Yunos (2001)	<i>Business incubator is an organization that systemizes the process of creating successful new enterprises by providing them with a comprehensive and integrated range of services.</i>
Neal Young (2001)	<i>Incubators are intended to provide new firms with the supportive network necessary to increase their probability of survival during the crucial early years when they are most vulnerable.</i>
U.S. Small Business Administration	<i>Incubators are defined as physical</i>

Author(s)	Definitions
(2001)	<i>facilities that provide new firms with the supportive network necessary to increase their probability of survival during the crucial early years when they are most vulnerable.</i>

Thus, in a generic sense, business incubators are intended to provide new firms with the supportive network necessary to increase their probability of survival during the crucial early years when they are most vulnerable (Young, 2001). Besides the common term “incubator,” other terms referring to this concept are “enterprise centers,” “business and technology centers,” and “innovation centers.”

There is no prototypical business incubator. Some incubators provide physical resources, such as space, shared services, and assistance with start-up costs. Others focus more on providing managerial and entrepreneurial resources. Incubators represent different things to different organizations, directing their efforts based on diverse economic conditions and entrepreneurship objectives. One of the main goals of incubation programs is to produce successful graduates – businesses that are financially viable and free standing when they leave the incubator, usually in two to three years². By providing entrepreneurs with services on a ‘one-stop’ basis, and enabling tenants to reduce their overhead costs by

² NBIA <http://www.nbia.org/whatis.html>

sharing facilities, business incubators are able to significantly improve the survival and growth prospects of new start-ups (Malan, 2002).

The concept of an incubator facility is neither new, nor limited strictly to enterprise development; it comprises at least four dimensions as described below (Allen, 1985):

- **Enterprise development** is derived from existing literature on entrepreneurship. In entrepreneurship literature, an incubator is an organization that assists the startup of new enterprises.
- **Flexible affordable working space** of incubators is derived from experience in mainly American, multi tenant commercial real estate. As service and information sector firms have assumed greater roles in the economy, multi-tenant facilities have emerged. Multiple occupancy buildings help to assure more affordable rent, since businesses can rent the optimal amount of space and thus minimize rental costs.
- **Business consultancy network** of incubators is well established in the Canadian economy. Consulting firms of various sizes and degrees of specialization provide business assistance in areas such as marketing, finance, and management.
- **Shared office services** of incubators are a more recent development. The shared office concept (often called executive suites, office networks or office headquarters) is well suited to young enterprises that require clerical type support services and minimal space, but do not possess the resources to hire full-time support staff or rent large quarters.

- A fifth dimension, ***entrepreneurial synergy***, is also viewed as an additional element that incubators may provide (Mihailo and Campbell, 1984).

For the incubator concept to acquire meaning of its own, it must not be limited strictly to one of the dimensions described. Instead, the concept should contain as many of those elements as possible.

For this research the focus is on business incubators that are organizations providing a business consultancy network, shared office services, entrepreneurial synergy, enterprise development capabilities and may or may not provide flexible affordable working space for nurturing startup companies.

Having put forth a preferred definition of incubation, the next section describes the incubation system and how this system represents an effective method to develop and grow viable companies.

2.2.2 Incubation System

As discussed earlier, a business incubator is an innovative system designed to assist entrepreneurs, particularly technical entrepreneurs in developing their ideas from inception through to the commercialization and launch of a new enterprise (Malan, 2002). According to Smilor (1987), “the basic concept behind the new business incubator – whether technology-oriented or non technical, urban or rural, nonprofit or for-profit, public or private, locally owned or a part of a chain – is to leverage entrepreneurial talent. The primary driver of new business ventures is neither the availability of funds nor the rate of

technological advance; it is the entrepreneur". Incubators nurture young firms, helping them to survive and grow during the start-up period, when they are most vulnerable³.

To incubate fledgling companies implies an ability or desire to maintain some kinds of prescribed and controlled conditions favorable to the development of new firms. The incubator seeks to give form and substance – that is, structure and credibility – to start-up or emerging ventures (Smilor 1986). Consequently, a business incubator is a facility for the maintenance of controlled conditions to assist in the cultivation of new companies.

The controlled conditions include four types of resources: 1) secretarial support, 2) administrative assistance, 3) facilities support, and 4) business expertise; including management, marketing, accounting, and finance. By controlling these conditions, the business incubator seeks to effectively link talent, technology, and capital. This allows them to leverage entrepreneurial talent, accelerate the development of new companies, and thus speed the commercialization of technology (Smilor, 1987).

In addition, the incubator attempts to extend the networking capabilities of the entrepreneur through affiliations with the private sector, universities, government entities, and nonprofit institutions. The expectation is that this system can result in viable tenant companies that generate economic

³ NBIA <http://www.nbia.org/whatis.html>

development, technology diversification, job creation, profits, and successful products. This framework for commercialization is depicted in Fig 2.2.

Figure 2.2: The Incubation System

Source: (Smilor, 1986)

This incubation system represents an effective method to develop and grow viable companies. The success of the incubator precedes the success of the tenant firms. If the incubator is operated as a small business itself, and is able to sustain itself as a self-sustaining entity, then the incubator can positively contribute towards building companies and economic development.

In the next section different types of incubators are classified, followed by the concept of a facility life cycle that discusses the various growth stages the incubator passes through over time.

2.2.3 Classifying Different Types of Incubators

Just as there are many types of businesses, there are many different types of incubators; and not all incubators are created equal. The sections below, describe incubators classified according to the following types:

1. Based on physical space
2. Based on management support provided vs. technology level,
3. Based on the objectives of their primary sponsors

2.2.3.1 Classifying incubators based on physical space

Based on the physical space provided, incubators are classified as: 'traditional or first generation' and 'virtual or second generation'. The 'first generation' incubators (from the period between the 1970s to the mid 1990s) are also called 'traditional' incubators. They facilitate economic development by promoting entrepreneurship, innovation, employment opportunities and growth (Malan, 2002). These types of incubators are generally operated directly by national or local authorities. Universities or private sector organizations have established specialized incubators. Typically, this model provides affordable

multi-tenant space, shared services, and a full range of business consulting services.

The 'second generation' incubators (from the late 1990s) referred to by Lalkaka, (2001) are often primarily virtual⁴. These 'second generation' incubators are also called 'new economy incubators' or 'incubators without walls'. These incubators often have an essentially virtual presence, with financial and business services at the core of the offering. These incubators tend to focus mainly on high technology and Internet related activities, and do not have job creation as their principal aim. Instead these are private sector, profit-driven incubators with payback coming from investments in companies rather than rental income. These types of incubators typically provide workspace and focused consulting services to a small growth-potential group of firms. Further, they take equity in these companies and accelerate them to the market through technology licensing/acquisitions deals, or via Initial Public Offerings (IPOs).

Given their focus on technology and Internet related activities, in the 1999-2000 period, some 400 for-profit, Internet incubators were added in the U.S. and elsewhere because of the expanding opportunities that the Internet seemed to offer (Lalkaka, 2001). However, with the sharp decline of dot.com companies since mid-2000, the bulk of these incubators have closed down and not developed to the extent originally hoped (Lalkaka, 2001).

⁴ One example of a 'second generation' incubator is the recently renamed Accenture (previously Andersen Consulting) which has set up Business Launch Centres in the UK and the US, which provide new start-ups with business advisory services and technological assistance, ranging from help on building alliances and business development, technical infrastructure development through to Marketing and PR Assistance.

The differences lie in the varying emphasis placed on the importance of physical aspects, as opposed to other business support services, and the business incubation process itself.

2.2.3.2 Classifying incubators based on management support provided vs. technology level

The two dimensions of management support and technology level gives rise to nine different types of incubators. These are: shared office incubators, business parks, science parks, industrial incubators, enterprise agencies, innovation centers, business incubators, business centers, and technology centers. The combination of incubator units (space) and business support services is what makes the incubator concept unique. Further, the importance of physical space as opposed to other business support services constitutes the essence of the concept. The relationship between incubator modalities and between these and other SME promotion structures that include a physical space element is illustrated below in Figure 2.3.

Figure 2.3: Types of Incubators Based on Management Support vs.

Source: (Malan, 2002)

Shared office incubators, in the bottom left-hand corner of Figure 2.3, generally have a non-selective intake, provide little or no management support and have no special criteria with regards to business activities and technology content. Whereas, on the other hand, technology centres, in the upper right-hand corner, have highly selective admission criteria, provide hands on management support, and have highly specialized technology focus.

Business incubators, on the top left-hand corner of the matrix provide a high degree of management support to tenants.

As the concept of business incubators developed, the focus shifted from providing space, to providing services. This was a cognizant endeavor at cultivating and growing firms. Apart from lack of physical space, the difference between first generation and second-generation incubators in Figure 2.1 can also be attributed to the level of management support seen in Figure 2.3. Second-generation incubators, based on their characteristics, are 'virtual' in nature and hence the value added by these incubators is of the level and type of support and assistance provided to tenant firms. Therefore management support is always high in these cases. Another observable fact that is worth noting is the move towards providing services rather than a combination of services and physical space.

2.2.3.3 Classifying incubators based on the objectives of primary sponsors

Incubators can be broadly classified into four different types, depending on the primary sponsors and the objectives of each type. Allen and McCluskey (1990) used a value added continuum, with property development and business development at the two extremes to describe four kinds of incubators and their operations. The four types represent a slightly different focus for incubator development and operation.

For-profit property development incubators seek primarily to capture real estate appreciation (Nyrop, 1986). Non-profit development corporations (Allen,

1985; Pacholski, 1988; Smilor, 1987) primarily focus on creating jobs and enhancing the entrepreneurial climate. Academic incubators seek to commercialize university technology (Allen, 1985; Smilor, 1987) while at the same time providing local economic development benefits. For-profit seed capital incubators are mainly physical embodiments of the seed fund manager wanting to have the firms in their portfolio located at one location, so they can be given maximum attention (Allen, 1985). Beyond these primary organizational objectives secondary objectives are also highlighted (see Table 2.2).

Table 2.2: The Business Incubator Continuum: Facility Objectives

	Real Estate	Value Added Through ←-----→		Business Development
	For-Profit Property Development Incubators	Non-Profit Development Corporation Incubators	Academic Incubators	For-Profit Seed Capital Incubators
Primary Objective	Real estate appreciation ▪ Sell proprietary services to tenants	Job creation ▪ Positive statement of entrepreneurial potential	Faculty-Industry collaboration ▪ Commercialize university research	Capitalize investment opportunity ▪ Rapid enterprise growth
Secondary Objective	▪ Create opportunity for technology transfer ▪ Create investment opportunity	▪ Generate sustainable income for organization ▪ Diversify economic base ▪ Bolster tax base ▪ Complement existing programs ▪ Utilize vacant facilities	▪ Strengthen service and instructional mission ▪ Capitalize investment opportunity ▪ Create good will between institution and community	▪ Product development ▪ Self sufficiency ▪ Wealth creation

Source: (Allen and McCluskey, 1990)

Beyond these four organizational types, two other types are worth mentioning. The first – public-private partnerships – is a hybrid combination of two or more of the previously mentioned four organizational types. In these types of incubators, the partnership objectives are very diverse (Allen and McCluskey, 1990). The last type of organizational arrangements is just starting to appear as a distinct group. A few large companies have developed corporate incubators to develop entrepreneurial spirit among employees. The focus of the present thesis is on the following types of incubators; for-profit property development corporation, non-profit development corporation, academic, and for-profit seed capital incubators acting as a tool for enterprise development.

2.2.4 Facility Life Cycle

Early research into defining the lifecycle of a business incubator was carried out by Allen in the late 1980's. The life cycle envisages incubators moving from a real-estate focus to a business development focus over time and changing its strategies as it does. The three stages in an incubator lifecycle are: start-up, business development, and maturity (Allen, 1988). The interaction of the “stages of evolution” of an incubator facility with the three areas of responsibility that must be covered by an incubator manager, (incubator stakeholders, the building or facilities and incubator tenants) gives rise to an incubator time/function matrix as set out below in Table 2.3.

Table 2.3: Incubator Time/ Function Matrix

	Stakeholders	Facility	Tenant Companies
Start-up	<ul style="list-style-type: none"> ▪ Create core group of sponsors ▪ Assemble mission statement ▪ Determine needs and resources of sponsors 	<ul style="list-style-type: none"> ▪ Perform cost/benefit analysis of building rehabilitation ▪ Rehab initial space to be rented ▪ Admit first tenant companies 	<ul style="list-style-type: none"> ▪ Provide basic shared tenant services ▪ Offer flexible, inexpensive space ▪ Provide access to professional assistance
Business Development	<ul style="list-style-type: none"> ▪ Enlist aid of sponsors to market facility ▪ Enlist aid of sponsors to provide business support services ▪ Expand base to include more stakeholders 	<ul style="list-style-type: none"> ▪ Attract one or more anchor tenant companies ▪ Renovate space on as needed basis ▪ Provide space for shared tenant service 	<ul style="list-style-type: none"> ▪ Assists firms in capital acquisition ▪ Create programs to encourage mixing of companies ▪ Market the collected products and services of tenants
Maturity	<ul style="list-style-type: none"> ▪ Reassess levels of commitment to original plans ▪ Evolve programs to reflect changing needs of stakeholders ▪ Construct alliances between and among stakeholders 	<ul style="list-style-type: none"> ▪ Manage cash flow ▪ Construct specialized lease hold components ▪ Leverage physical plant for future interest opportunities 	<ul style="list-style-type: none"> ▪ Take equity in tenant companies ▪ Sub-contract to private service providers ▪ Coordinate seed capital pool

Source: (Allen, 1988)

The focus of management attention during the “start-up” stage is on the establishment of the physical facility. This may be through the renovation of an existing building, or construction of a purpose built accommodation. Because of incubator cash flow requirements, early tenants are likely to be chosen on their capacity to pay rent rather than their growth potential. This stage ends around the time that the facility financially breaks even.

During the second or “business development” phase, attention is redirected towards the nurturing of new businesses. More emphasis is placed on developing a business advisory function and business network. Another characteristic of the business development stage is the incubator manager working to build synergies through dialogue and trading between tenants. When demand for space is appreciably greater than space available for tenants, and sophisticated, responsive business advisory arrangements are functioning well, the incubator is ready to move into the “maturity” phase.

Maturity is when the incubator spreads its span of influence throughout its region, becoming a focus for entrepreneurial endeavor. Greater demand for tenancy than available space, allows the incubator to become more discerning with its entrance criteria and accelerate the graduation of firms. At this stage, the program may consider expanding to accommodate the increased demand for its services. As the incubator moves through the three phases of the life cycle, it would be expected that the quality and quantity of development outcomes (e.g., in terms of firms graduated) would be higher.

The life-cycle process suggests one central tension within incubators – balancing between the enterprise development mission and the necessity to run the incubator as a self-sustaining real estate operation (Allen and McCluskey, 1990). The success of the enterprise development mission depends on a sustainable real estate operation, but not necessarily vice-versa.

The ensuing discussion from Tables 2.2 and 2.3 suggest that as the business incubator matures and grows, so does its objectives. Initially, when the incubator is in the start-up phase, the focus is on admitting firms by offering inexpensive space and shared services. Over time, as the business incubator attains financial stability, it expands by providing business networks and services to tenant firms and in helping tenant firms grow. The primary objective of non-profit development corporations, is in nurturing firms and helping them grow through job creation. These types of incubators provide a business consultancy network, shared office services and enterprise development capabilities. They foster entrepreneurship through high management support and involvement. As seen from Figure 2.3, business incubators on the top left-hand corner provide a high degree of management support to tenant firms, thereby concluding that incubators in the business development phase are mostly not-for profit incubators with a focus on job creation.

Similarly, for-profit incubators with a primary focus on wealth creation and capitalizing on investment opportunities, become more selective of the type of tenant firms admitted and the level of risk involved. They tend to focus on technology-based ventures with high returns on investment and take equity

stakes in tenant firms to capitalize on their investment. These incubators tend to provide high management support and have highly specialized technology focus. These incubators are on the top right hand corner of Figure 2.3.

The preceding sections have so far examined the history of business incubators, the concept of incubation system, preferred definition of incubation, classification of the different types of incubators, and the facility life cycle concept. The next section defines success and presents a consolidated measure of success.

2.3 Success Defined

The definitions and criteria for success changes over time for individuals, companies, and industries. Success is often defined as a result or outcome, or a favorable or satisfactory result or outcome (Saarinen, 1996). According to Lalkaka (1996) the performance of a business incubator should be measured essentially by the survival and growth of the businesses it incubates. Campbell and Allen (1987) ascertain that success should be measured against what is trying to be achieved. However the following issues complicate the measurement process for evaluating the success of incubators:

1. Most business incubators offer a wide range of programs from rent subsidies and shared office services, to business networking and educational services. Since new businesses have diverse needs, the incubation program offers a wide range of tangible and intangible services that can affect different aspects of a new venture. Due to the variety of

client needs, business incubation programs set a variety of goals and have a complex range of outcomes. Measuring the outcomes of these programs, which at times are intangible, is not easily quantifiable (Kumar and Kumar, 1997; Sherman and Chappell, 1998)

2. Business incubators pursue different goals and have varying priorities based on their primary source of funding. These different types of incubators have their certain common services and activities. However each has distinct services that cater to its own clientele. Thus, the question of whether the same success measures should be applied to every type of incubator needs to be addressed (Kumar and Kumar, 1997; Sherman and Chappell, 1998).
3. Finally, the incubation program has suffered from a problem; a concentration on process rather than on outcomes or impacts. The impact of an incubation program is generally not realized within the same fiscal year in which the investment is made. This further complicates the measurement process, since any evaluation must be undertaken several years after the expenditure was made (Kumar and Kumar, 1997; Sherman and Chappell, 1998).

The preceding arguments do not suggest that it is impossible to evaluate business incubator programs. However, it does suggest the need for a proper conceptual framework for evaluating the costs and benefits of the various incubator programs. Past studies have focused on measuring success of an incubation program by assessing the number of tenant companies in the facility,

jobs created, firms graduated, entrance criteria, economic development, and profits (Allen, 1985; Campbell, 1988; Kumar and Kumar, 1997; Smilor and Gill, 1986). These authors have generally looked at the incubators from facility, tenant, and graduate perspectives (Allen and McCluskey, 1990). Most incubator managers agree that incubators performance evaluation criteria should include: community level impact (number and types of jobs created), incubator level impact (measured using information collected on incubator's financial performance, number of tenant firms graduated, survival rate of incubators, and services provided) and incubator manager's performance.

The key problem for researchers establishing metrics is agreeing on the criteria by which incubators should be evaluated. Bearse (1998), Sherman and Chappell (1998) and Tornatsky et al. (1996) concur that there are no satisfactory benchmarking comparators for evaluating incubators. In addressing this, Lalkaka and Shaffer (1998) gave a number of metrics by which they believed incubators should be evaluated internationally. In a different approach, National Business Incubation Association (NBIA, 1996) identified the most important measures in evaluating performance as; the number of jobs created, clients served and companies graduated. A conclusion that can be drawn from the foregoing discussion is that there is a lack of standardization of evaluation approaches in terms of measures and methodology. The majority of incubator studies have focused on; incubator, incubator manager, incubators and their tenants, and incubator programs as their level of analysis (see Table 2.4).

Table 2.4: Unit of Analysis Employed by Different Authors

Year	Author(s)	Unit of Analysis	Sample	Response Rate	Instrument (s)	Analysis
June (2000)	Morten T. Hansen, Nitin Nohria, and Jeffrey A. Berger	Incubator Stake-holders	356 for profit incubators worldwide	69% (169 completed surveys)	Telephone interviews.	Factor Analysis.
Feb (2001)	Neal Young	Incubator Managers	28 business incubators (for-profit and non-profit)	100 % (28)	Telephone surveys	Mean, Median
November (1998)	Hugh Sherman and David S. Chappell	Incubator programs	50 incubator programs, 310 tenant firms	40 % (126 completed surveys)	Surveys	Average
(1985)	David N. Allen	Incubators and their tenants	40 incubator managers and 1050 tenants in these incubator facilities	850 tenants of which 30% was obtained for this study.	Surveys	Mean, Median
(1985)	David N. Allen and	Incubators and their	12 incubator	44% (56 tenant	Surveys	Mean, Median, and

Year	Author(s)	Unit of Analysis	Sample	Response Rate	Instrument (s)	Analysis
	Syedur Rahman	tenants	managers and 126 tenant firms	firms)		Average
August (1987)	Raymond W. Smilor	Incubator managers and directors	117 incubators	43% (50 incubators)	Mail surveys	On-site review, case study analysis, in-depth interviews with incubator managers and directors.
Winter (1990)	David N. Allen and Richard McCluskey	Incubator managers		70.5%(127 incubator manager)	Mail surveys	Regression Analysis

Due to the ambiguity in adopting a standard measure for evaluating the success of incubators, a consolidated measure of success was developed for the purpose of this study. An incubator that has graduated firms, has created jobs, and is able to achieve financial break-even is called a successful incubator for the purposes of this research. This measure of success has been adopted because a number of authors have identified these variables as factors that were used to evaluate the success of business incubators (Allen, 1985; Allen and McCluskey, 1990; Campbell, 1988; Kumar and Kumar, 1997; Sherman and

Chappell, 1998; Smilor and Gill, 1986). Further, this consolidated measure includes the categories of community level impact (number and types of jobs created) and incubator level impact (measured using information collected on incubator's financial performance, number of tenant firms graduated, survival rate of incubators, and services provided) that most incubator managers agree should be included when evaluating the incubators performance.

2.4 Success Factors

Based on this literature review and from previous studies conducted by authors, sixty-four variables have been identified that affect the success of business incubators. The number of variables is large (sixty-four), and the number of simple correlations among the variables is also large. These sixty-four variables are grouped into six factors based on; their similar characteristics, literature review, and the definition of incubators adopted for this research. These factors are 1) shared services, 2) facilities and location, 3) funding and support, 4) incubator governance, 5) tenant entry and exit criteria, and 6) mentoring and networking.

Table 2.5 provides a summary of the variables identified through literature and grouped into six factors. For example under shared services there are; logistical or physical services, shared business support services, and business consulting expertise. Flexibility in size, length of lease, and city centric location makes up the facilities and location factor. Financing arrangements and organizational arrangements, make up the funding and support factor. Incubator

governance consists of; concise program milestones with clear policies and procedures, an experienced incubator manager, a board of directors, and the presence of an advisory council. Ability to create jobs, written business plan, unique opportunity, locally owned, advanced technology related, space requirements, new start-up, age, and complementary to existing firm variables along with time limit on occupancy and space requirements make up the tenant entry and exit criteria factor. Finally affiliations with key institutions, both public and private, entrepreneurial network, entrepreneurial education, tie to a university, and community support comprise the mentoring and networking factor.

Table 2.5: Summary of Incubator Success Variables Identified Through Literature

Variables identified through literature	Author(s)
Shared Services	
1. Logistical or Physical Services	Allen (1985)
a. Security services	√
b. Computers	√
c. Conference room	√
d. Custodial services	√
e. Photocopier	√
f. Furniture and equipment rental	√
g. Library	√
h. Telephone equipment	√
2. Shared Business Support Services	Allen (1985)
a. Photocopy	√
b. Receptionist	√
c. Typing	√

Variables identified through literature	Author(s)
<ul style="list-style-type: none"> d. Clerical e. Filing f. Mail service g. Word processing h. Off-hours answering service i. Audio-visual equipment j. Shipping and receiving 	<ul style="list-style-type: none"> √ √ √ √ √ √ √
<p>3. Business Consulting Assistance or Expertise (Financial Consulting)</p> <ul style="list-style-type: none"> a. Business taxes b. Risk management and insurance c. Government grants and loans d. Government procurement process e. Government contract preparation f. Equity and debt finance arrangements g. Export development assistance 	<p>Allen (1985), Allen and Rahman (1985), and Smilor (1987)</p> <ul style="list-style-type: none"> √ √ √ √ √ √ √
<p>4. Business Consulting Assistance or Expertise (Management Assistance)</p> <ul style="list-style-type: none"> a. Business plan preparation b. Employee relations c. Advertising and marketing d. Health and benefit packages 	<p>Allen (1985), Allen and Rahman (1985), and Smilor (1987)</p> <ul style="list-style-type: none"> √ √ √ √
<p>5. Business Consulting Assistance or Expertise (Professional Business Services)</p> <ul style="list-style-type: none"> a. Legal counseling b. Legal representation c. Patent assistance d. Accounting e. Computing and information 	<p>Allen (1985), Allen and Rahman (1985), and Smilor (1987)</p> <ul style="list-style-type: none"> √ √ √ √ √

Variables identified through literature	Author(s)
services f. Book-keeping g. Introduction to venture capitalist	√ √
Facilities and Location 1. Flexibility in size and length of lease 2. City centric location	Allen and Rahman (1985), Campbell and Allen (1987), and Parke (1995) Young (2001), and Hansen et al. (2000)
Funding and Support 1. Financing arrangement 2. Organizational arrangement	Allen (1985), and Allen and Rahman (1985) Allen (1985), and Allen (1988)
Incubator Governance 1. An experienced incubator manager 2. A key board of directors 3. A noted advisory council 4. Concise program milestones with clear policies and procedures	Smilor (1987) Allen (1985), and Smilor (1987) Allen (1985), and Smilor (1987) Smilor (1987)
Tenant Entry and Exit Criteria 1. Ability to create jobs 2. Present a written business plan 3. Have a unique opportunity 4. Locally owned firm 5. Advanced technology related firm 6. Space requirements 7. Complementary to existing firms 8. New start-up firm 9. Age of firm 10. Affiliated with university	Allen (1985), and Smilor (1987) Smilor (1987) Smilor (1987) Allen (1985), and Smilor (1987) Allen (1985), and Smilor (1987) Allen (1985) Allen (1985) Allen (1985), and Smilor (1987) Allen (1985) Allen (1985)

Variables identified through literature	Author(s)
11. Be able to pay operating expenses	Smilor (1987)
12. Time limit on tenancy	Allen (1985), and Smilor (1987)
13. Space requirements	Allen (1985), and Smilor (1987)
Mentoring and Networking	
1. Entrepreneurial network	Smilor (1987)
2. Entrepreneurial education	✓
3. Tie to a university	✓
4. Community support	✓
5. Affiliation with key institution, both public and private	✓
Age of Incubator	Allen and McCluskey (1990)
Size of Incubator	Allen and McCluskey (1990)

Each of the factors are explained in detail in the following sections. Section 2.4.1 discusses shared services; facilities and location as described in section 2.4.2. In the next section, the funding and support factor is outlined, followed by incubator governance in section 2.4.4. Section 2.4.5 presents tenant entry and exit criteria. Mentoring and networking dimension is examined in section 2.4.6. Finally section 2.4.7 presents a discussion on the age and the size of incubator.

2.4.1 Shared Services

Emerging companies require business expertise. Very often they will have the talent, ideas, and even capital to launch a new venture. However they often lack, in various degrees, the business know-how to transform these assets into viable business enterprises (Smilor, 1987). The start-up phase of a small business is associated with considerable uncertainty regarding the operating levels of the business. Incubators provide many services that help reduce the set up costs of business. By providing shared services, the tenant firms can hire fewer support staff, and avoid the purchase or lease of office equipment. With support services located in the facility, tenant entrepreneurs can seek business advice from incubator staff. Services provided to tenants can be divided into three general categories: logistical or physical services, shared business support, and business consulting assistance or expertise (Allen, 1985). Business consulting services consist of financial consulting, management assistance, and professional business assistance (Allen and Rahman, 1985; Smilor, 1987). The business consulting services are meant to complement the limited range of business skills and knowledge possessed by entrepreneurs and to a certain extent the incubator manager. Table 2.6 lists the services that have been identified through the literature under each of the categories:

Table 2.6: Services Provided by Incubator

Logistical or Physical Services	Shared Business Support Services	Business Consulting Assistance or Expertise
<ul style="list-style-type: none"> ▪ Security services ▪ Computers ▪ Conference room ▪ Custodial services ▪ Photocopier ▪ Furniture and Equipment rental ▪ Library ▪ Telephone Equipment 	<ul style="list-style-type: none"> ▪ Photocopy ▪ Receptionist ▪ Typing ▪ Clerical ▪ Filing ▪ Mail Service ▪ Word Processing ▪ Off-Hours Answering Service ▪ Audio-Visual Equipment ▪ Shipping and Receiving 	<p><u>Financial Consulting</u></p> <ul style="list-style-type: none"> ▪ Business taxes ▪ Risk Management and Insurance ▪ Government Grants and Loans ▪ Government Procurement Process ▪ Government Contract Preparation ▪ Equity and Debt Finance Arrangements ▪ Export Development Assistance <p><u>Management Assistance</u></p> <ul style="list-style-type: none"> ▪ Business plan preparation ▪ Employee Relations ▪ Advertising and Marketing ▪ Health and Benefit Packages <p><u>Professional Business Services</u></p> <ul style="list-style-type: none"> ▪ Legal Counseling ▪ Legal Representation ▪ Patent Assistance ▪ Accounting ▪ Computing and Information Services ▪ Bookkeeping ▪ Introduction to Venture Capitalist

2.4.2 Facilities and Location

2.4.2.1 Flexibility in size and length of lease

Most incubators provide space at below market rents. Incubators usually charge for space on a quality basis, thus office space and manufacturing space have different rates. Part of the rental rate variation is also due to the inclusion of utility, services, and business assistance costs in the rental fee (Allen and Rahman, 1985). Flexibility was noted to be crucial to a successful incubator (Campbell and Allen, 1987). The incubator facilities are generally designed to allow firms to move within them as they expand. Flexibility was also evident in short-term leases and the option of deferred rental payments. Since small business is associated with considerable uncertainty as to the operating levels of the business, in particular the level of sales, it is difficult for small business to plan in terms of the size of facilities and the length of suitable lease (Parke, 1995). Hence *flexibility* in terms of the size as well as the length of lease is crucial.

2.4.2.2 City Centric Location

Authors have identified location as a factor in determining incubator's success. Young (2001) in his study found that 57% of incubators are located in major cities. Hansen et al. (2000) also found in their study that 68% of incubators have only one location that too, situated in big cities. The location of incubators in

cities near research parks, universities or research labs is designed to offer entrepreneurs access to a wider range of facilities, individuals and opportunities within their field of business. Additionally, tenant firms are able to network with experienced, successful entrepreneurs and may engage in strategic alliances to exploit business opportunities together.

2.4.3 Funding and Support

2.4.3.1 Financing Arrangement

Incubator financing depends largely upon whether or not the facility is privately or publicly sponsored (Allen, 1985; Allen and Rahman, 1987). Private sector sponsors include corporate money and direct donations. Public sector sponsors include federal, state, and local governments. Rent and service fees are the primary forms of income for incubators.

2.4.3.2 Organizational Arrangements

Incubators can be characterized as one of the four organizational types: for-profit private or corporate; not for-profit public or government; academic or educational institutions; and a hybrid public/private partnerships (Allen, 1985; Allen 1988). For-profit incubators are less likely to place emphasis on entry criteria for tenant firms, since they are concerned with obtaining full occupancy rather than job creation potential. Not for-profit incubators are more likely to place time limits on tenant residency, since their primary objective is job creation and

economic development. For-profit incubators are less likely to limit tenant residency due to the financial risk associated with tenant turnover.

2.4.4 Incubator Governance

The management structure of most incubator facilities consists of incubator managers, board of directors, and advisory council, who play key roles in recommending, reviewing, and approving companies for inclusion in the incubator facility (Allen, 1985; Kumar and Kumar, 1997; Smilor, 1987). Executive boards are defined as frequently involving investors or financial contributors and individuals with business and technical acumen who help set policy (Allen, 1985). Advisory boards are defined as being composed primarily of individuals who have an interest in the facility, but generally are not involved in policy matters (Allen, 1985). Owners or major sponsors of incubators are also involved in a variety of active and passive ways. Their involvement is in the form of financial support, serving on the board of directors, advising tenants, taking an equity position with tenant companies, working as consultants to tenant companies and even serving on board of directors of their tenant companies. This type of owner involvement is most prevalent among privately sponsored and university-sponsored incubators. Incubator governance consists of:

- An experienced incubator manager (Smilor, 1987)
- A key board of directors (Allen, 1985; Smilor, 1987)
- A noted advisory council (Allen, 1985; Smilor, 1987), and

- Concise program milestones with clear policies and procedures (Smilor, 1987)

Whether and how rapidly companies develop in an incubator is partly dependent on the chemistry between those managing the incubator and the entrepreneurs in the tenant companies (Smilor, 1987). Tenant companies need to know what will be expected of them, what the incubator will provide, how they will be evaluated, and what the day-to-day procedures and general operating policies of the incubator will be. All emerging companies experience problems and uncertainties. To help minimize the difficulties, it is incumbent upon incubator management to communicate to entrepreneurs, incubator's policies and procedures for dealing with tenant company development. Entrepreneurs also need to understand the program milestones by which tenant company performance will be measured. This relationship between the incubator and tenant company can be a sensitive one, especially if the expectations of each are different, or if there is confusion over what is contributed and what is received from the association. Thus, the more concise the program milestones and the clearer the policies and procedures, the greater the likelihood that expectations on both sides will be met (Smilor, 1987).

2.4.5 Tenant Entry and Exit Criteria

If an incubator seeks to build companies, then it must have a selection process through which it evaluates, recommends, and selects tenant firms (Allen, 1985; Smilor, 1987). Unless there is some set of criteria by which to determine

tenant company selection, there is no frame of reference for judging whether a company is on track and no way to decide whether it may need additional resources. Different types of incubators have different purposes. Privately sponsored facilities are likely to emphasize investment potential, real estate development and technology transfer, while publicly sponsored facilities are more likely to stress job creation and economic diversification. The objectives of different incubators can be operationally interpreted as a set of entry and exit policies. Entry policies are formulated in two ways. Firstly, general criteria may be applied to the admission of firms. Secondly, certain specific types of firms may not be permitted to enter the facility. The entry criteria for tenant selection are provided below in Table 2.7.

Table 2.7: Entry Criteria for Tenant Selection Process

Tenant Entry Criteria	Types of Firms Excluded
<ul style="list-style-type: none"> - Ability to create jobs (Allen, 1985; Smilor, 1987) - Present a written business plan (Smilor, 1987) - Have a unique opportunity (Smilor, 1987) - Locally owned firm (Allen, 1985; Smilor, 1987) - Advanced technology related firm (Allen, 1985; Smilor, 1987) - Space requirements (Allen, 1985) - Complementary to existing firms (Allen, 1985) - New start-up firm (Allen, 1985; Smilor, 1987) - Age of firm (Allen, 1985) - Affiliated with university (Allen, 1985) - Be able to pay operating expenses (Smilor, 1987) 	<ul style="list-style-type: none"> - Retail (Allen, 1985) - Wholesale (Allen, 1985) - Heavy manufacturing (Allen, 1985) - Light manufacturing (Allen, 1985) - Warehousing (Allen, 1985) - Professional personal services (Allen, 1985) - Non-profit organizations (Allen, 1985) - Non-advanced technology firms (Allen, 1985)

Exit criteria are not as extensive as entry criteria. Generally, exit policy is defined by a *time limit* to a tenant's occupancy of the facility. Successful tenants, such as those that no longer need the incubator's services or are constrained by space, move from the facility. These firms have used the facility as the concept is intended, i.e., to be nurtured (Allen, 1985). Some incubator managers would prefer tenants to be permanently situated in the facility, thereby assuring greater certainty of occupancy and avoiding financial risks associated with tenant turnover. Thus the only exit criteria used by incubators are time limits on occupancy and space requirements.

2.4.6 Mentoring and Networking

2.4.6.1 Entrepreneurial Network

Entrepreneurship is a dynamic process. It requires links or relationships not only among and between individuals but also among and between a variety of institutions (Smilor, 1987). The stronger, more complex, and more diverse the web of relationships, the more the entrepreneur is likely to have access to opportunities; the greater his chance of solving problems expeditiously, and ultimately the greater the chance of success for a new venture. An entrepreneurial network can provide links and relationships that can promote and sustain a new venture in an incubator. Incubators try to advance tenant company development by providing the interface for a broader and richer range of networking opportunities to entrepreneurs.

2.4.6.2 Entrepreneurial Education

If tenant companies are to grow they must eventually stand on their own. One persistent problem that most incubators encounter is the reluctance of tenant companies to move out on their own. The protected environment of the incubators is hard to leave. The expectations of tenant companies for continued support, the reinforcement of peers, the ability to tap business expertise, and the general comfort of working in an environment that one knows, can make the process of graduation from the incubator a difficult one. To deal with this problem, many incubators are addressing the need for entrepreneurial education (Smilor, 1987). It seeks to develop the skills – to instill some of the necessary know-how – in entrepreneurs so that they extend their own abilities in running a company.

2.4.6.3 Tie to a University

A tie to a university proves beneficial not only for the incubator but also for the university (Smilor, 1987). Incubators benefit by having former university professors as managers or advisors, or having university faculty entrepreneurs in tenant companies. For the university, the incubator provides a mechanism to commercialize university research. It helps a university partly fulfill an emerging obligation of directly contributing to economic development and also provides an opportunity for university faculty and graduate students to do research (Smilor, 1987).

2.4.6.4 Community Support

Community support plays an important role in sustaining incubator development and thereby in incubator success (Smilor, 1987). Most incubators in some way reflect a community's effort to diversify its economy, create jobs, and leverage entrepreneurial talent for a more viable long-term economy. Part of the process however, involves recognizing that companies take time to develop. Previous studies have shown that incubators contribute to the process of building indigenous companies. That is, they can keep homegrown talent at home and develop companies that in turn help generate jobs for the community (Smilor, 1987). Because of this, incubators do gain financial, moral, and/or public relations support from communities. This support is crucial in leveraging additional assistance from professionals and others in the community, who may be able to provide business expertise to tenant companies.

2.4.6.5 Affiliation with key institutions, both public and private

Smilor (1987) identified affiliation with key institutions, both private and public as an important intangible element, playing a key role in incubator development. Affiliation with institutions provides entrepreneurs with access to a wide range of skills and services. It also helps link entrepreneurs with highly successful and experienced entrepreneurs. These experienced professionals can then guide and assist the entrepreneur on a regular basis.

2.4.7 Age and Size of Incubator

A study by Allen and McCluskey (1990) found that the age and size of business incubators affect the number of jobs created and firms graduated. They found that older incubators have more time to produce results, thereby creating more jobs and that larger facilities have more tenants who can produce more jobs or graduates. Together age and size of incubators explain 59% of variance in jobs created by tenant firms (Allen and McCluskey, 1990).

2.5 Research Objective

It is clear from the preceding literature review that there is no standard measure for evaluating incubator success. Despite using the same basic terminology, not all incubators have been successful in realizing their objectives. There are a number of factors responsible for the failure of incubators. Costs of the building, low occupancy in the building and tight cash flow are a few factors responsible for incubator failures (Kumar and Kumar, 1997). Furthermore, most of the research conducted to date has essentially been descriptive (types, numbers, characteristics and services) or evaluative in terms of impacts (Albert and Gaynor, 2001). Based on the literature research and to the best of our knowledge, we have identified Kumar and Kumar's (1997) study as one of the earliest studies conducted in Canada on incubators. This motivates us to pose the following research question as objective for this study. The intention is to empirically measure success of business incubators.

1. What factors affect the performance (success) of business incubators in Canada?

CHAPTER 3 Proposed Model

3.1 Proposed A-Priori Model

Based on the literature review an a-priori model is developed for the study (see Figure 3.1). The model represents the theoretical framework for this study. The variable of primary interest, the dependent variable, is the degree of success of incubators. An attempt is made in this study to explain the variance in this dependent variable through a number of independent success factors categorized as: 1) shared services, 2) facilities and location, 3) funding and support, 4) incubator governance, 5) tenant entry and exit criteria, and 6) mentoring and networking.

Further, the relationship between some of the independent variables and the dependent variable is influenced by two moderating variables: the age of the facility, and the size of the facility. Additionally, as the age of the facility increases, its size may also increase in terms of acquiring more space and tenants. These moderating variables influence the relationship between: shared services and incubator success; tenant entry and exit criteria and incubator success; and mentoring and networking and incubator success.

As seen in the model, facilities and location; and incubator governance directly determine the success of the incubator. Table 3.1 summarizes the independent variables, moderating variables, and dependent variables. All these variables are explained in section 2.4.1 to 2.4.7.

Figure 3.1: An a-priori Model of Incubator Success Factors

Table 3.1: Summary of Independent, Moderating, and Dependent Variables

Independent Variables	Moderating Variables	Dependent Variables
Shared services	Age of facility	Incubator success
Facilities and Location	Size of facility	
Funding and Support		
Incubator Governance		
Tenant Entry and Exit		
Criteria		
Mentoring and		
Networking		

3.2 Research Hypotheses

Based on the variables identified throughout the literature, as factors affecting the success of incubators, an a-priori model is developed and the following hypotheses are formulated.

H1: The greater the focus on shared services provided by incubators, the more likely the incubators success for older facilities (business incubators that have been in existence for a number of years).

For older facilities, if business incubators focus more on providing shared services to tenant firms, then they are more likely to succeed in nurturing and

creating viable firms. There exists a positive relationship between shared services and business incubator success.

H2: The better the facilities and location provided by incubators, the more likely the incubator success.

If business incubators have city centric location, and offer tenant firms the flexibility regarding the size of unit occupied (the ability to collapse or expand the space provided) and the length of lease of occupancy (ability to provide month-to-month lease), they are more likely to succeed in helping firms grow. There exists a positive relationship between flexibility in size and length of lease and business incubator success.

H3: The better the incubator governance, the more likely the incubator success.

If business incubators have an experienced incubator manager, a key board of directors, a noted advisory council, and concise program milestones with clear policies and programs, then they are more likely to succeed in helping tenant firms be viable and successful. There exists a positive relationship between incubator governance and business incubator success.

H4: The stronger the enforcement of tenant entry and exit criteria, the higher the probability of incubator success for older facilities.

For older facilities, if incubators screen potential tenant firms for admission based on the following entry criteria: ability to create jobs, a written business plan, an unique opportunity, are locally owned, are advanced technology related firm, have space requirements, complement existing firms, are a new start-up, relative young firm, are affiliated with university and are able to pay operating expenses and have time limit on tenancy and space requirements as exit criteria, then they are more likely to succeed. There exists a positive relationship between tenant entry and exit criteria for selection purposes, and business incubator success.

H5: The greater opportunities for mentoring and networking among the tenants, the more likely the incubator success, for older facilities.

For older facilities, if business incubators focus more on providing entrepreneurial networks and education, tie with a university, community support, and affiliation with key institutions to tenant firms, then they are more likely to succeed. There exists a positive relationship between mentoring and networking opportunities among the tenants and business incubator success.

The hypothesis for funding and support factor is not tested because, based on the literature review it is implied that funding and support is a

prerequisite for incubator's success. Table 3.2 provides a summary of the hypotheses and the respective questions that will help in testing the hypotheses.

Table 3.2: Summary of Hypotheses and the Respective Questions

Hypotheses #	Question #'s
H1: The greater the focus on shared services provided by incubators, the more likely the incubators success for older facilities	2.1, 2.2, 2.3, 2.4, 2.5
H2: The better the facilities and location provided by incubators, the more likely the incubator success	3.1, 3.2, 3.4
H3: The better the incubator governance, the more likely the incubator success	5.1
H4: The stronger the enforcement of tenant entry and exit criteria, the higher the probability of incubator success for older facilities	6.1, 6.2
H5: The greater opportunities for mentoring and networking among the tenants, the more likely the incubator success, for older facilities	7.1

CHAPTER 4 Research Methodology

This section describes the steps taken to conduct the proposed study. This section is comprised of five sub-sections. The first sub-section describes the research design of the proposed study. The second sub-section discusses the sampling details. The third sub-section looks at the survey instrument details and the last two sub-sections explain the measures used and the proposed data analysis.

4.1 Research Design

The proposed study involved an investigation of factors affecting the performance of business incubators. Little research had been done in literature to understand the relationship among various success factors (highlighted in section 2.4) and performance (success) of business incubators in Canada. This research is formal in nature, as a number of hypotheses were empirically tested. An ex-post facto design was implemented, as the researcher did not have any control over the independent variables. The study undertook collection of primary data with the help of communication-based techniques such as the survey. A structured questionnaire format was chosen over the mailed survey for the following reasons:

1. It provided a consistent means of collecting data.
2. It could be administered in a neutral environment, thereby encouraging candid responses.

3. It helped in reducing any bias that may have been introduced in data collection through open-ended interviews.
4. It permitted more detailed quantitative statistical analysis than semi-structured or open-ended interviews allow.

The proposed study was carried out once and represents a snapshot at one point in time.

4.2 Sample

The sample used for this study consisted of incubator managers in Canada, involved in the day-to-day operations of the incubator. The sample was so proposed, as the respondents would have the necessary insights and experiences of managing incubators and in managing the relations within the incubator with tenant firms and outside of the incubators with private and public entities. Recent research by Canadian Association of Business Incubators (CABI)⁴, suggests that the number of business incubators across Canada is over 100 compared to over 950 incubators in the U.S.⁵ Thus, given the number of business incubators in Canada, a census study was chosen. All the incubators in the population were included but only those satisfying the definition⁶ of

⁴ <http://www.cabi.ca/Vol7no3oct2002.pdf>

⁵ http://www.nbia.org/resource_center/bus_inc_facts/index.php

⁶ For this research incubators are defined as organizations providing business consultancy network, shared office services, entrepreneurial synergy, enterprise development capabilities, and may or may not provide flexible affordable working space for nurturing startup companies.

incubators were surveyed. Business incubators were chosen from various databases, such as the database of Canadian Association of Business Incubators (CABI), and Information Technology Association of Canada (ITAC). Census sampling yielded a response rate of approximately 55%. Of the 56 business incubators that were part of the population, 31 incubators responded to our study. Of the remaining 25 who did not respond, 5 didn't return phone calls made to them. 10 incubator managers refused to participate in the study given their time and work constraints and the definition of incubators adopted for this study did not apply to another 10 incubators.

4.3 Questionnaire Design

The questionnaire was developed based on the literature review. A consolidated questionnaire composed of different measurement scales and questions was designed. Each related success factor was measured on a 1 to 5 Likert scale. The Likert scale was incorporated in the questionnaire as the respondents were asked to rate the importance of the factors relative to other factors. Further, the objective of the study was to establish those factors that have a relatively higher score.

The questionnaire consisted of eight sections. The first section captured background information on the incubator. The next section asked for information on the nature and scope of shared services provided by the incubator. Section three was related to facilities and location between the incubator and tenant firms. Section four and five were related to the funding and support and incubator

governance respectively. Section six was on tenant entry and exit criteria. Mentoring and networking was captured in section seven and finally section eight asked respondents to rate how successful they think their business incubator was. Table 4.1 provides a summary of the factors and the respective questions

Table 4.1: Summary of the Factors and the Respective Questions

Factor	Question #'s
Shared Services	2.1, 2.2, 2.3, 2.4, 2.5
Facilities and Location	3.1, 3.2, 3.4
Funding and Support	4.1, 4.2, 4.3
Incubator Governance	5.1
Tenant Entry and Exit Criteria	6.1, 6.2
Mentoring and Networking	7.1
Age of incubator	1.1
Size of incubator	1.4a
Measure of Success	8.2
Respondents perception of success	8.3

4.4 Pretest

The questionnaire was pre-tested with two incubators chosen from the sample population. The pre-test did not result in significant improvement of the research instrument. These two incubators are part of the 31 responses.

4.5 Data Analysis

As the objective of this study is to find the factors that affect the performance of business incubators, correlation analysis helped in explaining whether the independent variables correlated with the dependent variable or not.

CHAPTER 5 Discussion of Results

The results of the study, along with the discussion, are presented in this chapter. This chapter consists of five sections. Section 5.1 explains the descriptive statistics performed on the data. Section 5.2 deals with the internal consistency tests and section 5.3 discusses the measurement of the dependent variable of incubator's success. Section 5.4 deals with the correlation analysis and the hypotheses testing and section 5.5 explains the regression analysis performed on the data.

The objective of this research was to determine the factors that affect the performance (success) of business incubators in Canada. The analysis done to achieve the objective was quantitative, and was performed with the help of a statistical package, SPSS version 10.0.

The respondents were asked to rate their level of importance, on a five point Likert scale, on the sixty-four variables measuring success of business incubators. Based on similarity and the internal consistency test, these sixty-four variables were grouped into six broad categories or factors, as we call them throughout this research. For example, facilities and location factor included these three variables: flexibility in size, length of lease, and city centric location. Incubator governance included: experienced incubator manager, a board of directors, presence of advisory council, and concise program milestones with clear policies and procedures. These six factors are:

1. Shared Services

2. Facilities and Location
3. Funding and Support
4. Incubator Governance
5. Tenant Entry and Exit Criteria, and
6. Mentoring and Networking.

5.1 Descriptive Statistics

General observations are presented in the form of descriptive statistics. Descriptive statistics provide initial insights into the data so that a better description of the situation can be made and a better understanding can be created with the data set. Descriptive statistics are shown in the form of tables from 5.1 to 5.23.

As mentioned earlier, the number of respondents for this study is 31. Out of the 31 business incubators surveyed, 45.16% of incubators surveyed had assisted up to 20 tenants firms (Table 5.1). 25.80% incubators had assisted between 21-40 tenants firms. Average number of firms assisted by the incubators was 105.57 (Low = 2, and High = 1300). Total number of firms assisted by incubators is 3167.

Table 5.1: Number of Firms Assisted by the Incubator

No.	Number of firms assisted by the incubator	Number of responses	% Responses
1	1-20	14	45.16 %
2	21-40	8	25.80 %
3	61-100	1	3.2 %
4	101-120	1	3.2 %
5	141-160	1	3.2 %
6	181-200	2	6.45 %
7	341-360	1	3.2 %
8	381-400	1	3.2 %
9	1281-1300	1	3.2 %
10	N/A	1	3.2 %
TOTAL		31	100 %

For number of firms that subsequently went out of business, 58.06% of the incubators responded that between 1-9 tenant firms had gone out of business (Table 5.2). 3.2% of respondents indicated that between 170-179 tenant firms were out of business. The average number of tenant firms out of business per incubator is '11.76'. 25.80% of incubators surveyed responded as 'N/A' when asked as to the number of firms that went out of business. These incubators have either been established recently (less than a year), or are regional business

centers that provide services and assistance to tenant firms in pre-incubation stages (before they enter the incubators as tenant firms) and do not necessarily track their success or failure. Further, the total number of firms that went out of business is 368.

Table 5.2: Number of Firms Out of Business

No.	Number of firms that went out of business	Number of responses	% Responses
1	1-9	18	58.06 %
2	10-19	1	3.2 %
3	20-29	0	
4	30-39	1	3.2 %
5	40-49	1	3.2 %
6	50-59	0	
7	60-69	1	3.2 %
8	170-179	1	3.2 %
9	NA	8	25.80 %
TOTAL		31	100 %

Table 5.3 highlights the number of firms graduated by the surveyed incubators. As seen from the table, 41.93% of the incubators had graduated between 1-9 tenant firms. Another 19.35% responded as having graduated between 10-19 tenant firms. Also 4 respondents selected 'N/A' when asked the

number of firms they have graduated. These incubators answered N/A because they were established recently (less than a year old). The total number of firms graduated by the surveyed incubators is 847 and the average number of firms graduated by the incubators is “31”.

Table 5.3: Number of Tenant Firms Graduated

No.	Number of firms graduated	Number of responses	% Responses
1	1-9	13	41.93 %
2	10-19	6	19.35 %
3	20-29	1	3.2 %
4	30-39	1	3.2 %
5	40-49	0	
6	50-59	1	3.2 %
7	60-69	3	9.6 %
8	120-129	1	3.2 %
9	300-309	1	3.2 %
10	NA	4	12.90 %
TOTAL		31	100 %

Respondents were also asked to indicate whether they are currently assisting outreach clients (firms not located in the incubator facility, but still assisted by the incubator). Table 5.4 presents the results, showing the number of

outreach clients currently assisted by incubators. As seen from Table 5.4, 54.83% respondents indicated that they are currently assisting between 1-9 outreach clients. Another 16.12% respondents mentioned that between 10-19 firms are outreach clients. 6.45% respondents are currently assisting between 20-29 outreach clients and each of the 3.2% respondents are assisting outreach clients between 50-59, 60-69, 80-89, 170-179, and 700-709. Incubators with a mean of 41.21 outreach clients per incubator are assisting a total of 1195 outreach clients.

Table 5.4: Number of Outreach Clients Currently Assisted by Incubators.

No.	Number of outreach clients currently assisted by incubator	Number of responses	% Responses
1	1-9	17	54.83 %
2	10-19	5	16.12 %
3	20-29	2	6.45 %
4	50-59	1	3.2 %
5	60-69	1	3.2 %
6	80-89	1	3.2 %
7	170-179	1	3.2 %
8	700-709	1	3.2 %
9	N/A	2	6.45 %
TOTAL		31	100 %

Table 5.5 indicates that 48.4% responded YES and 51.6% responded NO when asked whether it is part of the incubator's business plan to break even.

Table 5.5: Incubators Plan to Break Even

No.	Category	Number of responses	% Responses
1	YES	15	48.4 %
2	NO	16	51.6 %

When asked to specify how many years it will take for the incubator to break even, 51.6% responded that it was not part of the incubator's plan to break even. This is consistent with the results seen in Table 5.5 – 16 respondents indicated that it is not part of their plan to break even.

Table 5.6 highlights the number of years taken to achieve break even by incubators. The majority of the respondents specified that it has taken/ will take 5 years to achieve break even.

Table 5.6: Number of Years to Achieve Break Even

No.	Number of years to achieve break even	Number of responses	% Responses
1	0 (Not part of plan to break even)	16	51.6 %
2	1	3	9.6 %
3	2	1	3.2 %
4	3	2	6.45 %

No.	Number of years to achieve break even	Number of responses	% Responses
5	4	1	3.2 %
6	5	5	16.12 %
7	6	1	3.2 %
8	7	1	3.2 %
9	N/A	1	3.2 %
TOTAL		31	100 %

Table 5.7 shows that 83.9% of the incubators are not for-profit and only 16.1% are for-profit incubators.

Table 5.7: Incubator is Designed to be For-Profit or Not For-Profit

No.	Category	Number of responses	% Responses
1	For-profit	5	16.1 %
2	Not for-profit	26	83.9 %

Table 5.8 shows that 54.8% of the incubators are located within the city and also near a university, research park, or research lab. Another 35.5% are located just within the city, while 6.45% are located 5-10 km from the city and near a university, research park, or research lab.

Table 5.8: Location of Business Incubator

No.	Location of business incubator	Number of responses	% Responses
1	Within the city	11	35.5 %
2	10-50 km from the city	1	3.2 %
3	Within the city and located near a university, research park, or research lab	17	54.8 %
4	5-10 km from the city and located near a university, research park, or research lab	2	6.45 %
TOTAL		31	100 %

The perception of how successful the respondents felt their business incubator is, was also captured. They were asked to indicate how successful they felt their business incubator is. All the respondents felt that their business incubator is successful with 41.9% respondents saying that their incubator is very successful (Table 5.9). Each of the 22.6% respondents indicated that their incubator is either successful or extremely successful and another 12.9% felt they incubator is somewhat successful. It is interesting to note that even those incubators that are less than year old believed their incubator to be successful.

The findings of this study somewhat match with a recent study concluded by Canadian Association of Business Incubators (CABI). They found that incubation in Canada is successful and most of the incubators they surveyed responded that their incubators are successful (Lussier, 2003).

Table 5.9: How Successful is the Business Incubator

No.	Success of business incubator	Number of responses	% Responses
1	Not at all successful	0	
2	Somewhat successful	4	12.9 %
3	Successful	7	22.6 %
4	Very successful	13	41.9 %
5	Extremely successful	7	22.6 %
TOTAL		31	100 %

5.1.1 Factor 1: Shared Services

5.1.1.1 Professional Business Services

As discussed earlier, entrepreneurs often lack a full array of business skills and the incubator shared services are designed to complement their limited range of business skills. Professional business services (Business Consulting Assistance) is often cited as an important criteria in incubators success (Allen, 1985; Allen and Rahman, 1985; and Smilor, 1987). When the respondents were asked about their perception about the importance of shared services, approximately 67% of them considered it to be very important to extremely important. Table 5.10 presents the results of the importance of professional business services related variables for incubator's success.

Table 5.10: Percentage, Mean and Standard Error for Professional Business Services Related Variables

No.	Variable Name	% Response						
		* Rating Scale					Mean	**S.E
		1	2	3	4	5		
1	Legal Counseling	16.0	20.0	20.0	24.0	20.0	3.12 (N=25)	0.28
2	Legal Representation	32.0	16.0	8.0	20.0	24.0	2.88*** (N=25)	0.33
3	Patent Assistance	8.0	16.0	20.0	32.0	24.0	3.48 (N=25)	0.25

No.	Variable Name	% Response						
		* Rating Scale					Mean	**S.E
		1	2	3	4	5		
4	Accounting	20.0	16.0	24.0	24.0	16.0	3.0 (N=25)	0.28
5	Computing and Information Services	24.0	16.0	20.0	16.0	24.0	3.0 (N=25)	0.31
6	Book-keeping	40.0	16.0	8.0	32.0	4.0	2.44 (N=25)	0.28
7	Introduction to Venture Capitalist	8.0	12.0	12.0	36.0	32.0	3.72 (N=25)	0.26

*1=Not at all important, 2=Somewhat important, 3=Important, 4=Very important, 5=Extremely important

** S.E=Standard Error

*** t-test not significant (Appendix III)

As can be seen from Table 5.10, introduction to venture capitalist is perceived by organizations to be the most important factor, as 32% of the respondents rated it as been extremely important for incubators success. The mean score of 3.72 indicates that, on average, incubators perceived introduction to venture capitalist as key to incubator's success.

The other variables, mainly legal representation, patent assistance, and computing and information services, were also perceived important by the respondents in impacting incubator's success. This can also be inferred from the

mean scores of 2.88, 3.48, and 3.0 respectively for legal representation, patent assistance, and computing and information services. The results reflect the view of the authors provided in the literature, where they have given emphasis on achieving success with legal representation, patent assistance, and computing and information services to tenant firms (Allen, 1985; Allen and Rahman, 1985; and Smilor, 1987).

Legal counseling and accounting are also considered important, with 20% and 16% respondents indicating that they are important for success for business incubators. The mean score for legal counseling and accounting are 3.12 and 3.0 respectively.

It is interesting to note that book-keeping did not score high on the list, as compared to the other factors discussed above. The reason for low emphasis placed on book-keeping, could be because tenant firms have to file their taxes anyway and they would prefer to do so independently, or through the services of qualified professionals. Moreover, since taxes are a sign of the credible financial health of a firm, qualified individuals or companies are required to attest the same. Thus, tenant companies prefer to keep their own book-keepers.

Further, as seen from Table 5.10, N=25 indicating that 6 cases were not selected for analysis, since the respondents ranked some of the above criteria as 'N/A'.

5.1.1.2 Financial Consulting Assistance

Variables such as business taxes, government grants and loans and government procurement process have been cited as important variables determining incubator's success. Respondents were asked to rank the importance of financial consulting assistance provided to tenant firms. Table 5.11 highlights the results of financial consulting assistance related variables for incubator's success.

Table 5.11: Percentage, Mean and Standard Error for Financial Consulting Assistance Related Variables

No.	Variable Name	% Response						
		* Rating Scale					Mean	**S.E
		1	2	3	4	5		
1	Business Taxes	13.6	36.4	31.8	18.2	0	2.55 (N=22)	0.21
2	Risk Management and Insurance	22.7	22.7	31.8	9.1	13.6	2.68*** (N=22)	0.28
3	Government Grants and Loans	4.5	0	18.2	31.8	45.5	4.14 (N=22)	0.22
4	Government Procurement Process	40.9	13.6	27.3	13.6	4.5	2.27 (N=22)	0.27

No.	Variable Name	% Response						
		* Rating Scale					Mean	**S.E
		1	2	3	4	5		
5	Government Contract Preparation	40.9	31.8	13.6	9.1	4.5	2.05 (N=22)	0.25
6	Equity and Debt Finance Arrangements	18.2	13.6	18.2	13.6	36.4	3.36 (N=22)	0.33
7	Export Development Assistance	13.6	31.8	27.3	22.7	4.5	2.73*** (N=22)	0.24

*1=Not at all important, 2=Somewhat important, 3=Important, 4=Very important, 5=Extremely important

** S.E=Standard Error

*** t-test not significant (Appendix III)

As seen from Table 5.11-45.5% of the respondents rated government grants and loans as extremely important financial consulting assistance provided to tenant firms. It was closely followed by equity and debt finance arrangements and risk and management insurance with 36.4% and 13.6% respectively. This can also be inferred from the mean score of 4.14, 3.36, and 2.68 respectively. These findings coincide with the view provided by other studies (Allen, 1985; Allen and Rahman, 1985; and Smilor, 1987).

40.9% of the respondents rated government procurement process and government contract preparation as not at all important. The findings indicate that

though access to and knowledge of government grants and loans is important, actually conducting business with government departments and ministries is not considered important at all. Since the majority of the tenant firms are for-profit ventures, they rely less on doing business with government.

Few (4.5%) respondents felt that providing export development assistance is an extremely important service. It was found that the majority prefer conducting business locally or nationally. They have little reliance on exporting and a limited knowledge of export related laws.

Finally, business taxes were not a top priority for the respondents, since tenant firms already have prior arrangements for assistance in preparing business taxes. Further, N=22 indicating that 9 cases were not part of the analysis as respondents ranked some of the above criteria as "N/A".

5.1.1.3 Management Assistance

A number of authors have cited management assistance services, provided by incubators, as important for their success (Allen, 1985; Allen and Rahman, 1985; Smilor, 1987). Table 5.12 shows the results of management assistance related variables for incubator's success.

Table 5.12: Percentage, Mean and Standard Error for Management Assistance Related Variables

No.	Variable Name	% Response						
		* Rating Scale					Mean	**S.E
		1	2	3	4	5		
1	Business Plan Preparation	11.5	0	7.7	23.1	57.7	4.15 (N=26)	0.26
2	Employee Relations	15.4	26.9	26.9	23.1	7.7	2.81*** (N=26)	0.24
3	Advertising and Marketing	11.5	7.7	23.1	38.5	19.2	3.46 (N=26)	0.24
4	Health and Benefit Packages	38.5	23.1	34.6	3.8	0	2.04 (N=26)	0.19

*1=Not at all important, 2=Somewhat important, 3=Important, 4=Very important, 5=Extremely important

** S.E=Standard Error

*** t-test not significant (Appendix III)

As can be seen from Table 5.12-57.7% of the respondents have ranked preparation of business plan as an extremely important variable for providing management assistance to tenant firms. This also has a mean score of 4.15. Advertising and marketing follows the preparation of a business plan with 19.2% of respondents indicating that it is extremely important for incubators to provide this service to tenant firms.

Few (7.7%) respondents felt that providing employee relations is an extremely important service. Instead it was up to the tenant firms to educate and motivate their own employees.

Finally, 38.5% of respondents considered it not at all important to provide health and benefit packages. This is because majority of the tenant firms have third party insurers and/or third party benefit providers, who tailor their packages to suit the needs of tenant firms and their employee's.

As seen from Table 5.12, only 26 cases were selected because 5 respondents ranked some of the above criteria as "N/A".

5.1.1.4 Shared Business Support Services

Shared business support service related variables are considered important in determining success of incubators (Allen, 1985). Table 5.13 highlights the results of shared business support services related variables for success of business incubators.

Table 5.13: Percentage, Mean and Standard Error for Shared Business Support Services Related Variables

No.	Variable Name	% Response						
		* Rating Scale					Mean	**S.E
		1	2	3	4	5		
1	Audio-Visual Equipment	20	10	30	20	20	3.10 (N=20)	0.32
2	Shipping and Receiving	20	15	25	20	20	3.05 (N=20)	0.32
3	Mail Service	10	10	30	25	25	3.45 (N=20)	0.29
4	Photocopy	15	10	25	25	25	3.35 (N=20)	0.31
5	Clerical Service	45	15	10	25	5	2.30 (N=20)	0.32
6	Receptionist	30	30	10	15	15	2.55 (N=20)	0.33
7	Off-Hours Answering Service	55	15	10	10	10	2.05 (N=20)	0.32

No.	Variable Name	% Response						
		* Rating Scale					Mean	**S.E
		1	2	3	4	5		
8	Filing	70	20	0	10	0	1.50 (N=20)	0.21
9	Word Processing	55	25	10	10	0	1.75 (N=20)	0.23
10	Typing	55	25	10	10	0	1.75 (N=20)	0.23

*1=Not at all important, 2=Somewhat important, 3=Important, 4=Very important, 5=Extremely important

** S.E=Standard Error

As seen from Table 5.13, 25% of the respondents rated mail service and photocopy as an extremely important service provided to tenant firms. The respective mean scores for mail service and photocopy are 3.45 and 3.35. These two variables are closely followed by audio-visual equipment and shipping and receiving, with 20% of respondents indicating that these are extremely important shared business support services provided by incubators. The mean scores for audio-visual equipment and shipping and receiving are 3.10 and 3.05 respectively.

70% of respondents have indicated filing, while 55% respondents have ranked off-hours answering service, word processing, and typing as not at all important. The means scores for filing, off-hours answering service, word processing, and typing are 1.5, 2.05, 1.75 and 1.75 respectively. These findings

indicate that tenant firms are experienced enough to satisfy their typing, word processing, and filing needs internally, without dependence on outside experts or resources. Also, since most of the tenant firms arrange for their own telephone services; off-hours answering service is not considered important, as telephone companies include such services as part of their overall package.

Few (15%) respondents have indicated receptionist as been extremely important whereas 45% of respondents ranked clerical service as not at all important. A possible explanation for the low results is that tenant firms are fledgling companies with less than 10 employees. Thus, they have limited need for a receptionist and clerical services.

Further, 11 cases were not selected because the respondents ranked some of the above criteria as "N/A".

5.1.1.5 Physical or Logistical Services

Table 5.14 presents the results of the importance of physical services for success of incubators.

Table 5.14: Percentage, Mean and Standard Error for Physical or Logistical Services Related Variables

No.	Variable Name	% Response						
		* Rating Scale						
		1	2	3	4	5	Mean	**S.E
1	Security Services	0	15	20	25	40	3.9 (N=20)	0.25
2	Computers	30	20	20	15	15	2.65 (N=20)	0.33
3	Conference Room	0	5	30	40	25	3.85 (N=20)	0.20
4	Custodial Services	5	20	35	20	20	3.30 (N=20)	0.26
5	Photocopier	10	15	25	25	25	3.40 (N=20)	0.29
6	Furniture and Equipment Rental	25	20	20	15	20	2.85*** (N=20)	0.33
7	Telephone Equipment	15	20	35	20	10	2.90 (N=20)	0.27
8	Library	10	15	30	10	25	3.15 (N=20)	0.30

*1=Not at all important, 2=Somewhat important, 3=Important, 4=Very important, 5=Extremely important

** S.E=Standard Error

*** t-test not significant (Appendix III)

As seen from Table 5.14-40% of respondents indicated that security services are an extremely important service provided by incubators to tenant firms. This is reflected in the mean score of 3.9. 25% of the respondents ranked conference room, photocopier, and library as an extremely important service for tenant firms. The mean scores for the variables conference room, photocopier, and library are 3.85, 3.4, and 3.15 respectively. These findings are consistent with previous studies (Allen, 1985).

20% of respondents have identified both custodial services and furniture and equipment rental as being extremely important.

Few respondents have marked computers and telephone equipment as extremely important (15% and 10% respectively). The low results for computers and telephone equipment is because computers are ubiquitous and telephone equipments are inexpensive now days. Hence, tenant firms generally own their computers and/or telephone equipments.

Further, as seen from Table 5.14, 11 cases were not selected for analysis as the respondents ranked some of the above criteria as "N/A".

5.1.2 Factor 2: Facilities and Location

Flexibility in the size and the length of a lease were noted to be crucial for incubator's success (Campbell and Allen, 1987; and Parke, 1995). When respondents were asked about their perception, approximately 68% of them considered this factor to be very important to extremely important. Table 5.15

presents the results of the importance of the facilities and location related variables for incubator's success.

Table 5.15: Percentage, Mean and Standard Error for Facilities and Location Related Variables

No.	Variable Name	% Response						
		* Rating Scale					Mean	**S.E
		1	2	3	4	5		
1	The option for deferred rental payments	33.33	33.33	9.5	14.3	9.5	2.33 (N=21)	0.30
2	The ability to provide short term leases	9.5	19.0	23.8	19.0	28.6	3.38 (N=21)	0.30
3	Ability to provide flexible space requirements	0	4.8	23.8	33.33	38.1	4.05 (N=21)	0.20
4	Time limit on occupancy	4.8	23.8	19.0	23.8	28.6	3.48 (N=21)	0.28
5	City centric location	19.0	9.5	28.6	23.8	19.0	3.14 (N=21)	0.30

*1=Not at all important, 2=Somewhat important, 3=Important, 4=Very important, 5=Extremely important

** S.E=Standard Error

As seen from Table 5.15, 38.1% of respondents considered the ability to provide flexible space requirements to be extremely important. This is reflected in the mean score of 4.05. The ability to provide flexible space is followed by the ability to provide short-term leases and time limit on occupancy. 28.6% of the respondents indicated that both these variables are extremely important for incubator's success. The mean scores for the above two variables are 3.38 and 3.48 respectively.

As seen from Table 5.8, 54.8% of the respondents had indicated that their incubators are located within the city and near a university, research park, or research lab. Table 5.15 also indicates that 19% of the respondents agreed that city centric location is extremely important for an incubator's success.

Finally, few respondents (9.5%) felt that the option for deferred rental payments is extremely important. This may be because of the fact that the incubator already offers flexible space requirements and provides short-term leases, thereby offsetting the need for deferred rental payments.

Further, 10 cases were not selected for the analysis because the respondents ranked some of the above criteria as "N/A".

5.1.3 Factor 3: Funding and Support

Incubator funding and support largely depends on whether the incubator is privately or publicly sponsored, and the organizational type of the incubator (Allen, 1985; Allen, 1988; and Allen and Rahman, 1987). When the respondents were asked about their perception of the importance of funding and support for

an incubator's success, 78% of them considered it to be very important to extremely important. Table 5.16 and 5.17 highlights the results of funding and support variables for an incubator's success.

Table 5.16: Incubator Financial Arrangement

No.	Type of incubator sponsorship	Number of responses	% Responses
1	Privately sponsored	2	6.5 %
2	Publicly sponsored	24	77.4 %
3	Both privately and publicly sponsored	5	16.1 %

Table 5.17: Incubator Organizational Arrangement

No.	Type of incubator organizational arrangement	Number of responses	% Responses
1	For-profit property development corporation	2	6.5 %
2	Non-profit development corporation	17	54.8 %
3	Academic incubator	8	25.8 %
4	For-profit seed capital incubator	2	6.5 %
5	Virtual incubator	3	9.7 %
6	Others	6	19.35 %

As seen from Table 5.16, when asked about the financial arrangement of the incubator, publicly sponsored incubators accounted for 77.4% of the

responses. This finding is consistent with studies, which indicate that the majority of incubators are publicly sponsored (NBIA, 1985). Further, as seen from Table 5.17, 54.8% incubators are non-profit development corporations, followed by 25.8% that are academic incubators. Since the majority of incubators are publicly sponsored, the objective or organizational arrangement of these incubators is not-for profit or non-profit.

It is also worth noting the significant number of 'other incubators' that have sprung up within the last decade. Other incubators include: innovation, kitchen, life sciences, non-government lab, scientific and technology incubators.

5.1.4 Factor 4: Incubator Governance

From the tenant firms' point of view, having governance structure for incubators is important (Allen, 1985; and Smilor, 1987). When the respondents were asked about their perception of the importance of incubator governance for incubator's success, only 45% of them considered it to be very important to extremely important. The results of incubator governance related variables for incubator's success are highlighted in Table 5.18.

Table 5.18: Percentage, Mean and Standard Error for Incubator Governance Related Variables

No.	Variable Name	% Response						
		* Rating Scale					Mean	**S.E
		1	2	3	4	5		
1	An experienced incubator manager	3.7	3.7	11.1	25.9	55.6	4.26 (N=27)	0.20
2	A key board of directors	11.1	7.4	11.1	33.3	37.0	3.78 (N=27)	0.26
3	A noted advisory council	14.8	11.1	29.6	14.8	29.6	3.33 (N=27)	0.27
4	Concise program milestones with clear policies and procedures	0	7.4	18.5	29.6	44.4	4.11 (N=27)	0.19

*1=Not at all important, 2=Somewhat important, 3=Important, 4=Very important, 5=Extremely important

** S.E=Standard Error

As shown above, 55.6% of the respondents believe it is extremely important to have an experienced incubator manager. This is reflected in the mean score of 4.26 for this variable. Further, 44.4% of the respondents feel that having concise program milestones, with clear policies and procedures, is

extremely important to ensure the tenant firm's progress and incubator's success. The mean score for concise program milestones with clear policies and procedures is 4.11.

When the respondents were asked to indicate whether a key board of directors, and a noted advisory council is important, 37% and 29.6% respondents respectively indicated that these two variables are extremely important with mean scores of 3.78 and 3.33 respectively.

Finally, N=27 indicates that 4 cases were not selected because the respondents ranked some of the above criteria as "N/A".

5.1.5 Factor 5: Tenant Entry and Exit Criteria

For an incubator to be successful, it must have both an entry criteria, to select tenant firms, and an exit criteria, to ensure that tenant firms have been nurtured and able to operate successfully outside of the incubator (Allen, 1985; and Smilor, 1987). When the respondents were asked about their perception of the importance of tenant entry and exit criteria, 60% of them considered it to be very important to extremely important. The results of tenant entry and exit criteria related variables for an incubator's success are presented in Table 5.19.

Table 5.19: Percentage, Mean and Standard Error for Tenant Entry and Exit Criteria Related Variables

No.	Variable Name	% Response						
		* Rating Scale					Mean	**S.E
		1	2	3	4	5		
1	Ability to create jobs	10.5	15.8	15.8	42.1	15.8	3.37 (N=19)	0.29
2	Ability to present written business plan	0	15.8	15.8	52.6	15.8	3.68 (N=19)	0.22
3	Have a unique opportunity	5.3	15.8	26.3	26.3	26.3	3.53 (N=19)	0.28
4	Ability of the firm to be owned locally	26.3	26.3	31.6	10.5	5.3	2.42 (N=19)	0.27
5	Advanced technology related firm	21.1	0	21.1	15.8	42.1	3.58 (N=19)	0.36
6	Ability of firm to present its space needs	21.1	31.6	21.1	21.1	5.3	2.58 (N=19)	0.28
7	Complementary to existing firms	26.3	36.8	15.8	21.1	0	2.32 (N=19)	0.25
8	New start-up firm	15.8	21.1	31.6	15.8	15.8	2.95*** (N=19)	0.30
9	Age of firm	42.1	21.1	10.5	15.8	10.5	2.32 (N=19)	0.33
10	Affiliated with university	42.1	47.4	10.5	0	0	1.68 (N=19)	0.15

No.	Variable Name	% Response						
		* Rating Scale						
		1	2	3	4	5	Mean	**S.E
11	Be able to pay operating expenses	0	0	21.1	36.8	42.1	4.21 (N=19)	0.18
12	Companies can only rent units for a fixed period of time	15.8	21.1	26.3	26.3	10.5	2.95 (N=19)	0.29
13	Companies leave when they need more space to expand	10.5	36.8	36.8	10.5	5.3	2.63 (N=19)	0.23

*1=Not at all important, 2=Somewhat important, 3=Important, 4=Very important, 5=Extremely important

** S.E=Standard Error

*** t-test not significant (Appendix III)

As seen from Table 5.19, 42.1% of the respondents ranked the ability to pay operating expenses and advanced technology related firm as the most important factors for an incubator's success. The means scores for the above two variables are 4.21 and 3.58 respectively; 26.3% of the respondents felt that having a unique opportunity played an important role in tenant entry criteria. Further, the ability to create jobs, the ability to present a written business plan, and new start-up are all considered extremely important entry criteria by 15.8%

of the respondents. Thus, as a number of variables have been identified to be extremely important, it suggests that developing effective tenant entry criteria is not an easy task for business incubators.

Two other variables that ranked as extremely important for 10.5% of the respondents are: age of firm, and the ability of tenant firms to rent units (space) for a fixed period of time.

Few (5.3%) respondents see the ability of the tenant firm to be locally owned, to present its space needs, and for the tenant firm to leave when they need more space to expand, as extremely important tenant entry and exit criteria. A mean score of 2.5 was observed in all these cases.

Finally, 42.1% of respondents indicated that affiliation with an university is not at all important when screening tenant firms for admission into the incubator facility. This suggests that as most of the incubators are located near a university, research park, or research lab, a formal association with a university is not required. Further, complementary to existing firms is also not an extremely important criterion for tenant selection.

12 cases were not selected for analysis as the respondents ranked some of the above criteria as "N/A".

Time limit on a tenant's occupancy of a facility is considered an important exit criterion (Allen, 1985). When asked the maximum length of time tenants can occupy incubator units, 25.8% of the respondents indicated 36 months (3 years), as seen in Table 5.20. 22.5% respondents indicated 60 months (5 years) as the

next common time limit on occupancy. Following this, 6.45% respondents ranked 18 months (1.5 years) time limit on occupancy. Further, 3.2% respondents believed that 6 months, 24 months (2 years), and 48 months (4 years) as maximum time limit to tenants occupancy. Additionally, 11 respondents indicated that they don't have a time limit to occupancy and tenant firms can occupy space at the facility for as long as they desire.

Table 5.20: Maximum Time Limit to Tenants Occupancy

No.	Maximum time limit to occupancy in months	Number of responses	% Responses
1	6	1	3.2 %
2	18	2	6.45 %
3	24	1	3.2 %
4	36	8	25.8 %
5	48	1	3.2 %
6	60	7	22.5 %
7	N/A	11	35.48 %
TOTAL		31	100 %

5.1.6 Factor 6: Mentoring and Networking

When the respondents were asked about their perception of the importance of mentoring and networking, 90% of them considered it to be very important to extremely important for an incubators success.

As seen from Table 5.21, 53.3% of the respondents have indicated entrepreneurial network as an extremely important variable for an incubator's success. This is referred in the mean score of 4.33 for entrepreneurial network.

43.3% of the respondents feel that affiliation with key institutions, both public and private, are extremely important for an incubator's success. The mean score for this variable is 3.9.

33.33% and 30% of respondents ranked entrepreneurial education and community support respectively, as extremely important variables; followed by 16.7% of respondents indicating that ties to a university are also extremely important for an incubator's success.

Table 5.21: Percentage, Mean and Standard Error for Mentoring and Networking Related Variables

No.	Variable Name	% Response						
		* Rating Scale					Mean	**S.E
		1	2	3	4	5		
1	Entrepreneurial Network	0	3.3	13.3	30.0	53.3	4.33 (N=30)	0.15
2	Entrepreneurial Education	0	10.0	26.7	30.0	33.33	3.87 (N=30)	0.18
3	Tie to a University	16.7	20.0	36.7	10.0	16.7	2.90*** (N=30)	0.24
4	Community Support	6.7	13.1	23.3	26.7	30.0	3.60 (N=30)	0.23

No.	Variable Name	% Response						
		* Rating Scale						
		1	2	3	4	5	Mean	**S.E
5	Affiliation with key institutions, both public and private	3.3	10.0	23.3	20.0	43.3	3.9 (N=30)	0.22

*1=Not at all important, 2=Somewhat important, 3=Important, 4=Very important, 5=Extremely important

** S.E=Standard Error

*** t-test not significant (Appendix III)

5.1.7 Age and Size of Incubator

Table 5.22 presents the results of the age and the size of an incubator. The mean age of the incubator was 8.23 years. Thus, for this study, incubators less than 8 years old will be considered as younger incubators, whereas incubators greater than 8 years old will be considered as older incubators. This results in 18 younger and 12 older incubators.

The number of tenant firms currently assisted by the incubator will be treated as proxy for the size of the incubator variable. As the number of tenant firms assisted by incubators grows, so does the size of incubator, in order to accommodate these firms and their growing needs. Further, these larger facilities have more tenants, thereby producing more jobs or graduates (Allen and McCluskey, 1990). Table 5.22 highlights the tenant firms currently being assisted

by the incubators. The surveyed incubators are currently assisting a total of 344 tenant firms. This translates to approximately 12 tenant firms per incubator.

Further, from Table 5.22, for younger incubators, the number of tenant firms currently assisted by incubators varies between 1-18, and for older incubators the number of tenant firms currently assisted by incubators varies between 13-65. Thus, in general, as the age of an incubator increases so does the size of an incubator.

Table 5.22: Age and Size of Incubator

No.	Number of years since the incubator was established	Number of responses	Number of tenant firms currently assisted by incubator
1	1	4	1, 6, 7, and 0
2	2	2	11 and 18
3	3	1	0
4	4	2	0 and 2
5	5	3	3, 10, and 17
6	6	4	0,5,8
7	8	2	0 and 65
8	9	2	7 and 16
9	11	3	5, 10, and 14
10	14	1	22
11	15	1	4
12	17	2	13 and 28
13	18	1	5
14	19	1	20
15	22	1	45

Respondents were asked to rank the importance of the following independent variables affecting the performance of incubators. Table 5.23 summarizes the results of the respondent's perceptions of factors affecting the performance of incubators. The results were analyzed for both, younger and older incubators. As seen, both younger and older incubators indicated that, mentoring and networking factor was perceived to be the extremely important, (mean for younger incubators is 4.50 and mean for older incubators is 4.62), followed by funding and support (mean for younger incubators is 4.29 and mean for older incubators is 4.15). Younger incubators placed more emphasis on tenant entry and exit criteria (mean 4.07), as compared to facilities and location (mean 3.92), for older incubators.

Younger incubators ranked facilities and location (mean 3.93), whereas older incubators perceived that, tenant entry and exit criteria, and shared services, each with a mean of 3.77, were very important factors affecting the performance of incubators. These are followed by incubator governance (mean 3.64) and shared services (mean 3.50), for younger incubators. Finally, for older incubators, incubator governance (mean 3.62), was ranked as a very important factor affecting the performance of incubators.

Table 5.23: Summary of Factors Affecting the Performance of Incubators

No.	Factor	Mean for Younger Incubators	Mean for Older Incubators	Overall Mean
1	Shared Services	3.50	3.77	3.64
2	Facilities and Location	3.93	3.92	3.89
3	Funding and Support	4.29	4.15	4.18
4	Incubator Governance	3.64	3.62	3.57
5	Tenant Entry and Exit Criteria	4.07	3.77	3.89
6	Mentoring and Networking	4.50	4.62	4.50

5.2 Independent Variables

The internal consistency⁷ test performed for this research was Cronbach's alpha. This test measures the internal consistency of the survey instrument; where subjects respond to questions on a scale (e.g. 1-5 for this research). Cronbach's alpha can range between 0 and 1.

A Cronbach's alpha of 0.60 and above indicates that the survey instrument is internally consistent (Stevens, 1996). Table 5.24 shows that all 6 factors (independent variables) have a Cronbach's alpha over 0.6, hence the survey instrument can be considered as internally consistent.

⁷ Internal consistency is an index of the extent to which sets of items on a test measure the same trait or characteristic (Stevens, 1996).

Table 5.24: Internal Consistency Test

Factor	Cronbach's alpha
1. Shared Services	0.8804
2. Facilities and Location	0.8339
3. Funding and Support	0.6361
4. Incubator Governance	0.7022
5. Tenant Entry and Exit Criteria	0.8154
6. Mentoring and Networking	0.6623

5.3 Dependent Variable: Incubator Success

The dependent variable for the study is incubator success. We have studied the influence of the independent variable on this dependent variable. For the purpose of this thesis, three measures were selected, namely:

- To contribute to local job creation
- To produce successful graduates,
- To achieve financial break-even.

A consolidated success measure was obtained by taking the average of the above three measures. A Cronbach's alpha of 0.625 shows that this measure is internally consistent. This consolidated success measure (including the three measures outlined above), was used, as the dependent variable for further analysis of data.

5.4 Hypotheses Testing

Given the exploratory nature of the study, five hypotheses (H1-H5) were tested at both 0.01 and 0.05 level of significance. The variables identified in the preceding analysis (except for age of facility and size of facility) were grouped into six factors; and a correlation analysis⁸ was performed to study the strength of the relationship between each of the six factors and the incubator's success (dependent variable). Further, the age and the size of the incubator were found to be highly correlated (Pearson correlation of 0.401) with a significance level of 0.05. Thus age and size of incubator shall be treated as one moderating variable called 'age of incubator', for the purpose of testing this hypothesis.

H1: The greater the focus on shared services provided by incubators, the more likely the incubator's success for older facilities.

By splitting the cases into younger (less than 8 years old) and older (greater than 8 years old), the hypothesis was not rejected at 0.01 level of significance, i.e. the results support this hypothesis. A correlation coefficient of 0.831 (Table 1 - Appendix IV) suggests that the older incubators, which focus on shared services, are more likely to achieve success.

Further, when the above hypothesis was tested for younger incubators, the hypothesis was rejected at 0.05 level of significance, i.e. the data does not

⁸ Correlation analysis is a technique to determine to what degree one variable is related to another or the nature of association between two variables (Stevens, 1996).

support this hypothesis. A correlation coefficient of 0.077 (Table 2 - Appendix IV) suggests that for younger incubators, a greater focus on shared services does not necessarily mean the more success for the incubators.

H2: The better the facilities and location provided by incubators, the more likely the incubator success.

The hypothesis was rejected at 0.05 level of significance, i.e. the data does not support this hypothesis. A correlation coefficient of 0.175 (Table 3 - Appendix IV) suggests that a city-centric location, and flexibility in the size and the length of the lease provided, will not necessarily increase the probability of success. Further explanation is required to understand whether a city-centric location, and flexibility in the size and length of a lease is a prerequisite for incubator's success, or there are other factors that influence the relationship between facilities and location and incubator success.

However, when the above hypothesis was tested for older incubators, the hypothesis was not rejected at the 0.05 level of significance, i.e. the results support the hypothesis. A correlation coefficient of 0.611 (Table 1 - Appendix IV) suggests that for older incubators, a city-centric location, and greater flexibility in the size and the length of the lease, means a higher chance of incubator success. Similarly, the hypothesis was rejected at 0.05 level of significance for younger incubators, i.e. the data does not support the hypothesis. A correlation coefficient of - 0.130 (Table 2 - Appendix IV) suggests that for younger

incubators, a city-centric location, and greater flexibility in size and length of lease does not necessarily mean a higher chance of success.

H3: The better the incubator governance, the more likely the incubator success.

The hypothesis was rejected at 0.05 level of significance, i.e. the data does not support this hypothesis. A correlation coefficient of 0.251 (Table 3 - Appendix IV) suggests that an experienced incubator manager, a key board of directors, a noted advisory council, and concise program milestones with clear policies and procedures, will not necessarily increase the incubators chance of success.

However, on further analysis it was found that an experienced incubator manager, a key board of directors, noted advisory council, and concise program milestones with clear policies and procedures are highly correlated (Table 4 - Appendix IV). Hence, factor analysis was performed revealing two components (Appendix V): an experienced incubator manager, (from henceforth termed 'Operational Direction'), a key board of directors, a noted advisory council, and clear program milestones with clear policies and procedures, from henceforth termed 'Strategic Direction'. Following the factor analysis, incubator governance hypothesis was split into the following two hypotheses:

H3a: The more operational direction (experienced incubator manager), the more likely the incubator succeeds.

The hypothesis was not rejected at the 0.01 level of significance, i.e. the results supports this hypothesis. A correlation coefficient of 0.419 (Table 5 - Appendix IV) suggests that incubators with more operational direction are more likely to succeed.

H3b: Better strategic direction, greater the incubator success.

The hypothesis was rejected at the 0.05 level of significance, i.e. the data does not support this hypothesis. A correlation coefficient of 0.141 (Table 6 - Appendix IV) suggests that a more strategic direction does not necessarily mean greater chances of incubator success.

H4: The stronger the enforcement of tenant entry and exit criteria, the higher the probability of incubator success for older facilities.

The hypothesis was not rejected at 0.01 level of significance, i.e. the results supports this hypothesis. A correlation coefficient of 0.681 (Table 1 - Appendix IV) suggests, that for incubators over 8 years old, a stronger enforcement of tenant entry and exit criteria, will lead to greater incubator success.

Further, for younger incubators, the hypothesis was rejected at 0.05 level of significance. A correlation coefficient of -0.23 (Table 2 - Appendix IV) suggest

that a stronger enforcement of tenant entry and exit criteria for younger incubators, does not necessarily mean more the incubator success.

H5: The greater opportunities for mentoring and networking among the tenant firms, the more likely the incubator success, for older facilities.

The hypothesis was rejected at 0.05 level of significance, i.e. the data does not support the hypothesis. A correlation coefficient of 0.172 (Table 1 - Appendix IV) suggests that for older incubators, better mentoring and networking opportunities among tenant firms, will not necessarily mean greater incubator success.

The above hypothesis was rejected at 0.05 level of significance for younger incubators too. A correlation coefficient of -0.136 (Table 2 - Appendix IV) suggests that the greater mentoring and networking opportunities among tenant firms of younger incubators, will not lead to a higher probability of success.

CHAPTER 6 Findings, Conclusions, Benefits and Limitations of the Study

This chapter includes the findings and conclusion of the study, followed by limitations, benefits, and scope for future research.

6.1 Findings and Conclusions

The main objective of the study was to ascertain the factors that affect the performance (success) of business incubators. This study has been able to achieve this goal. The sample size for the study was limited and was restricted to Canadian business incubators. However, enough information was gathered to be able to successfully examine success factors for incubator's success.

The findings of the study can be classified into two categories. First of all, overall picture of business incubators in Canada was captured. An analysis of the responses indicates that the surveyed incubators have assisted an average of 105 firms each, and a total of 3167 firms. Of these firms, 847 firms have graduated from the incubators (the average number of firms graduated from incubators is 31), indicating a success rate of 26.7%. The majority of these incubators are located within cities and near a university, research park, or research lab; indicating that incubator management realizes the need to supplement entrepreneurs lack of business acumen by providing access to a wider range of facilities, individuals and opportunities within their field. A large number of these incubators (24) are publicly sponsored, with 17 of them being

non-profit development corporations. 51.6% of the respondents indicated that it is not part of their business plan to break even- i.e. a portion of their revenues will come from public agencies and subsidies provided by the government. Thus, the results show the view of mainly publicly sponsored non-profit development incubators.

Approximately 63% of the respondents feel that their incubators are either very or extremely successful. This finding is consistent with the results obtained, in chapter 5, when the respondents were asked about the individual criterion for measuring success, the dependent variable.

When respondents were asked about their perception of the importance of each of the 6 factors, 60 to 90% of the respondents indicated that, apart from incubator governance, these factors are either very or extremely important. Only 45% of respondents indicated that incubator governance is either very or extremely important. This indicates that the variables identified through the literature, and grouped into 6 factors, were important for incubator's success. However, when the respondents were asked to individually rank the importance of all the various variables that make up the broad category of 6 factors, the results were not encouraging. For example, flexibility in the size and the length of lease was considered important by almost 68% of the respondents for incubator's success; but when it came to how they perceived the option for deferred rental payments for incubator's success, a mean score of 2.33 suggests that they were not as positive about it.

Further examination of 'incubator governance' factor revealed high correlations amongst the variables that make up this factor. These include: experienced incubator manager, key board of directors, noted advisory council, and concise program milestone with clear policies and procedures. Thus factor analysis was performed, presenting 2 components; operational direction and strategic direction. Hence, the incubator governance hypothesis (H3) was split into two hypotheses, H3a and H3b.

The hypotheses were then tested to determine which factors influence incubator's success. The 7 hypotheses tested, 3 were accepted and 4 were rejected. Shared services, incubator governance (H3a) and enforcement of tenant entry and exit criteria positively influenced incubator's success.

As seen from the descriptive statistics, incubators are less than 8 years old are younger incubators, and incubators more than 8 years old are older incubators. Further, from Table 2.3, incubators mature over time while evolving through three stages. Younger incubators pass through start-up and business development phases, whereas, older incubators progress from business development phase to maturity. Younger incubators (incubators in the start-up phase) place more emphasis on establishing the physical facility, and admitting tenant firms that have the ability to pay rent. Further the type of shared services provided is limited, in terms of the expertise and the level of support provided, as the incubators themselves are in the start-up phase. Hence for tenant firms, even though the shared services provided, complements their skills, yet it is limited in terms of developing and growing the tenant firms due to lack of well developed

incubator advisory functions and formal networks. Thus, for younger incubators, providing shared services, does not necessarily mean more likely the success for the business incubator.

On the other hand, older incubators have well functioning and responsive business advisory arrangements. The incubator manager is more involved with the activities of the tenant firms, and is focused in nurturing firms and helping them grow through job creation. The ability of the tenant firm to succeed increases, because of the type and level of shared services provided and the high degree of management support provided to them. This is possible as the incubator itself moves from a real-estate focus to business development focus, which happens over time as the incubator grows and matures. Thus as the incubator grows and matures, so does the quality and type of shared services provided. Hence older incubators positively affect performance of incubators.

The same is true for tenant entry and exit criteria. As the incubator evolves from start-up to maturity phase, so does their objective. During start-up stage, emphasis is placed on the ability of the tenant firm to pay rent. With time, as the incubator generates sufficient operating income from rental payments, focus shifts towards providing qualified advisory functions and networks for tenant firms. Finally, during the maturity phase, the objective is to admit tenant firms with growth potential and the ability to be a viable enterprise. Thus, the quality and quantity of development outcomes (e.g. in terms of firms graduated) increases. Hence, tenant entry and exit criteria positively affect the performance of incubators, especially for older incubators.

For incubator governance it is worth noting that operational direction positively affected the performance of incubators. As seen from factor analysis; experienced incubator manager and key board of directors; noted advisory council and concise program milestone with clear policies and procedures, were the 2 components extracted. A key role of an incubator manager is not only to assist the tenant firms on a daily basis, but also to communicate to entrepreneurs 'program milestones' by which the tenant company's performance will be measured. They also act as a bridge, to introduce entrepreneurs to skilled individuals/organizations. Thus, managing a relationship with tenant firms and entities involved in setting incubator's policy requires experience and prior knowledge of running incubators. This is where an incubator manager's experience plays a key role; in operationalizing incubator policies determined by the board of directors, and effectively linking entrepreneurs to noted advisory council. Hence, the more experienced the incubator manager (operational experience), the higher the incubators chance of success.

Strategic direction did not seem to influence incubator's success, because the board of directors and advisory council, are involved in policy matters and not the day-to-day operations of the incubators. Their involvement is in the form of financial support and serving on board of directors of tenant companies, to help them with policy decisions. Majority of the time they are passively involved with the tenant firms and the incubator operations. It is the incubator manager who maintains the delicate relationship with tenant firms and the incubator's advisory

functions. Hence, strategic direction does not necessarily influence incubator's success.

Two interesting findings of this study, were that facilities and location, and opportunities for mentoring and networking, did not seem to influence incubator's success. Incubators in the start-up phase tend to place emphasis on covering their operating expenses through tenant firm's ability to pay rent. Since these incubators are trying to be established, they do offer below market rents but don't offer flexibility in the size and the length of lease. Thus, facilities and location did not influence incubator's success. However, for older incubators, facilities and location positively affect incubator's success. This can be interpreted by the argument that incubators in a property development phase tend to place emphasis on a tenant firm's ability to pay rent, rather than to grow. Thus, as the incubator moves from a property development to business development phase, its primary objective changes; from capturing real estate appreciation to nurturing young firms (Table 2.2). This provides the tenant firms with flexibility in the length and the size of a lease to accommodate their varying needs. This transformation to business development incubator happens over time, as the incubator evolves from startup to maturity (Table 2.3). Thus, for older incubators (mature), flexibility in the size and the length of a lease positively influences incubators success.

One interpretation for mentoring and networking opportunities not influencing incubator's success is that entrepreneurs with specialized knowledge hope to leverage complementary skills provided by incubators, defined as organizations providing a range of services to tenant firms. Further, management

problems and under-capitalization are frequently cited as reasons for small business failures. Thus, entrepreneurs try to minimize the failure risk associated with small firms, by being part of incubator facilities that provide shared services and access to a wide range of qualified resources, from various functional areas. Affiliation with key public and private institutions, entrepreneurial networks and education and ties to a university, are some of the ways that entrepreneurs can leverage qualified resources. Hence, mentoring and networking are implied for successfully running an incubator irrespective of whether it is a recent or mature incubator.

The study also defined a measure of success for incubators. As mentioned earlier, success measure should include community level impacts (number of jobs created) and incubator level impact (measured using information collected on incubator's financial performance, number of tenant firms graduated, survival rate of incubators, and services provided). A consolidated incubator success measure was designed for the purpose of this study.

Researchers as well as practitioners can use the results obtained by this study, to explore further the incubator's success factors constructs, as well as the measure of incubator success. Modifications to the questionnaire to allow future research are to be expected.

6.2 Benefits of the study

This study provides a limited basis for the generalizations of results as only 31 incubators were surveyed. The small sample size of this study (31), restricted the scope for conducting a rigorous statistical analysis, and thus the results obtained using regression analysis should be treated with caution.

There have been a limited number of studies conducted to examine the various success factors and performance (success) of business incubators in Canada. The results of the study will help in understanding the affect of these factors on the performance of business incubators. The study is first of its kind to empirically test these factors within the context of Canadian business incubators. Incubators can use the study as a tool to examine their current strategies and accordingly invest resources in developing the success factors.

6.3 Limitations of the study

This research study has several limitations. The selection of independent variables and the definition of success factors may be biased, as they are based on literature and practitioners viewpoint. Since some success factors evolve over time a long period than other, their significance may not be fully represented in this study. Some extraneous factors may have affected the respondent's responses such as partnerships with particular agencies and institutions. The limited sample size may make it difficult to validate the model.

6.4 Scope for future research

An interesting point to come out of the study was that flexibility in size and length of lease and opportunities for mentoring and networking did not directly influence an incubator's success. A more detailed study on this aspect would be an interesting topic for future research. A study with a larger sample size is required in order to test the relationship among the various success factors and how they influence an incubator's success.

A further study with virtual incubators should be conducted in order to examine the difference in success models between the two kinds of incubators. Analysis of incubator success measure may also be included in this study.

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Appendix I

Cover Letter

Success Factors for Business Incubators: An Empirical Study

Dear Participant:

I am a Master's student at Carleton University's Sprott School of Business completing my Masters of Management Studies (M.M.S.) program. I am currently working on my thesis, under the supervision of my supervisor Dr. Uma Kumar, on success factors for business incubators. I am contacting you in the hopes that you will take a few minutes of your time to help me with my research. This study is intended to satisfy the requirements of a master's thesis as part of the M.M.S. program.

I am studying the concept of business incubators, which have recently emerged as useful instruments in economic development. A number of factors have been identified that contribute to the success of business incubators. The focus of this study is to identify the various factors that lead to business incubator's success and then empirically test these factors. Thus, I am writing to ask if you could tell me how important certain factors are in achieving incubator success.

Completing the questionnaire shall not take more than 20-25 minutes. Your participation is entirely **voluntary**. The study is not expected to involve any economic, social, financial, or health related risks. But all reasonable safeguards have been taken to minimize the potential risks. **Your choice to participate in this study will in no way affect your work.**

Please be assured that your responses will be held in confidence by the researcher. Firewall and encryption software will be used to ensure that the data transferred via the Internet is secure and encrypted. However, safely transferring data via the Internet cannot be guaranteed. The data will be stored till the end of fall of 2004 in a locker in my supervisor's room at Eric Sprott School of Business. All the responses will be coded and aggregated and only summarized results will be presented in the final report document. The respondent and the organization will not be identified in any part of the study.

You have the right to withdraw from the research at any given time up until the survey is completed and sent back to the researcher. Once the researcher receives the completed survey, and should you decide to withdraw, it will be difficult to identify the respondent because the surveys cannot be linked back to the respondents.

If you have concerns or questions, please feel free to contact the persons listed below.

Thank you for your time and your help.

Professor and Supervisor	Director, Ethics Committee	Researcher
Dr. Uma Kumar	Prof. Klaus Pohle	Mr. Sameer Verma
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Appendix II

Questionnaire

Incubator Managers Study

1. Background Information on Business Incubators

1.1 What year was the incubator established in?

1.2 How many businesses has the incubator assisted since it started operating?

1.3 How many of these firms subsequently went out of business?

1.4 How many businesses have 'graduated' since the incubator started operations?

1.5 How many tenant businesses is the incubator currently assisting? Please distinguish between (a) tenant firms occupying units and (b) other ('outreach') clients not located in the facility

Tenant companies	<input type="text"/>	Other ('outreach') clients	<input type="text"/>
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1.6 Is it part of incubator's business plan to break even, i.e. generate sufficient income from non-public sources (e.g. payments from banks, private sector organizations and universities, investment income, etc) to cover operating costs? If yes, how long has it taken/will take for the incubator to reach this point?

No – not part of business plan	<input type="text"/>	Yes	<input type="text"/>	Years	<input type="text"/>
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2. Nature and Scope of Shared Services Provided by Incubators

This section of the questionnaire examines the type of incubator services available to companies and the way in which these services are priced

2.1 The following criteria relate to the ability of the incubator to provide Professional Business

Services. (Please indicate how important are the following criteria in your incubator on a 1-5 scale where (1) means, "not at all important" and (5) is "extremely important". Select "N/A" if do not know or never used.)

Also tick the appropriate boxes and indicate whether the services are provided (a) in house or by (b) an external staff

	1 Not at all important	2 Somewhat important	3 Important	4 Very important	5 Extremely important	N/A	In House	External staff
Legal Counseling	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>	<input type="text" value="N/A"/>	☐	☐
Legal Representation	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>	<input type="text" value="N/A"/>	☐	☐
Patent Assistance	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>	<input type="text" value="N/A"/>	☐	☐
Accounting	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>	<input type="text" value="N/A"/>	☐	☐
Computing and Information Services	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>	<input type="text" value="N/A"/>	☐	☐
Book-keeping	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>	<input type="text" value="N/A"/>	☐	☐
Introduction to Venture Capitalist	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>	<input type="text" value="N/A"/>	☐	☐

2.2 The following criteria relate to the ability of the incubator to provide Financial Consulting

Assistance. (Please indicate how important are the following criteria in your incubator on a 1-5 scale where (1) means, "not at all important" and (5) is "extremely important". Select "N/A" if do not know or never used.)

Also tick the appropriate boxes and indicate whether the services are provided (a) in house or by (b) an external staff

	1 Not at all important	2 Somewhat important	3 Important	4 Very important	5 Extremely important	N/A	In House	External staff
Business taxes	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>	<input type="text" value="N/A"/>	☐	☐
Risk and Management Insurance	<input type="text" value="1"/>	<input type="text" value="2"/>	<input type="text" value="3"/>	<input type="text" value="4"/>	<input type="text" value="5"/>	<input type="text" value="N/A"/>	☐	☐

	1 Not at all important	2 Somewhat important	3 Important	4 Very important	5 Extremely important	N/A
Shipping and Receiving	1	2	3	4	5	N/A
Mail Service	1	2	3	4	5	N/A
Photocopy	1	2	3	4	5	N/A
Clerical Service	1	2	3	4	5	N/A
Receptionist	1	2	3	4	5	N/A
Off-Hours Answering Service	1	2	3	4	5	N/A
Filing	1	2	3	4	5	N/A
Word Processing	1	2	3	4	5	N/A
Typing	1	2	3	4	5	N/A

2.5 The following criteria relate to the ability of the incubator to provide Physical or Logistical Services. (Please indicate how important are the following criteria in your incubator on a 1-5 scale where (1) means, "not at all important" and (5) is "extremely important". Select "N/A" if do not know or never used.)

	1 Not at all important	2 Somewhat important	3 Important	4 Very important	5 Extremely important	N/A
Security Services	1	2	3	4	5	N/A
Computers	1	2	3	4	5	N/A
Conference room	1	2	3	4	5	N/A
Custodial services	1	2	3	4	5	N/A
Photocopier	1	2	3	4	5	N/A
Furniture and Equipment Rental	1	2	3	4	5	N/A
Telephone Equipment	1	2	3	4	5	N/A
Library	1	2	3	4	5	N/A

3. Facilities and Location

This section of the questionnaire examines the type of lease arrangements incubators provide and the way in which these services are priced.

3.1 The following criteria relate to the flexibility in the size and length of lease of facilities.

(Please indicate how important are the following criteria in your incubator on a 1-5 scale where (1) means, "not at all important" and (5) is "extremely important". Select "N/A" if do not know or never used.)

	1 Not at all important	2 Somewhat important	3 Important	4 Very important	5 Extremely important	N/A
The option for deferred rental payments	1	2	3	4	5	N/A
The ability to provide short term leases (e.g. month to month lease)	1	2	3	4	5	N/A
Ability to provide flexible space requirements	1	2	3	4	5	N/A
Time limit on occupancy	1	2	3	4	5	N/A
City centric location	1	2	3	4	5	N/A

3.2 Please indicate the location of the business incubator from the following. Please check (✓) all that apply.

Location	
(1) Within the city	☐
(2) 5 – 10 km from the city	☐
(3) 10-50 km from the city	☐
(4) Greater than 50 km from the city	☐
(5) Located near a university, research park, or research lab	☐
(6) Other objective – please specify	

3.3 Does the rental charge for incubator space vary according to the type of space rented (e.g. office space versus manufacturing space). If yes, please indicate how the monthly rental (in CDN \$) for the smallest unit varied:

Categories	CDN \$
(1) Office space	<input type="text"/>
(2) Workshop space	<input type="text"/>
(3) Laboratory space	<input type="text"/>
(4) Mixed/other types of units	<input type="text"/>
(5) Common facilities, e.g. meeting rooms	<input type="text"/>

3.4 What is the maximum length of time tenants can occupy incubator units? Months

4. Funding and Support

4.1 Please indicate whether the business incubator is privately or publicly sponsored and whether it is designed to be not for-profit or for-profit?

Privately sponsored ☐	Publicly sponsored ☐
The incubator is designed to be not for- profit ☐	The incubator is designed to be for- profit ☐

4.2 How would you best describe the incubator? Please tick one of the following options:

Type of Incubator	Yes
(1) For-profit property development incubator	☐
(2) Non-profit development corporation	☐
(3) Academic incubator	☐
(4) For-profit seed capital incubator	☐
(5) Virtual incubator, i.e. no in-house space let to firms	☐
(6) Other type – please specify:.....	

4.3 Who were/are the main partners involved in setting up and operating the incubator? Please distinguish between (a) partners that are/were members of the board and (b) other partners:

Partners	Board Members	Other Partners
(1) National authorities and public agencies	☐	☐
(2) Companies, banks, and other private sector organizations	☐	☐
(3) Universities and other R&D organizations	☐	☐
(4) Community and voluntary organizations	☐	☐
(5) Other partner organizations	☐	☐

5. Incubator Governance

5.1 The following criteria relate to the governance of incubators.

(Please indicate how important are the following criteria in your incubator on a 1-5 scale where (1) means, "not at all important" and (5) is "extremely important". Select "N/A" if do not know or never used.)

	1 Not at all important	2 Somewhat important	3 Important	4 Very important	5 Extremely important	N/A
An experienced incubator manager	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ N/A
A key board of directors	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ N/A
A noted advisory council	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ N/A
Concise program milestones with clear policies and procedures	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ N/A

7. Mentoring and Networking

7.1 The following criteria relate to the ability of the incubator to provide mentoring and networking opportunities. (Please indicate how important are the following criteria in your incubator on a 1-5 scale where (1) means "not at all important" and (5) is "extremely important". Select "N/A" if do not know or never used.)

	1 Not at all important	2 Somewhat important	3 Important	4 Very important	5 Extremely important	N/A
Entrepreneurial Network	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ N/A
Entrepreneurial Education	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ N/A
Tie to a University	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ N/A
Community Support	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ N/A
Affiliation with key institutions, both public and private	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ N/A

8. Performance of Incubators

8.1 The following factors affect the performance of incubators. (Please indicate how important these factors are to you on a 1-5 scale where (1) means, "not at all important" and (5) is "extremely important". Select "N/A" if do not know or never used.)

	1 Not at all important	2 Somewhat important	3 Important	4 Very important	5 Extremely important	N/A
Shared Services	1	2	3	4	5	N/A
Facilities and Location	1	2	3	4	5	N/A
Funding and Support	1	2	3	4	5	N/A
Incubator Governance	1	2	3	4	5	N/A
Tenant Entry and Exit Criteria	1	2	3	4	5	N/A
Mentoring and Networking	1	2	3	4	5	N/A

8.2 To what extent have the following objectives been achieved (where 1= did not achieve objective and 5= exceeded objective):

Objectives of Incubator	1 Did not meet objective	2 Somewhat met objective	3 Met objective	4 Highly met objective	5 Exceeded objective	N/A
To contribute to local job creation	1	2	3	4	5	N/A
To produce successful graduates	1	2	3	4	5	N/A
To achieve financial break-even	1	2	3	4	5	N/A

8.3 Please indicate how successful you think the business incubator is on a 1-5 scale where (1) means, "not at all successful and (5) is "extremely successful". Select "N/A" if do not know or never used.

	1 Not at all successful	2 Somewhat successful	3 Successful	4 Very successful	5 Extremely successful	N/A
Success of business incubator	1	2	3	4	5	N/A

Appendix III

t-Test Results

Variable	Mean	t-Test
Legal representation	2.88	Not significant
Risk management	2.68	Not significant
Export development assistance	2.73	Not significant
Employee relations	2.81	Not significant
Furniture and equipment rental	2.85	Not significant
New start-up firm	2.95	Not significant
Tie to a university	2.90	Not significant

Appendix IV

Correlation Analysis

Table 1: Correlation Analysis for Incubator Success and the Independent Variables for Older Incubators*.**

		INCUSUCC	INCUSHSE	INCUFL	INCUIG	INCUEE	INCUMN
INCUSUCC	Pearson Correlation	1.000	0.831**	0.611**	0.182	0.681**	0.172
	Sig. (2-tailed)	.	0.000	0.020	0.534	0.007	0.555
	N	14	14	14	14	14	14
INCUSHSE	Pearson Correlation	0.831**	1.000	0.613*	0.226	0.443	0.266
	Sig. (2-tailed)	0.000	.	0.020	0.438	0.113	0.358
	N	14	14	14	14	14	14
INCUFL	Pearson Correlation	0.611**	0.613*	1.000	0.282	0.859**	-0.235
	Sig. (2-tailed)	0.020	0.020	.	0.328	0.000	0.418
	N	14	14	14	14	14	14
INCUIG	Pearson Correlation	0.182	0.226	0.282	1.000	0.121	-0.101
	Sig. (2-tailed)	0.534	0.438	0.328	.	0.680	0.732
	N	14	14	14	14	14	14
INCUEE	Pearson Correlation	0.681**	0.443	0.859**	0.121	1.000	-0.240
	Sig. (2-tailed)	0.007	0.113	0.000	0.680	.	0.409
	N	14	14	14	14	14	14
INCUMN	Pearson Correlation	0.172	0.266	-0.235	-0.101	-0.240	1.000
	Sig. (2-tailed)	0.555	0.358	0.418	0.732	0.409	.
	N	14	14	14	14	14	14

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

***. Incubators greater than 8 years old.

INCUSUCC – incubator success (dependent variable), INCUSHSE – shared services offered by incubators (independent variable), INCUFL – facilities and location of incubator (independent variable), and INCUIG – incubator governance (independent variable), INCUEE – tenant entry and exit criteria used by incubators to screen tenant firms (independent variable), and INCUMN – mentoring and networking opportunities provided by incubator (independent variable).

Table 2: Correlation Analysis for Incubator Success and the Independent Variables for Younger Incubators*.**

		INCUSUCC	INCUSHSE	INCUFL	INCUIG	INCUEE	INCUMN
INCUSUCC	Pearson Correlation	1.000	0.077	- 0.130	0.229	- 0.230	- 0.136
	Sig. (2-tailed)	.	0.786	0.645	0.411	0.409	0.630
	N	15	15	15	15	15	15
INCUSHSE	Pearson Correlation	0.077	1.000	0.521*	0.130	0.284	0.147
	Sig. (2-tailed)	0.786	.	0.039	0.631	0.286	0.588
	N	15	16	16	16	16	16
INCUFL	Pearson Correlation	- 0.130	0.521*	1.000	0.212	0.862**	0.392
	Sig. (2-tailed)	0.645	0.039	.	0.430	0.000	0.133
	N	15	16	16	16	16	16
INCUIG	Pearson Correlation	0.229	0.130	0.212	1.000	0.285	0.493
	Sig. (2-tailed)	0.411	0.631	0.430	.	0.285	0.052
	N	15	16	16	16	16	16
INCUEE	Pearson Correlation	- 0.230	0.284	0.862**	0.285	1.000	0.417
	Sig. (2-tailed)	0.409	0.286	0.000	0.285	.	0.108
	N	15	16	16	16	16	16
INCUMN	Pearson Correlation	- 0.136	0.147	0.392	0.493	0.417	1.000
	Sig. (2-tailed)	0.630	0.588	0.133	0.052	0.108	.
	N	15	16	16	16	16	16

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

***. Incubators less than 8 years old.

INCUSUCC – incubator success (dependent variable), INCUSHSE – shared services offered by incubators (independent variable), INCUFL – facilities and location of incubator (independent variable), and INCUIG – incubator governance (independent variable), INCUEE – tenant entry and exit criteria used by incubators to screen tenant firms (independent variable), and INCUMN – mentoring and networking opportunities provided by incubator (independent variable).

Table 3: Correlation Analysis for Incubator Success and the Independent Variables (INCUSUCC and INCUIG).

		INCUSUCC	INCUFL	INCUIG
INCUSUCC	Pearson	1.000	0.175	0.251
	Correlation			
	Sig. (2-tailed)	.	0.355	0.181
	N	30	30	30
INCUFL	Pearson	0.175	1.000	0.218
	Correlation			
	Sig. (2-tailed)	0.355	.	0.239
	N	30	31	31
INCUIG	Pearson	0.251	0.218	1.000
	Correlation			
	Sig. (2-tailed)	0.181	0.239	.
	N	30	31	31

INCUSUCC – incubator success (dependent variable), INCUFL – facilities and location of incubator (independent variable), and INCUIG – incubator governance (independent variable).

Table 4: Correlation Analysis for Incubator Governance Variables.

		Experienced incubator manager	Key board of directors	Noted advisory council	Concise program milestones with clear policies and procedures
Experienced incubator manager	Pearson Correlation	1.000	0.408*	0.072	0.477**
	Sig. (2-tailed)	.	0.023	0.699	0.007
	N	31	31	31	31
Key board of directors	Pearson Correlation	0.408*	1.000	0.441*	0.534**
	Sig. (2-tailed)	0.023	.	0.013	0.002
	N	31	31	31	31
Noted advisory council	Pearson Correlation	0.072	0.441*	1.000	0.379*
	Sig. (2-tailed)	0.699	0.013	.	0.035
	N	31	31	31	31
Concise program milestones with clear policies and procedures	Pearson Correlation	0.477**	0.534**	0.379*	1.000
	Sig. (2-tailed)	0.007	0.002	0.035	.
	N	31	31	31	31

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Table 5: Correlation Analysis for Incubator Success and Operational Direction.

		INCUSUCC	INCUOPRD
INCUSUCC	Pearson Correlation	1.000	0.419*
	Sig. (2-tailed)	.	0.021
	N	30	30
INCUOPRD	Pearson Correlation	0.419*	1.000
	Sig. (2-tailed)	0.021	.
	N	30	31

*. Correlation is significant at the 0.05 level of significance.

INCUSUCC – incubator success (experienced incubator manager).
INCUOPRD – operational direction (experienced incubator manager).

Table 6: Correlation Analysis for Incubator Success and Strategic Direction.

		INCUSUCC	INCUSTRD
INCUSUCC	Pearson Correlation	1.000	0.141
	Sig. (2-tailed)	.	0.457
	N	30	30
INCUSTRD	Pearson Correlation	0.141	1.000
	Sig. (2-tailed)	0.457	.
	N	30	31

INCUSTRD – strategic direction (mean of the following variables: a key board of directors, a noted advisory council, and concise program milestones with clear policies and procedures).

Appendix V

Factor Analysis

Communalities

	Initial	Extraction
Experienced incubator manager	1.000	0.852
Key board of directors	1.000	0.694
Noted advisory council	1.000	0.875
Concise program milestone with clear policies and procedures	1.000	0.703

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% Variance	Cumulative %	Total	% Variance	Cumulative %
1	2.187	54.679	54.679	2.187	54.679	54.679
2	0.937	23.424	78.103	0.937	23.424	78.103
3	0.458	11.447	89.550			
4	0.418	10.450	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix^a

	Component	
	1	2
Experienced incubator manager	0.657	- 0.648
Key board of directors	0.828	8.950E-02
Noted advisory council	0.613	0.706
Concise program milestone with clear policies and procedures	0.833	- 9.79E-02

Extraction Method: Principal Component Analysis.

a. 2 components extracted.