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THE INCUBATION OF TECHNOLOGY-INTENSIVE
NEW BUSINESSES

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THE INCUBATION OF
TECHNOLOGY-INTENSIVE
NEW BUSINESSES

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SUMMARY

Title: The Incubation of Technology-Intensive New Businesses
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The changing South African business environment and the present world-wide focus of governments on small, medium and micro enterprises (SMMEs) to assist in local economic development have once more placed the focus on business development programmes. The main objective of this study is then also to determine how a business incubation programme can play a role in the development of SMMEs in a South African business environment, particularly from a policy viewpoint.

In order to establish a foundational basis for discussion, the study commences with an examination of the concepts of new venture creation. The subsequent chapters take a closer look at business incubation, the various different approaches that exist, the various aspects that are involved in the design of an incubator, and incubation and technology transfer. With this new combined foundational basis of new venture creation and business incubation, this new economic development tool can be evaluated. The evaluation does not only consider the output in terms of financial input, but also against the various other factors that are needed for successful incubation. Finally, the study also presents case studies to provide the necessary background to the current incubation situation in South Africa.

The importance and role of business incubation in the development of local SMMEs is evident from the combined findings of this investigation.

Keywords: business, incubation, incubator, new venture, assistance, and development

SAMEVATTING

Titel: Die Inkubasie van Tegnologiese-Intensiewe Nuwe Besighede
Outeur: Jacobus Johannes Wagner
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Die huidige verandering in die Suid Afrikaanse besigheidsomgewing, sowel as die verwagtinge van verskeie regerings dat klein, medium en mikro besighede die plaaslike ekonomie sal versterk, het weereens die aandag op plaaslike ontwikkelings programme geplaas. Die hoof doel van hierdie studie is dus om te bepaal hoe 'n besigheids inkubasie program 'n rol kan speel in die ontwikkeling van klein besighede in 'n Suid Afrikaanse besigheidsomgewing. Die klem van die ondersoek val dan ook meer vanuit 'n beleids oogpunt.

Om te verseker dat 'n goeie fondament vir bespreking bestaan, begin die studie met 'n ondersoek na die beginsels van entrepreneurskap en besigheidsvorming. Die opeenvolgende hoofstukke bestudeer die verskillende aspekte van besigheids inkubasie, onder andere: die verskillende benaderinge tot die beginsel van inkubasie, die verskillende faktore wat betokke is in die ontwerp van 'n inkubator, tegnologie oordrag, ens. Met hierdie nuwe basis van besigheids ontwikkeling en inkubasie, kan die proses van besigheids inkubasie as 'n instrument vir ekonomiese ontwikkeling geëvalueer word. Die evaluasie vergelyk nie net die uitset van inkubsie teen die finansieële inset nie, maar ook teen al die ander faktore wat nodig is vir suksesvolle inkubasie. Ten slotte, verskaf die studie ook 'n gevallestudie om die nodige agtergrond te verskaf oor die toestand van inkubasie in Suid Afrika.

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TABLE OF CONTENTS

1. INTRODUCTION	1
1.1 Overview	2
2. NEW VENTURE DEVELOPMENT	5
2.1 The Promise Of New Venture Creation	5
2.2 The Problem Of Survival	8
2.2.1 Period of Failure	9
2.2.2 Problems New Ventures Encounter	10
2.2.3 Reasons for Business Failures	15
2.2.4 Perceived Causes of Success	17
2.3 Size Classification	23
2.4 New Venture Creation	25
2.4.1 Entrepreneurship: An Overview	25
2.4.2 The Entrepreneurial Process	28
2.4.3 The Four Cornerstones of an Enterprise	30
2.4.4 The Entrepreneurial Environment	33
2.5 Implications For Policy Makers	41
2.6 Current Initiatives To Support Small firms	43

3.	BUSINESS INCUBATION	46
<hr/>		
3.1	The History Of Business Incubation	47
3.2	Defining Business Incubation	49
3.2.1	General Definition of ‘Incubation’	49
3.2.2	General Definitions of the Term: ‘Business Incubator’	49
3.2.3	Discussion	52
3.2.4	Definition : Business Incubation	53
3.2.5	Definition : Business Incubator	53
3.2.6	Incubator without Walls	53
3.3	The Business Incubation Process	54
3.3.1	The Four Cornerstones of Business Incubation	58
3.3.2	Other Aspects of Incubation	62
3.3.3	Additional Advantages of Business Incubation	66
4.	DIFFERENT INCUBATION APPROACHES	70
<hr/>		
4.1	Incubator Objectives	70
4.1.1	General Objectives of Incubators	70
4.1.2	Specific Objectives of an Incubator	71
4.2	Categories Of Incubators	72
4.2.1	University Associated Incubators	73
4.2.2	Non-profit Incubators	74
4.2.3	For-profit Incubators	76
4.2.4	Additional Categories	81
4.2.5	Types of European Incubators	83
4.3	A Comparison Between Incubation Programmes In The USA And Europe	84
4.3.1	Similarities	85
4.3.2	Differences	85

5. INCUBATOR DESIGN	87
5.1 Evolution Of An Incubator	87
5.1.1 The Start-up Stage	88
5.1.2 The Business Development Stage	89
5.1.3 The Maturity Stage	91
5.1.4 Implications for Incubator Development	93
5.1.5 Conclusion	95
5.2 Determining Incubator Feasibility	95
5.3 Geographic Location	98
5.3.1 Infrastructure	98
5.3.2 Urban Incubators	99
5.3.3 Rural Incubators	100
5.3.4 Discussion	101
5.4 The Incubator Facility	102
5.4.1 Site Options	102
5.4.2 Incubator Size	103
5.4.3 Renovation	104
5.4.4 Space Configuration	105
5.4.5 Problems Encountered	108
5.5 Financing	109
5.5.1 Sources of Income	109
5.5.2 Financial Requirements	115
5.6 Incubator Structure	118
5.6.1 Incubator Staffing	121

6.	INCUBATION & TECHNOLOGY TRANSFER	124
<hr/>		
6.1	The Entrepreneurial Network	126
6.2	Additional Mechanisms	127
6.2.1	Licensing	127
6.2.2	Acquisition	128
6.2.3	Joint Venture	128
6.2.4	Purchase	128
6.2.5	Recruitment	128
6.3	Incubators And Technology Transfer	129
6.4	Incubator-University Interaction	134
7.	EVALUATING BUSINESS INCUBATION	139
<hr/>		
7.1	The Effectiveness Of Incubators	139
7.1.1	Enterprise Creation	140
7.1.2	Employment Creation and Enterprise Success	142
7.1.3	Cost Effectiveness	146
7.1.4	Incubation's Contribution to Local Economic Development	149
7.1.5	Non-Quantifiable Benefits	149
7.2	Business Incubation Obstacles	150
7.2.1	Exogenous Factors	151
7.2.2	Endogenous Factors	151
7.2.3	Criticisms	152
7.3	Successful Business Incubation	153
7.3.1	A National Enterprise Development Strategy	155
7.3.2	Infrastructure	155
7.3.3	A Feasibility Study	156
7.3.4	Community Support	156
7.3.5	Expectations and Schedules	157

7.3.6	Location	157
7.3.7	The Incubation Facility	157
7.3.8	Management	158
7.3.9	Financing	159
7.3.10	Organisation Structure	159
7.3.11	Networking	161
7.3.12	Collocation	161
7.3.13	University Linkages	162
7.3.14	Educational Programmes	162
7.3.15	Recruitment	162
7.3.16	Customised Assistance	163
7.3.17	On-Site Business Expertise	163
7.3.18	Concise Programme Milestones with Clear Policies and Procedures	164
7.3.19	Continuous Evaluation	164
7.3.20	Perception of Success	164
8. CASE STUDIES		166
8.1	Research Procedure	166
8.2	South African Incubators	168
8.2.1	Job Creation Incubators	170
8.2.2	Technology Development Incubators	173
8.2.3	New Incubation Programmes	175
8.2.4	Similar Development Efforts	179
8.2.5	Results from the South African Survey	181
8.2.6	Conclusions	187
8.3	University-Related Incubators Focusing On High-Technology Businesses In the United States of America	192
8.3.1	Rensselaer Polytechnic Institute Incubator	193
8.3.2	The Edison Technology Incubator	194
8.3.3	Austin Technology Incubator	196
8.3.4	The University of New Orleans Technology Enterprise Centre	198
8.3.5	Conclusions	199

8.4	Recommendations	200
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**9. CONCLUSIONS AND RECOMMENDATIONS: INCUBATION AS A
POLICY INSTRUMENT** **203**

9.1	Recommendations	206
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9.2	Recommendations For Future Research	210
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LIST OF FIGURES

FIGURE 1: PYRAMID OF BUSINESS ENTERPRISES IN SOUTH AFRICA	7
FIGURE 2: GENERAL BUSINESS FAILURE RATES ³	9
FIGURE 3: A FRAMEWORK FOR DESCRIBING NEW VENTURE CREATION.	30
FIGURE 4: TYPOLOGY OF SUPPORT SERVICES ¹	44
FIGURE 5: INPUTS AND OUTCOMES OF THE BUSINESS INCUBATION PROCESS	54
FIGURE 6: FUNCTIONAL MODEL OF A BUSINESS INCUBATOR	55
FIGURE 7: INCUBATOR SIZE ⁵⁹ — SQUARE METER	104
FIGURE 8: ORGANISATIONAL CHART	119
FIGURE 9: THE ENTREPRENEURIAL NETWORK	130
FIGURE 10: LOCATION AFTER INCUBATION.....	149
FIGURE 11: COMMON INCUBATOR PROBLEMS.....	152
FIGURE 12: THE DEGREE OF SUPPORT TOWARDS A SPECIFIC TARGET GROUP	183

LIST OF TABLES

TABLE 1: SEVEN PERSPECTIVES ON THE NATURE OF ENTREPRENEURSHIP.....	26
TABLE 2: INCUBATOR GOALS AND ORIENTATIONS	73
TABLE 3: TYPICAL CONFIGURATION OF A 2,800 M ² INCUBATOR.....	106
TABLE 4: INCUBATOR REVENUE ANALYSIS ⁴⁷	111
TABLE 5: INCUBATOR OPERATING EXPENSES ⁴⁷	116
TABLE 6: ASSESSMENT CRITERIA	141
TABLE 7: DISTRIBUTION OF HIVES IN SA	170
TABLE 8: INCUBATOR OBJECTIVES - RANKED ACCORDING TO IMPORTANCE.....	182
TABLE 9: TARGET GROUPS - RANKED ACCORDING TO IMPORTANCE.	182
TABLE 10: SELECTION CRITERIA FOR JUDGING THE SUITABILITY OF NEW TENANTS - RANKED ACCORDING TO IMPORTANCE.....	186
TABLE 11: AVAILABILITY OF SERVICES	188

LIST OF APPENDICES

APPENDIX A: RANKING OF SERVICES BY MANAGERS AND TENANTS	212
APPENDIX B: THE AVERAGE PAID AND VOLUNTEER STAFF BY SIZE OF US INCUBATORS ⁴⁷	213
APPENDIX C: DESIRABLE TRAITS OR ATTRIBUTES OF AN INCUBATOR MANAGER ¹	214
APPENDIX D: PROBLEMS EXPERIENCED BY INCUBATORS	215
APPENDIX E: TEMPORARY REMOVAL OF RESTRICTIONS ON ECONOMIC ACTIVITIES ACT	217
APPENDIX F: RECOMMENDATIONS MADE BY THE SBDC ON THE FUTURE DEVELOPMENT OF HIVES.	218
APPENDIX G: CONTACT INFORMATION	221
APPENDIX H: QUESTIONNAIRE USED FOR SOUTH AFRICAN SURVEY	223

LIST OF ABBREVIATIONS

AAC	Anglo American Corporation
ATDC	Advance Technology Development Centre
ATI	Austin Technology Incubator
CA	California
C ² E	Commercialisation and Enterprise
CEO	Chief Executive Officer
CSIR	Council for Scientific and Industrial Research
CWRU	Case Western Reserve University
DC	District of Columbia
EBN	European Business Innovation Centre Network
EDI	Enterprise Development Inc.
FCC	Fulten-Carrol Centre
FRD	Foundation for Research Development
IC ²	Innovation Creativity and Capital Centre
ICNC	Industrial Council of Northwest Chicago
ICV	Internal Corporate Venture
IDIs	Industry Development Incubators
ITI	Institute for Technological Innovation
JCIs	Job Creation Incubators
JIT	Just In Time
LBSCs	Local Business Service Centres
LSCs	Local Service Centres
LGI	“Laboratorium vir Gevorderde Ingenieurswese (Edms) BPK” Laboratory for Advanced Engineering (Pty) Ltd
Ltd	Limited
MAC	Manufacturing Advisory Centre
MIT	Massachusetts Institute of Technology
MCC	Microelectronics and Computer Technology Corporation
NBIA	National Business Incubation Association

PCUTI	The Pre-Competition University Technology Incubator
Pty	Proprietary (applicable in Australia, New Zealand & South Africa)
R&D	Research and development
RDP	Reconstruction and Development Programme
ROI	Return on investment
RPI	Rensselaer Polytechnic Institute
SA	South Africa
SBDC	Small Business Development Corporation
SMMEs	Small, Medium and Micro Enterprises
TCI	Technology Centres International
TDIs	Technology Development Incubators
TfD	Technology for Development
UCSC	University City Science Centre
UK	United Kingdom
UP	University of Pretoria
US	United States
USA	United States of America
✓ARPI	Venture Affiliates of RPI
VC	Venture Capital
VCI	Venture Capital Incubator
×TV	Xerox Technology Ventures

I. INTRODUCTION

*Incubators are a cost-effective instrument in the creation
of new enterprises and in the development of jobs*¹

Keith Hillyer
Manager
Private Sector Development Programme
United Nations Development Programme

The business incubator concept is both praised as a useful tool for creating new enterprises and brushed aside as an expensive fad that does little for economic development. Today, the numbers are increasing, with business incubators sprouting up all over the world. Approximately 1,500 business incubators are in operation world wide, with roughly one-half in the United States and about 250 in industrialising countries. Considering the current trends, business incubators in industrialising countries may well double in number to more than 500 within the next five years¹. From the data obtained in the 1991 NBIA survey, the National Business Incubation Association (NBIA) extrapolates that business incubators have from their inception, helped to create at least 82,000 jobs in the USA alone. This figure assumes an average of 140 jobs created per business incubator. The NBIA believes the actual number of jobs created by companies receiving assistance from business incubators is closer to 100,000¹, but the association has not had the capacity to fully document the business incubator industry's growth.

While the process of establishing and operating an incubator may be similar in various environments, success is not guaranteed. Business incubation, like many other business support systems, may produce excellent or poor results depending on its adaptation to suit local needs, the commitment of its sponsors, the skills of its management team, and the policy framework within which it operates. To ensure that new ventures, especially technology orientated new ventures, in South Africa receive the optimal benefits that can be obtained from business incubation, a policy framework needs to be created that suits

¹ This figure considers only jobs in the United States of America.

the local environment. However, in order to make recommendations for a policy, it is necessary to understand the concept of business incubation and the factors that influence the success of business creation and development in business incubation. This document, therefore, tries to shed some light on how business incubators can be used as a policy instrument in leveraging entrepreneurial talent, economic development, job creation, new business development, and technology transfer in South Africa.

1.1 OVERVIEW

The following overview aims to guide the reader through the various chapters, informing the reader on the reason behind each chapter and its contents. The largest part of Chapters 2 to 7 is based on a literature review. Chapter 8, on the other hand, is based on primary research by the author, as well as the literature. Finally, Chapter 9 consists of a combination of conclusions and recommendations.

Chapter 2: New Venture Development

Chapter 2 informs the reader why there is a need to look at SMMEs in the first place, and explains the problems of survival and the process of new venture creation. Additionally, a few of the many business development programmes are mentioned and the size classification for SMMEs is provided. The reader should, at the end of the chapter, be able to form a concept of what is needed for business development, and can then use this information through the rest of this document to evaluate the business incubation process. It is important to realise that even though many factual information are quoted from previous research, that it is only quoted to assist the reader to comprehend the process of new venture development and the motivation behind assistance programmes.

Chapter 3: Business Incubation

Chapter 3 first takes a look at the history of business incubation, and then tries to define business incubation without putting it into an absolute 'rigid box'. The chapter then goes on to explain the business incubation process around a new graphic model, developed

from the previously presented definitions and from the research presented in Chapter 2. The uniqueness of this model lies in the graphical representation of the combination of the four cornerstones of business incubation, the four cornerstones of a new venture, and the interaction between them and the external environment. Additional advantages obtained by the new venture, from incubation and other closely related aspects of incubation are also discussed.

Chapter 4: Different Incubation Approaches

Chapter 4 provides the reader with the various incubation programme objectives, their different categories and the common link between them. A short comparison is also made between incubation programmes in the USA and in Europe.

Chapter 5: Incubator Design

Chapter 5 is aimed at providing the reader with the necessary information in order to understand the process involved in creating an incubator, i.e.: the time involved, the financial aspects, the resources needed, etc. Additionally, Chapter 5 also tries to help the reader visualise the physical dimension of the incubation process as embodied in the incubator facility and its personnel.

Chapter 6: Incubation and Technology Transfer

Chapter 6 provides a more in-depth look at technology transfer and what role incubation programme can play in it. The chapter also evaluates the relationship between an incubator and a university as resource.

Chapter 7: Evaluation of Incubator Performance

In spite of the lack of information on their effectiveness, policy makers increasingly view incubators as viable economic development tools. The existing literature concerning incubators has not put the phenomenon in perspective — most describe individual incubator facilities or tell how to start one. For the interested local developer this

literature offers much ‘how to’ information, but little that identifies factors crucial to their success or which evaluates the concept’s soundness. Chapter 7 attempts to fill this gap by presenting an analysis of the issues relevant to incubator success.

Chapter 8: Case Studies

Chapter 8 represents an investigation to determine what similar development efforts are in operation in South Africa. These development efforts are also described and discussed to provide the reader with the necessary background to the current incubation situation in South Africa. In addition to the local incubation programmes, Chapter 8 also presents a study on three ‘successful’ university-related incubators in the US. The aim of this study was to obtain additional information on the relationships that exist between incubators that focus on enterprises involved in technology development, and their sponsors. Recommendations are now made towards the future development of incubators in South Africa, based on the information gained from both studies.

Chapter 9: Incubation as a Policy Instrument

Chapter 9 contains the conclusion based on all the previous chapters, as well as additional recommendations that were not necessarily made in the previous chapters, but that should be considered by policy makers and incubator developers.

2. NEW VENTURE DEVELOPMENT

This chapter prepares the background for an assessment of the incubator by conceptualising the nature and scope of new venture development. The chapter also reviews the range of small enterprise support projects currently practised around the world, what has and what has not worked, and the performance measures and lessons that can be derived from these. It is important to realise that even though many factual information are quoted from previous research, that it is only quoted to assist the reader to comprehend the process of new venture development and the motivation behind assistance programmes. In fact, most of the research is more than five years old and the validity may be questioned. However, since no more recent information was obtained, it is assumed that the reader will be able to build a good enough concept of the new venture development process from the available research, without focusing on the exact quantities, to incorporate the business incubation process' place in new venture development. Having laid the groundwork, incubation can then be located in the overall context of small, medium and micro enterprise (SMME) development and the business incubator can be evaluated against other development efforts to observe its deficiencies, limitations, and advantages as a new venture development tool.

Naturally, the first question that arises is that of why a country needs to look at small business development in the first place, especially from an industrial policy viewpoint? The answer to this question lies in the enormous promise that Small, Medium and Micro Enterprises (SMMEs) offer.

2.1 THE PROMISE OF NEW VENTURE CREATION

For most of this century, it was common sense that business success came with size. Then came the 1980s, and this bit of managerial wisdom was turned on its head. While bloated corporations were down-sizing, small ones were proliferating. According to a much-publicised finding by MIT researcher David Birch², small companies of fewer than 100 employees were responsible for as many as eight out of ten new jobs. Among

the 4.6 million US companies with 500 or fewer employees, the US Small Business Administration reported that 14.6 million people are employed. In 1990 the Fortune 500 firms accounted for a mere 7 percent of the total US employment, and the reduction has continued ever since³. This trend is not limited to the United States of America (USA) and can be recognised in the new global economy that is increasingly characterised by three processes¹:

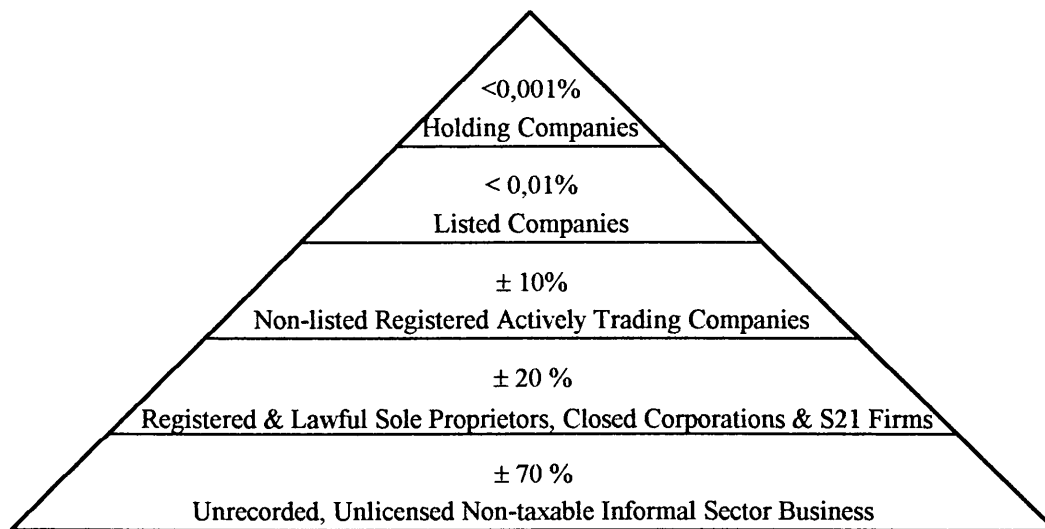
- ◇ The overall lowering of trade barriers and concurrent emergence of regional trading blocks.
- ◇ The shift towards information and service-orientated activities, in order to create new competitive advantages in the world market.
- ◇ The down-sizing of large organisations, together with mergers and acquisitions, in the face of restructuring.

These three processes decrease the number of opportunities available for people to join the labour force, especially in large companies, increasing overall unemployment. In return, SMMEs are playing an ever-increasing role in absorbing labour, penetrating new markets and expanding economies in creative ways. SMMEs are therefore now generally seen as an effective means of creating most of the new jobs which countries will need in the future. In both industrialised and developing countries, SMMEs have become the prime vehicle to address challenges of economic growth and job creation. In general, SMMEs constitute the overwhelming bulk of total firms by number and contribute around one-third to one-half of gross national product, creating almost all the net growth in employment, as well as a significant proportion of technical innovations⁴. Research has, however, shown that not all small businesses are job generators. Firms that made the largest contribution towards job generation, include: technology-based firms, high growth firms, and service businesses³⁵.

The good performance by SMMEs in developing countries, has even been achieved despite the actions of governments, and not necessarily because of them. As net job

creators, even in periods of recession, SMMEs can help to raise and distribute incomes more widely, and broaden participation in asset management. There are many reasons for this good performance of SMMEs. One reason is the fact that we live in an era of ever increasing technological change, creating new business opportunities for flexible enterprises. When many big companies were slow to respond to shifts in technology and markets, small companies were on the cutting edge of innovation -- a trend symbolised by the amount of high-tech start-ups in California's Silicon Valley and Boston's Route 128. Small companies with growth-orientated management can adapt faster to change, create new products and bring them to the market swiftly, trim overheads, and feed the large corporations with low cost, high-value services. SMMEs complement the activities of large-scale industry and work in symbiosis with it. Businesses in technology-based products and services are therefore making even larger contributions to value-added production, innovation, employment and exports.

FIGURE 1: PYRAMID OF BUSINESS ENTERPRISES IN SOUTH AFRICA



Today (1996), there are more than 1 million SMMEs in South Africa, absorbing more than a quarter of the labour force of 15 million people. This is in addition to about 3,5 million people involved in some or other type of survivalist activities ⁵. The Small Business Development Corporation (SBDC) in South Africa estimates that approximately

40 percent of the overall economic activity in South Africa can be accredited to small scale enterprises in both formal and informal sectors¹. They also estimate that approximately 75 percent of the new jobs in South Africa are generated by the small business sector. With South Africa being freed from the constraints of the apartheid system, a host of valuable new opportunities have opened for SMMEs. Even though South Africa's economy is in transition, it seems logical that shoring up the base of small business and nurturing new business formations will be more important than attempts to attract employers from outside. This does not mean that large industrial, mining and other enterprises that have been responsible for a great deal of the growth of the local economy should be ignored. On the contrary, these large enterprises should be supported along with the SMMEs sector. SMMEs have, however, been largely neglected by governments during much of the century and should therefore receive special attention. SMMEs generate employment, provide a more equitable income distribution and can serve as a seedbed for developing the skilled worker base needed for industrial expansion. In addition to mobilising resources, SMMEs activate competition and co-operation, exploit niche markets, enhance productivity and technical change, and effectively revitalise the local economy through regional and export trade¹.

2.2 THE PROBLEM OF SURVIVAL

The insecurity of expecting new ventures to be the drivers of the national economy is related to their instability. The process of enterprise formation is a dynamic one occurring over a period of years and is influenced by many factors. Unfortunately most of the factors that interact on the new venture oppose success and for the vast majority of new businesses the odds of survival are definitely not good. The success rate of new ventures, particularly those that are technology intensive, is often disconcertingly low. New venture failures include companies that are poorly planned, with products and services that are not attuned to the market. However, they also include companies with great promise and innovative products that cannot get adequate financing, and need to

¹ Information obtained from a SBDC 'Property Projects' brochure.

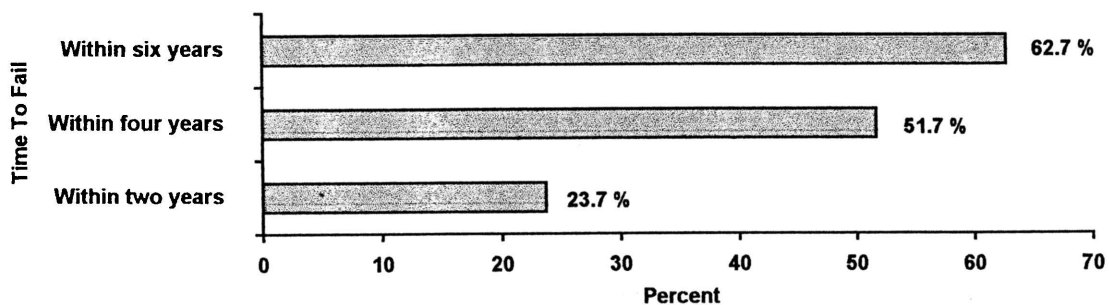
learn how to market their products and services, develop strategic alliances, and find effective distribution channels.

2.2.1 Period of Failure

While government data, research, and business mortality statisticians may not agree on the precise failure and survival figures for new businesses, they do agree that failure is the rule, not the exception. One study of business failures and bankruptcies in the USA, found that for those businesses which failed, over 53 percent of the failures occurred in the first 5 years; nearly 30 percent occurred in years 6 through 10; and the remaining 17 percent involved firms in existence more than 10 years ⁶.

Figure 2 is a distillation of a number of studies of failure rates in the USA over the last 50 years and illustrates the fact that (1) failure rates are high and (2) the majority of the failures occur in the first two to five years. This picture is supported by the findings of several different studies ^{7,8}.

FIGURE 2: GENERAL BUSINESS FAILURE RATES ³



This failure rate of new firms is, however, not equal across all types of small businesses ⁱⁱ. High-tech firms have the lowest rate of failure, followed by manufacturing and the retail

ⁱⁱ The failure rate for South African businesses may differ. However, the research presented here gives a good indication of businesses in general.

and services businesses with the highest rates. Cooper⁹ did a study of high tech firms in the Boston and Palo Alto areas and found discontinuance rates of 20 percent and 29.2 percent after four to five years, respectively.

An important issue is the identification of conditions that account for such a substantial number of business failures and, in turn, specification of courses of actions to reduce this failure rate. One approach from which one can try to simplify the complexity of determining what assistance should be provided to new ventures, is to determine the common problems that new ventures experience, the general reasons for new venture failures, and the success factors common to very successful established ventures. We can then focus on those areas that can be influenced and that will specifically address the problem areas that SMMEs experience in their quest for survival and growth. Once the focus areas are determined, we can proceed to determine what the best alternatives are to assist new ventures.

2.2.2 Problems New Ventures Encounter

Although it is difficult to isolate the causes of business failure into a few discrete factors, a fairly clear picture can be drawn from the nature of the problems that small businesses encounter. Depending on where they have come from, most entrepreneurs launching new ventures have significant deficiencies in one or more areas, e.g. lack of experience in marketing. Because of these deficiencies, most entrepreneurs do not have the knowledge to plan ahead and to try to minimise, or even avoid, the difficulties that are associated with new ventures. Even when entrepreneurs do plan ahead they may still not have the skill or experience to manage the obstacles as they occur during the different phases of firm growth.

Some of the common problems exhibited by start-ups are reflected in the list below.

2.2.2.1 Product or service

Entrepreneurs show a tendency to:

- ◇ focus on perfecting the invention, product, service or prototype, ignoring the other aspects of a business;
- ◇ assume that they know what the customer wants in the product or service and therefore shy away from market research;
- ◇ fail in testing their products for manufacturability or lack the capacity or plan for manufacturing;
- ◇ fail to determine the financial feasibility of their product or service.

2.2.2.2 Cash flow

Entrepreneurs show a tendency to:

- ◇ not understand cash flow. They often naively believe that negative cash flow will turn positive without doing anything to make this happen;
- ◇ have inadequate financial management skills;
- ◇ not know what sources of funds to tap or strategies to use in order to get more cash when they need it.

2.2.2.3 Sales and marketing

Entrepreneurs show a tendency to:

- ◇ underestimate the importance of sales;
- ◇ misunderstand the importance of market position;
- ◇ have difficulty in assessing the competition;
- ◇ underestimate the time it takes to get the product to market.

2.2.2.4 The entrepreneurial team

Entrepreneurs show a tendency to:

- ◇ overestimate their personal capacity and to miscalculate their strengths and weaknesses;
- ◇ lack the skills needed to recruit and select the people to fill out the management team;
- ◇ undervalue complementary talent or are unwilling to allocate adequate resources to acquire talent, creating an entrepreneurial team with marginal or inadequate performers;
- ◇ fail to recognise the importance of interpersonal relationships among the members of the management team and fail to work with them to create an effective team.

2.2.2.5 Growth problems

Major difficulties facing the expanding small firm occur because of:

- ◇ problems of establishment in the first one or two years — finding customers, developing products;
- ◇ problems of consolidation in the next period — finding staff, delegating, controlling the business;
- ◇ problems of expansion in the next phase — finding finance, competing with much bigger firms in the market.

Because it is small, the entrepreneurial company will continually have to overcome certain
COMMON PROBLEMS:

- ◇ a limited number of employees;
- ◇ limited financial resources — e.g. lack of working capital to fulfil larger contracts;
- ◇ prejudice among large firms and public-sector buyers against small suppliers;
- ◇ a small management team primarily consisting of the partners in the business. These individuals will often be learning the main problems of the business as they go along;
- ◇ a fairly narrowly defined geographic and industry sector;

- ◇ premises that are unlikely to be totally suitable for the nature of the business conducted;
- ◇ reliance on historic information provided by external accountants which will generally be at least one year out-of-date.

Taken together, these factors emphasise the fragility of the new small business. For example, if a key member of the team quits, the effect can be catastrophic, while in a larger organisation this would not matter as much. Should a substantial customer be slow in placing an order, a crisis may result. These are the features that characterise the small business as one that muddles along from day to day. Rather than controlling its destiny, it allows itself to be controlled.

The MAJOR PROBLEMS facing the small company can be classified into three types ¹⁰:

- I. *External factors*: Those factors are usually beyond the direct control of management.
- II. *Internal factors*: That items that management deals with day to day and over which it has some degree of control.
- III. *Financial*: A combination of internal financial factors and external capital markets.

Franklin and Goodwin ¹⁰, found that small businesses experience the greatest difficulties with external factors. However, they also found that many small business owners/managers are guilty of blaming uncontrollable variables for most of their problems and not employing resources that require extra or non-routine effort and thought. Even though the problems small business owner-managers encounter are not necessarily an indication of why small businesses fail during the first few critical years, it does provide assistance providers and policy makers with a guideline to the types of assistance that SMMEs require ⁱⁱⁱ.

ⁱⁱⁱ For a ranking of the problems that SMMEs experience, refer to Franklin and Goodwin ¹⁰.

Given that at least 50 percent of new ventures fail during the first 5 years^{iv}, the dynamic nature of the venturing process can not be ignored. The starting point is a universal issue, as the new venture struggles for autonomy in the creation and development of a viable enterprise. Following this, the enterprise experiences problems with expansion, stability and institutionalisation. The puzzle becomes more complex as each small business is affected by different internal and external variables. In order to maintain the momentum of the business, these variables need to be faced and addressed as the enterprise moves through different stages of development. Dodge and Robbins¹¹ used the life-cycle stages that a firm goes through as a contingency variable, and studied the major problems common to small businesses in each life-cycle stage.

In agreement with other studies, Dodge and Robbins found that external problems are more important early in the life-cycle, with internal problems becoming more critical as the small business grows and develops. In the stability stage, however, they noted an upturn in external problems. Although internal problems still dominated, external problems showed an increase across the life-cycle. Owner/manager hesitancy offers one explanation for this. Environmental factors, which include the direction, intensity and pace of technological change, demand the flexibility and dramatic adaptability of the small business. The tendency, however, is that owner/managers become fixated by the current internal workings of the firm, and in the process they ignore the ever-changing, competitive environmental conditions that demand certain assumptions and practices to permit growth and the ultimate survival of the business.

In all four stages (viz.: start-up, growth, maturity and decline) during a business' life-cycle, small businesses face problems. Planning, be it marketing, management or finance, constitutes one of the biggest problems, as it is pertinent to the initial business plan. In the second stage, when the firm starts to grow, the setting up of accounting systems to facilitate the recording of information and the controlling of cash-flow become major

^{iv} For more information, refer to heading 'Period of Failure', on page 9.

problems. As a result, business control is affected and the demand for capital sources increase as the firm struggle to meet daily monetary obligations. Even once sales increase, the owner/manager is faced with the most frequently mentioned management problems, inventory and cost control. There are also eventualities, such as location and expansion, that represent an ongoing issue and can occur in at least three of the four life-cycle stages.

The results ^v from the study by Dodge and Robbins have far reaching implications for business assistance programmes. Business assistance programmes need to develop operational capabilities that provide flexibility in response to the turbulence of continuous environmental change, providing the right assistance at the right moment when the specific business needs it the most.

2.2.3 Reasons for Business Failures

Research that has been conducted on the general causes of small business failures, has tended to employ either a case approach or a macro-economic approach, and several empirical studies of success and failure tend to “emphasise specific characteristics of the entrepreneur or the enterprise...” ¹². In a nation-wide survey of more than a thousand small businesses in the USA, Peterson, Kozmetsky and Ridgeway ¹³ found that only slightly more than a third of the reasons given for small business failures were external in nature. The majority of reasons cited as causing small businesses to fail were internal. Twenty nine percent of the individuals interviewed specifically stated that “a lack of management expertise” caused most small business failures. Their conclusion is in line with previous research. Wichmann ¹⁴ also found that inadequate management skills were the most common cause for small business failures. Wichmann ¹⁴ even went further and stated that management related problems were mostly experienced in accounting and marketing. Other management related problems included, in order of importance: long-

^v A summary of characteristics and major small business problems during the organisational life-cycle can be obtained in the article by Dodge and Robbins ¹¹.

range planning, inventory control, personnel selection and supervision, accounts receivable collection, debt control, and others. In one of the more recent studies, El-Namaki ¹⁵, also attributed small business failure to a lack of professional management skills and to the entrepreneur's negative side, i.e. centralisation of power, lack of strategic planning, lack of technological innovation, etc.

Unsuccessful business owner/managers do not see themselves in the same way that others do, and only few of them will admit that they are bad managers, with personal shortcomings. Nevertheless, failure means a situation where available capital is insufficient, and this can in return be blamed on incompetent management, which has not only exhausted the available capital, but also incurred debt beyond the ability to pay. Poor management in the failed or failing business is evidenced by conditions such as ¹⁶:

- ◇ Inventory imbalance
- ◇ Over-extension of credit
- ◇ Excessive overhead and operating costs
- ◇ Cash flow difficulties
- ◇ Competitive weakness

With very little research on business failures in South Africa, policy makers have to rely on international research results. Nevertheless, experience does suggest that many small business failures can be contributed to incompetent management across the world. Clark and Louw's "Ten Major Reasons Why New Businesses Fail", in their book 'Small Business Opportunities' in South Africa, are in line with international research findings. They presented the following problems that can, for all intents and purposes, be attributed to incompetent management:

- ◇ Cash flow problems
- ◇ Expenses get out of hand

- ◇ Problems in selling the product
- ◇ Owner's enthusiasm wanes
- ◇ The owner fails to delegate
- ◇ Poor planning
- ◇ Incorrect sales forecast
- ◇ Poor record keeping
- ◇ Failure to develop managerial skills

2.2.4 Perceived Causes of Success

Just as it is not easy to define the causes of failure, it is also not easy to define the causes of success in business venturing. Nevertheless, it must be remembered that success and failure are opposite sides of the same coin. Given the dynamic nature of the venturing process, success is not a stable state, but a dynamic reality. Success can therefore be seen as good management in action. Observation of the most impressive success stories shows that a new venture needs to be mature before it can be said to be successful. This 'maturity' can, however, only be reached after one or two decades, and then this 'successful state' may last some decades before showing signs of decline. Success is therefore often measured too soon, and ratings given after only a few years of the new venture's existence.

Most studies have been trying to explain the reasons for success of a new venture through one of four perspectives ¹⁷:

- I. The endogenous explanation
- II. The exogenous explanation
- III. A combination of the endogenous and exogenous explanation
- IV. The chaos explanation

2.2.4.1 Endogenous explanation

Endogenous explanations refer to success factors within the limits of the new venture itself. Studies that focus on an entrepreneur's personality or behaviour, share a common bias towards successful entrepreneurs. Although this is not always explicitly stated, the assumption implies that the accountability of a large part of the success of a new venture, lies within the entrepreneur. Ibrahim and Goodwin¹⁸ surveyed two samples of successful small firms in Canada and the United States to investigate contributing factors to a successful small firm. They concluded that entrepreneurial behaviour and managerial skills represented the key contribution towards the success of small-business management. However, their study is also an example of how a research design can shape the findings. The networking argument, one of the more recent endogenous explanations by Dubini and Aldrich¹⁹, associates the effective networking of entrepreneurs with the success of new ventures. Although this argument cannot be disputed, the networking argument only accounts for a part of the successful outcome.

2.2.4.2 Exogenous explanations

Exogenous explanations focus on sociological and economic factors. They ascribe analytical primacy to the environment as the most critical source of the success or failure of the ventures, and highlight the impact of the sociological and economic environment of the entrepreneurial process. This is the extreme opposite of endogenous explanations, which tend to exaggerate the entrepreneur's role. Exogenous explanations, however, show a tendency to exaggerate environmental determinism whilst ignoring the voluntaristic nature and accountability of human contribution.

2.2.4.3 A combination of the endogenous and exogenous explanation

The partial nature of endogenous and exogenous explanations led some scholars to combine the two perspectives. However, in his review on the different explanations for success, Bouchikhi¹⁷ found that none of the existing combined models completely satisfy

the explanation for success, and that most of the models are oversimplified frameworks created for the sake of statistical testing.

2.2.4.4 The chaos theory

According to chaos theorists, the outcome of the entrepreneurial process can not be predicted, because it is not a smooth, continuous, or ordinary process. In his study on 'Entrepreneurs in High Technology'¹², Edward Roberts states that the "performance of an enterprise is the culmination of intricate interaction of a large number of factors" and "Although each has its effect on company performance, the proper mix of those factors is no doubt of critical importance and perhaps cannot be discovered". Considering that it is rather a disjointed, discontinuous and unique event, the entrepreneurial process should therefore rather be seen as a holistic process that cannot be analysed by breaking it down into its individual components¹⁷. Having stated that the outcome of the entrepreneurial process is not predictable, Smilor and Feeser²⁰ argue that research can only list and sort out all possible initial conditions.

Whichever perspective one chooses, the eventual goal of the entrepreneur is to achieve success for his or her enterprise, at least in terms of the entrepreneur's own standard of success. Even though Roberts stated that the proper mix of factors that influence the success of an enterprise may never be found, he continued to focus on the question of, "What chain of factors is likely to produce a successful entrepreneur?"¹². Roberts, a Professor at the MIT Sloan School of Management, is viewed by many as being one of the top leaders in the field of Entrepreneurship. His study has, therefore, important implications for policy makers, because even with limited knowledge, we still need to know what the most important factors are that influence the success of a new venture, otherwise, no development programme can be justified, and we would just be 'putting out feelers in the dark'.

Roberts divided the likely influences upon technology-based companies' success into the following life-cycle stages of a business:

I. Pre-founding

- The entrepreneur's family background.
- The entrepreneur's education.
- The entrepreneur's age and work experience.
- The entrepreneur's personality and motivation.

II. At founding

- Technological base
- Financial base

III. Post-founding

- Marketing orientation
- Financing
- Managerial orientation

Knowing when to provide what type of assistance, has great value for the development of different business development programmes, in order to meet the varying needs of the new enterprise. Roberts, however, does not provide any definite distinction between influences in the early growth stage and the possible following 'expansion stage' of the new venture. It is, nevertheless, important that assistance programmes focus more on this early growth stage, since it is at this stage when most of the new ventures fail^{vi}.

2.2.4.5 Influences upon success before founding

The first set of factors that Roberts claims to have an influence upon company success, are aspects of the entrepreneurs themselves. He does, however, make a few additional statements that are applicable, and are worth mentioning.

2.2.4.5.1 Family background

While family background may have affected the individual's decision to found his own business, it had no direct influence on the ensuing success of the enterprise¹².

^{vi} For more information, refer to heading 'Period of Failure', on page 9.

2.2.4.5.2 Education

Roberts found it difficult to determine the effect of education on overall company success, and could not find any statistically significant direct relationship between education and success¹².

2.2.4.5.3 Age and experience

Roberts found that the available data “do not support any link between age of founders and company success”¹². He also found that there were no significant ties between general experience and company performance. However, he did find that there were important ties between aspects of work experience and technology transferred, which could relate to subsequent new company performance.

2.2.4.5.4 Personality and motivation

Roberts’ main finding was that “more successful technological entrepreneurs exhibit much greater task or achievement motivation than entrepreneurs who head slower growth firms”¹².

2.2.4.5.5 Number of founders

Roberts found that one of the strongest and most consistent correlates of later success of new technical enterprises is the number of original company founders. He attributes this success to the advantages possessed by teams of founders: “The greater variety and depth of talents, capabilities, initial capital, and experience available to new firms as the number of founders increases, should lead to higher performance” and “The advantages of beginning with more people who share the responsibilities carry over into the later operations of the firm. More founders can undertake more time consuming tasks that demand different sets of skills”¹².

2.2.4.6 Influences upon success at founding

2.2.4.6.1 The technological base

According to Roberts the technological base of the new firm is far more than a nicety, and directly correlates with the eventual degree of company success. New companies that have a higher degree of technology transfer, obtain a significant advantage over companies that have to, e.g. 'start from scratch'. An important remark made by Roberts, is that prospective entrepreneurs, frequently, take follow-on jobs in industry in search of business experience that he presumes might contribute to later entrepreneurial success. "Unfortunately, that additional work experience tends to diminish the amount of technology transfer..." It is especially the increasing time lag that, "deteriorates the degree of technology transfer, which is then responsible for lowering the performance rating of the firm"¹².

2.2.4.6.2 The financial base

The initial capital base at the start-up stage of a new venture is consistently linked to later company success. Roberts, on the other hand, argues that it is possible that the initial capital does not actually influence a company's success, but that it is merely symptomatic of a company's chances for success, e.g. if a company's chances for success is high, better financial assistance might be obtained. Nevertheless, what can be confirmed is that substantial initial financing does not guarantee success¹².

2.2.4.7 Influences upon success post-founding

2.2.4.7.1 Subsequent financing

Roberts was unable to find any consistent ties between subsequent financing and company success. Nevertheless, he did find that it was rather the high success the companies achieved that raised the additional capital, and not necessarily the reverse¹².

2.2.4.7.2 *Marketing orientation*

There are many marketing-related factors associated with the later success of emerging technology-based companies. Roberts found that the prior experiences of the founders in sales activities and the intensity of early company sales efforts, both correlate with later success. He also found that, “company contacts with customers that are aimed at determining customer needs, and the perception of customer helpfulness in determining product specifications also relate to success”¹².

2.2.4.7.3 *Managerial orientation*

In his detailed analysis of the early years of 20 technical companies, Roberts found that there was a significant correlation between the business experience of the founding teams and the early sales growth of those companies. In addition, Roberts found that “Many founders do not understand accounting or the need for conscientious cost control” and, when interviewed, most of the primarily technical founders appeared to have their “principal difficulties in non-technical areas (that is, personnel, marketing, finance)”. This is clearly an indication of the importance of managerial capabilities: doing the right thing right, and at the right time. Roberts further found that, “More successful entrepreneurs seem to balance their initial effort allocation well among engineering, sales, manufacturing, and administrative aspects of their young firms, without allowing their strong technical background to generate an overemphasis on technical activities”¹².

Roberts finally concluded that, “No single issue dominates the failures”¹²

2.3 SIZE CLASSIFICATION

There is no one generally accepted size classification for enterprises. The criteria used to classify enterprises according to size, include: employees, fixed assets, turnover, and technology-level. Classification varies to suit each country’s unique conditions, serving as a guide to apportioning the government's business support services. Divergent national definitions, both of small enterprises and their support programmes, make international comparisons very difficult. To accommodate local conditions, the size

classification for enterprises used in the White Paper of the Department of Trade and Industry — The National Strategy For The Development And Promotion Of Small Business In South Africa — was adopted for this study.

I) *Survivalist enterprises* are activities by people unable to find a paid job or get into the economic sector of their choice. Income generated from these activities usually falls far short of even a minimum income standard, with little capital invested, virtually no skills training in the particular field and only limited opportunities for growth into a viable business. Poverty and the attempt to survive are the main characteristics of this category of enterprises.

II) *Micro-enterprises* are very small businesses, often involving only the owner, some family member(s) and at the most one or two paid employees. They usually lack “formality” in terms of business licenses, value-added tax (VAT) registration, formal business premises, operating permits and accounting procedures. Most of them have a limited capital base and only rudimentary technical or business skills among their operators. Earning levels of micro-enterprises differ widely, depending on the particular sector, the growth phase of the business and access to relevant support.

III) *Small enterprises* constitute the bulk of the established business, with employment ranging between five and approximately 50. The enterprises will usually be owner-managed or directly controlled by the owner-community. They are likely to operate from business or industrial premises, be tax-registered and meet other formal registration requirements. Classification in terms of assets and turnover is difficult, given the wide differences in various business sectors like retailing, manufacturing, professional services and construction.

IV) *Medium enterprises* constitute a category difficult to demarcate vis-à-vis the “small” and “big” business categories. It is still viewed as basically owner/manager-controlled, though the share holding or community control base could be more complex. The

employment of 200 people and capital assets (excluding property) of about R5 million are often seen as the upper limit.

2.4 NEW VENTURE CREATION

To understand the process of new venture creation one needs to know who typically starts a new venture, what the driving forces are behind the decision, and what the interaction is between the entrepreneurial environment and the process of new venture creation. The most obvious starting point, therefore, is to look at entrepreneurship and the entrepreneurial process. One can then move on and try to identify the different environmental conditions that interact with the new venture to facilitate the process.

2.4.1 Entrepreneurship: An Overview

Although the term “entrepreneurship” has been used in a business context for well over two hundred years, there is still considerable disagreement regarding its meaning. While the overall field of entrepreneurship is loosely defined as the creation of new business enterprises by individuals or small groups²¹, there is currently no consensus on the definition of an entrepreneur, and without such a definition boundaries do not exist regarding what should be included when discussing entrepreneurial activities. While there have been literally hundreds of perspectives, seven of the most prevalent themes were summarised by Morris²², as shown in Table 1.

TABLE 1: SEVEN PERSPECTIVES ON THE NATURE OF ENTREPRENEURSHIP

The Creation of	Description
Wealth	Entrepreneurship involves assuming the risks associated with the facilitation of production in exchange for profit.
Enterprise	Entrepreneurship entails the founding of a new business venture where none existed before.
Innovation	Entrepreneurship is concerned with unique combinations of resources that make existing methods or products obsolete.
Change	Entrepreneurship involves creating change by adjusting, adapting, and modifying one's personal repertoire, approaches, and skills to meet different opportunities available in the environment.
Employment	Entrepreneurship is concerned with employing, managing, and developing the factors of production, including the labour force.
Value	Entrepreneurship is a process of creating value for customers by exploiting untapped opportunities.
Growth	Entrepreneurship is defined as a strong and positive orientation towards growth in sales, income, assets, and employment.

Albro Martin correctly pointed out that it is equally important to exclude certain roles from entrepreneurship, viz. ²³:

- I. A person who owns an enterprise or gives orders is not necessarily an entrepreneur.
- II. A person who assumes the risk of his or her capital is not necessarily an entrepreneur, but only an investor.
- III. A creative person in the literary, artistic, or dramatic sense is not necessarily an entrepreneur.

Entrepreneurship is clearly not a uniformly distributed quality and many researchers consider the appearance of the entrepreneur to be non-random. One can therefore understand that until recently, entrepreneurship research focused mostly on the entrepreneur, and the major thrust was to distinguish between the entrepreneur and the

non-entrepreneur and to prove that entrepreneurial firms are different from non-entrepreneurial firms. If the origins of entrepreneurs, their psychological characteristics, and sociological events that motivate them to begin new ventures could be established, then educational methods to upgrade entrepreneurial skills could be developed. McClelland²⁴ initiated an impressive research programme aimed at uncovering the psychological differences between entrepreneurs and non-entrepreneurs. His main conclusion was that people that have an urge for excellence, willingness to take a moderate risk, and desire to be independent, are very likely to become entrepreneurs. In short, the main difference is that entrepreneurs have a higher need for achievement. The findings and implications of his research, and the stream of research that followed on psychological differences of entrepreneurs, remain controversial. Brockhaus²⁵ surveyed a large amount of research and elaborating on this study, Yvon Gasse concluded: “Although much progress has been made in the past 15 years, no clear link has yet been established between the personality characteristics of entrepreneurs and the success of their business ventures.” Ginzberg and Buchholtz²⁶ also observed that no single empirical study provided a definite answer as to the possible differences in terms of personality traits between entrepreneurs and non-entrepreneurs. In his book ‘Entrepreneurs in High Technology’¹², Edward Roberts also agrees that no model of an entrepreneur can represent all entrepreneurs, even when one limits oneself to high-technology entrepreneurs. Roberts, nevertheless, went further and provided the following characteristic influences on the development of a technical entrepreneur¹²:

- I. A strong tendency for entrepreneurs to come from families in which the father was self-employed, providing a role model that presumably stimulated his son’s desire for independence — “the entrepreneurial heritage”.
- II. The family’s achievement-orientated religious background does affect the incidence of technical entrepreneurship.
- III. The median education was about a master’s degree, usually in engineering, and “only infrequently educated in all other disciplines, including management”.
- IV. The mid-thirties were the dominant age group for technical founders.

- V. The typical entrepreneur had a decade plus work experience, mainly obtained in development, rather than research work.
- VI. From a personality perspective, technical entrepreneurs had more of an “inventor” personality and were more likely to be extroverts. The entrepreneurs also showed a long-felt desire for their own business, but with a moderate need for achievement and a heavy orientation towards independence.

The basic assumption underlying most of the previously mentioned research, is that all entrepreneurs and their ventures are very similar. Gartner ²⁷, however, pointed out that the differences among entrepreneurs and among their ventures are much greater than one might expect: “in fact, the diversity may be larger than the differences between entrepreneurs and non-entrepreneurs and between entrepreneurial firms and non-entrepreneurial firms”. Gartner went further on to argue that the ongoing debate on personality traits is asking the wrong question. “Who is an entrepreneur?” should be changed to “What does the entrepreneur do?”. According to Gartner, “Entrepreneurs are identified by a set of behaviours which link them to organisation creation” and therefore the behaviour of entrepreneurs is more relevant to the creation of organisations than their personal psychological traits. Attention should therefore move away from examining the person to focusing on the entrepreneurial process.

2.4.2 The Entrepreneurial Process

Morris proposed the following definition as a synthesis of contemporary thought:

“Entrepreneurship is a process activity. It generally involves the following inputs: an opportunity; one or more proactive individuals; an organisational context; risk, innovation; and resources. It can produce the following outcomes: a new venture or enterprise; value; new products or processes; profit or personal benefit; and growth.” ²²

The importance of this definition should not be overlooked. First, it emphasises that the focus should be on the process rather than the (entrepreneurial) person, whilst recognising the indispensable role played by the person. Secondly, it distinguishes between components that are inputs during the entrepreneurial process, and those that are outcomes. Finally, it recognises that the set of necessary inputs is fairly definite, while the set of possible outcomes may or may not happen. While this definition delineates the phenomenon we are dealing with, it does not adequately capture the underlying variable nature of entrepreneurship.

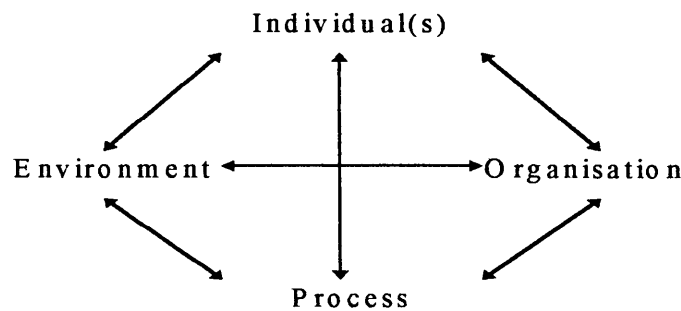
Gartner²⁸, on the other hand, conceptualised entrepreneurship as a process that occurs in an organisational setting: “Entrepreneurship is the creation of an organisation”. This approach to the study of entrepreneurship treats the organisation as the primary level of analysis and the individual is viewed in terms of activities undertaken to enable the organisation to come into existence.

2.4.2.1 Multidimensional influences

In analysing the entrepreneurial process, one finds that relying only on traditional models, such as a psychological model or a competitive strategy model, to analyse new ventures, is not useful. Any unidimensional model that attempts to distil the common basis for the collective success of entrepreneurial ventures can tell only part of the story.

Gartner²⁸ went further and developed a multi-dimensional framework for describing the creation of a new venture, as shown in Figure 3.

FIGURE 3: A FRAMEWORK FOR DESCRIBING NEW VENTURE CREATION.



The framework's main contribution to the entrepreneurial process is that it recognises the multidimensional aspects of new venture creation. First, it emphasises that individuals with expertise are a key element of the new venture, and at the same time it recognises the new venture as an organisational entity. It also stresses that the new venture is not instantaneously produced, but evolves over time. Finally, a new venture should be seen within the context of its environment: it is forced to seek out resources, and it competes in the market place. New venture creation can therefore not be comprehensively described, nor can its complexity be adequately accounted for, unless all of its four dimensions are investigated and an attempt is made to discover how variables from each dimension interact with variables from other dimensions.

2.4.3 The Four Cornerstones of an Enterprise

In his evaluation of the models and methodologies of new venture creation, Jeffrey Timmons found there are several common threads among entrepreneurial models, viz. ³:

- ◇ The importance of a talented, creative, committed lead entrepreneur who has realistic knowledge about his or her talents and the needs of the venture.
- ◇ The importance of attracting and molding a team with complementary skills and talents if the venture is to grow beyond roughly \$1 million in sales.
- ◇ The importance of a triggering idea for a product or service.

- ◇ The importance of a business plan to determine effective strategies, market potential, financial requirements, technical feasibility, and team needs.
- ◇ The importance of outside contacts, a network of people, and resources.
- ◇ The importance of appropriate financing.

On the revaluation of the models and methodologies evaluated by Timmons and adding the insight gained from Gartner's model of the entrepreneurial process ²⁸ and Edward Roberts' book, 'Entrepreneurs in high technology' ¹², it was found that, excluding time and external influences, the basis of a new venture can be divided into the following four cornerstones:

- I. Entrepreneurship
- II. Business Know-how
- III. Technology
- IV. Capital

2.4.3.1 Entrepreneurship

The primary driver of new business ventures is neither the availability of resources nor the rate of technological advance; it is the entrepreneur. Central to nearly all models of venture creation is the entrepreneur as catalyst, energiser, project champion, innovator, creator, and team leader. In this sense, the entrepreneur is not necessarily an individual and can therefore consist of a group of people ^{vii}.

2.4.3.2 Business know-how

The second cornerstone is business know-how. Business know-how is the ability to leverage business or scientific knowledge in linking talent, technology, and capital in emerging and expanding enterprises. It is the ability to find and apply expertise in a

^{vii} For more information on entrepreneurship, refer to heading 'Entrepreneurship: An Overview', on page 25.

variety of areas that can make the difference between success and failure. This expertise may involve management, marketing, finance, accounting, production, and manufacturing, as well as legal, scientific, and engineering help.

It is rare to find a potential entrepreneur who combines the technical expertise necessary for technological innovation with the business acumen necessary for successful product commercialisation. Incubators are designed to assist entrepreneurs in developing their business skills in an environment that promotes company development.

2.4.3.3 Technology

The third cornerstone is technology. The burst of creativity and innovation in emerging technological industries holds tremendous promise for economic development and technology business growth. In their report 'Profiting from Innovation', William Howard and Bruce Guile state that "the goal of using technology in business is not just technological excellence, but business success" and "such business success may arise serendipitously from a truly new technology, but more likely it will follow from a focused program of technical and business work and from making improvements to existing products and processes faster and more effectively than competitors"²⁹. Today, every business participates in technological change as an originator, user, or victim of technological invention and innovation. The importance of the technological base of the new firm is also underlined by Edward Roberts, and he states that it "directly correlates with and is a causal influence upon the eventual degree of company success"¹².

2.4.3.4 Capital

Capital^{viii} is the catalyst in the entrepreneurial chain reaction and forms the lifeblood of any emerging and expanding enterprise. With the range and complexity of financing alternatives in today's marketplace, companies need assistance in understanding the alternatives and in determining which may be the best for them. This process involves not

^{viii} Capital refers also to all physical resources.

only an understanding of the technical and financial dimensions of an alternative but also the ability to recognise the attitudes, perspectives, and concerns—the mind set—of those providing funds. This is particularly true when a company considers trading equity for control.

2.4.4 The Entrepreneurial Environment

One reason for concentrating on the entrepreneurial environment is that small-scale enterprises have the least control over the environment in which they operate. In return, the environment has probably one of the largest influences on new venture creation, if only in the sheer numbers of SMMEs that are influenced by it. While the role of environmental conditions in developing entrepreneurship has been recognised, Gnyawali and Fogel found that “most of the studies are highly fragmented, highly descriptive, and focus only on a few aspects of the environment. More importantly, most of the literature has neither paid adequate attention to the needs of the entrepreneur — the main beneficiary of the environment — nor described the environmental conditions in terms of the process of new venture creation”³⁰. Gartner developed a multi-dimensional framework^{ix} to describe the creation of a new venture, and shows the linkage between the environment, the organisation, the individual, and the entrepreneurial process. Gnyawali and Fogel went even further and attempted to bridge the gaps by *first* developing a more detailed conceptual framework to integrate existing literature on entrepreneurship environments. *Secondly*, they introduced some of the core elements of the new venture creation process and explicitly linked the environmental dimensions to the process of new venture creation, showing how environments can help increase people’s likelihood to go into business.

With “entrepreneurial environment”, Gnyawali and Fogel refer to the combination of factors that play a role in the development of entrepreneurship. “*First*, it refers to the overall economic, socio-cultural, and political factors that influence people’s willingness

^{ix} For more information, refer to heading ‘Multidimensional influences’, on page 29.

and ability to undertake entrepreneurial activities. *Second*, it refers to the availability of assistance and support services that facilitate the start-up process”³⁰. The framework developed by Gnyawali and Fogel, grouped the environmental conditions into the following five dimensions : government policies and procedures, socio-economic conditions, entrepreneurial and business skills, financial support to businesses, and non-financial support to businesses. This framework has important implications for policy makers. *Firstly*, it provides some of the most important conditions for new venture development and therefore points indirectly to the type of assistance that should be provided to SMMEs. *Secondly*, it provides a basis for policy makers, against which they can evaluate existing and new development programmes. *Thirdly*, it shows, together with Gartner’s multi-dimensional framework, that development programmes should not only focus on one specific facet, but that they should rather work together to create a more comprehensive assistance programme with a common end goal: successful new venture creation. *Finally*, it also shows that development programmes are on their own, are not enough. Government, educational institutions and families, in short the whole nation, should work together to create a more favourable environment for new venture creation.

2.4.4.1 Environmental conditions for new venture creation

2.4.4.1.1 Government policies and procedures

Market mechanisms need to function fluently and efficiently to ensure a conducive market for new venture creation, unrestrained by unnecessary restrictions. In general, entrepreneurs are discouraged to start a new venture when they have to follow many rules and procedural requirements, spending more time and money in fulfilling the procedural requirements than they can afford. Governments can prevent these restrictions by removing conditions that create market imperfections and administrative rigidities. In Franklin and Goodwin’s survey, ‘Problems of Small Business and Sources of Assistance’,¹⁰ five of the top ten problems cited by respondents were directly linked to government, paperwork and associated costs. These problems can be indirectly interpreted as problematic results of government policy and regulation.

Factors such as strong distribution channels and intense rivalry among existing firms provide an improved opportunity for entrepreneurs to pursue innovation. In his comprehensive study entitled “The Competitive Advantages of Nations”, Michael Porter asserted that “Government’s proper role is as catalyst and challenger; it is to encourage—or even push—companies to raise their aspirations and move to higher levels of competitive performance, even though the process may be inherently unpleasant and difficult”³¹.

Governments should also create an enabling environment for SMME finance development and support the evolution of such a network of institutions. The macroeconomic environment should ensure a stable national currency, controlled inflation, and predictable exchange rates. A sound commercial framework consisting of more open markets, cost-effective systems for delivering credit and technical support, protection of intellectual property and the environment, and consumer assurance of quality, is also essential for business formation and growth.

In developing countries, governments need also to focus more on developing primary infrastructural conditions, including a functioning telecommunications system, connections to utilities, and accessible transportation.

2.4.4.1.2 Socio-economic conditions

A society sympathetic towards entrepreneurship may be more important to the success of new ventures than most people realise. In fact, social factors may be equally important as technical assistance, physical facilities, etc. Many entrepreneurs are discouraged to start a new venture when most of the members of the society view new ventures with suspicion. This suspicion is especially evident in a society that has a negative outlook on risk taking.

A supportive attitude towards entrepreneurship and widespread public support for entrepreneurial activities are both needed to motivate people to start new businesses. The

presence of experienced entrepreneurs and successful entrepreneurial role models in a community provide an even more positive encouragement for people to become entrepreneurs. This positive encouragement should not only be evident in community structures, but throughout private and public organisations. The need for such motivational factors is generally higher in countries where entrepreneurial awareness is low than in countries where such awareness is high ²⁴. It is therefore imperative that government and business development organisations develop societal awareness towards entrepreneurship and make people recognise the importance of being entrepreneurs through organised programmes.

2.4.4.1.3 Entrepreneurial and business skills

Research shows that inadequate management skills are the most common cause for small business failures ^x. Therefore, unless entrepreneurs are well equipped with technical and business skills, they may not be able to overcome the various problems they encounter at different stages of their business' life-cycle. The need for training programmes appears particularly important in emerging market economies where very limited external assistance is available. Even when assistance programmes are available, entrepreneurs are poorly informed about the availability and suitability of the different assistance programmes. In his report on 'Small Business Management Assistance Needs and Sources'¹³, Peterson states that "the impression one obtains from actually talking to small business owners and managers is that they are not being provided with the kinds of management assistance they need". He further asserts that, despite the wide variety of management assistance programmes and sources, "there is a dearth of information regarding the specific management assistance of small business". Furthermore, many of the small-business-related assistance programmes are poorly researched and lack the necessary flexibility, practical orientation and structural cohesion, as demonstrated by Lalkaka and Bishop's assessment of the effectiveness of 'Small Enterprise Support Programmes' ¹.

^x For more information, refer to heading 'Reasons for Business Failures', on page 15.

2.4.4.1.4 Financial support to businesses

One of the key constraints facing the new and expanding SMMEs is the lack of access to finance. Generally, SMMEs require financial assistance for at least one of three purposes: to diversify or spread the start-up risk, to accumulate start-up capital, and to finance growth and expansion. However, in most developing countries and emerging market economies, lenders seem to be unwilling to invest in high-risk projects or tend to withhold support until the firm has been established successfully¹. Thus, a paradox emerges: an entrepreneur cannot start a business without financial assistance; on the other hand, he cannot obtain financial assistance because he lacks prior business experience.

This problem has many dimensions, including the following³²:

- ◇ difficulty for SMME loan applicants at conventional banks and other financial institutions to successfully meet the criteria for the granting of loan facilities, overdrafts or other types of funding, because of the high costs and risk involved in the processing and supervision of these loans;
- ◇ unwillingness of commercial banks to supply loans without conventional collateral;
- ◇ insufficient integration of formal and informal credit and lending services;
- ◇ too few specialised lending institutions;
- ◇ scarcity of venture capital funds and joint-venture partners;
- ◇ lack of organisations providing working capital and other short-term funding; and
- ◇ “... most bankers lack the kind of experience and capability needed for understanding and responding to the special needs of small entrepreneurs”³⁰.

Research has also shown that the “creation of investment companies, provision of low-interest loans, and availability of credit guarantee schemes for small business financing have all contributed to the establishment of new businesses”³⁰.

2.4.4.1.5 Non-financial support to businesses.

There are various support systems, other than financial assistance, which entrepreneurs require. Essential support entrepreneurs need include assistance in conducting market studies, in preparing business plans and in structuring an application for financial assistance.

Entrepreneurs spend a great deal of their time, during the start-up phase of the new venture, in making contacts with other entrepreneurs and related agencies³³. These networks provide four essential ingredients that enhance the entrepreneur's capability, viz.: support and motivation; examples and role models; expert opinion and counselling; and access to opportunities, information, and resources. Mechanisms that increase the opportunities for networking are therefore useful to enhance the business capabilities of entrepreneurs. The following mechanisms are used to increase the opportunities for networking: trade fairs, entrepreneurial fairs, associations and clubs, conferences and the availability of electronic mail.

Infrastructure forms an integral part of the entrepreneurial environment and makes a substantial impact on, especially, new ventures in developing countries. The lack of industrial premises often retards the growth of informal and small-scale manufacturing, especially in residential areas with congested housing. Other elements include the existence of universities and research and development programmes, a well-educated and technically skilled labour force, and modern transport and communication facilities that provide easy access to customers as well as suppliers.

Studies reflect the vital importance of assistance programmes for small businesses in developing entrepreneurship. In a study of the growth of jobs created by small firms across various US states, Phillips found that the presence of business development assistance was significantly correlated with the share of jobs created by small firms³⁴.

It can therefore be concluded that the existence of various environmental conditions stimulate and encourage the emergence and growth of new ventures. Although the existence of a single factor may not have a significant impact, the interaction of various factors may considerably increase the impact on entrepreneurial development in a country. A properly selected combination of factors will therefore have a far greater capacity for effectiveness, whereas the development of an individual condition may not be worth the effort and expense.

Even if all the environmental conditions for new venture creation were known, the new venture creation process would still be a relative 'black box' item. We are therefore still unable to determine what and how assistance should be provided to new ventures during the evolution of the business. Nevertheless, experience shows that the driving forces behind new venture creation are extremely suitable to assess and influence the improvement in the number of start-ups and their chances of success. Gnyawali and Fogel refer to these driving forces as the core elements of new venture creation³⁰.

2.4.4.2 The driving forces behind entrepreneurship

There are two general models explaining the forces behind new business formation:

- I. *The positive model* suggests that an entrepreneur is pulled into establishing a business when he perceives an opportunity to participate in an endeavour, and/or capitalise on past experiences, and/or expand on present capacities.
- II. *The negative model* suggests that an entrepreneur is pushed into establishing a business when he has a history of dissatisfaction and displacement and sees a new business as a means of changing past experiences rather than extending them into the future.

Gnyawali and Fogel³⁰ defined the three key elements that may lead to an increase in a person's desire and decision to start a business as opportunity, propensity to enterprise, and ability to enterprise:

2.4.4.2.1 Opportunity

“Opportunity refers to the extent to which possibilities for new ventures exist and the extent to which entrepreneurs have the leeway to influence their odds for success through their own actions.”³⁰

2.4.4.2.2 Propensity to enterprise

Propensity to enterprise can be defined as the extent to which a person with certain behavioural characteristics is able to perceive the opportunities available in the environment, seize such opportunities, and then turn such opportunities into profitable ventures. “An individual with high propensity to start a business is more likely to go into business when he or she sees several business opportunities in the environment. Furthermore, the propensity to enterprise will be enhanced when an individual feels confident in his or her ability to enterprise.”³⁰

2.4.4.2.3 Ability to enterprise

“Ability to enterprise refers to the sum of technical and business capabilities required to start and manage a business.” Technical capability refers to technical skills, while business capability refers to the knowledge and skills in various functional aspects of business such as business planning, product development, marketing, etc.

The key role of the entrepreneurial environment should be to help entrepreneurs develop both propensity to enterprise and ability to enterprise. Persons with low propensity to enterprise lack the necessary motivation and mind-set required to start a business, whereas persons with low ability to enterprise lack the skills needed to manage the start-up and subsequent processes of business operation. Thus, a high level of opportunity, propensity to enterprise, and ability to enterprise will positively correlate with an individual’s likelihood to engage in enterprise. It is therefore a crucial requirement in the process of new venture development, that a match between the opportunity, the propensity to enterprise, and the ability to enterprise be found.

2.5 IMPLICATIONS FOR POLICY MAKERS

In retrospect, we note that systematic research into the characteristics of successful ventures is a new and inexact science, and research in economics and strategic management has barely begun to focus on new venture development and performance. Entrepreneurship typically occurs in a real-world environment that lacks certainty, predictability, stability, and smoothness. Risk and uncertainty, paradoxes and contradictions, multi-dimensional influences and market imperfections are the rule, rather than the exception. Consequently, business as usual includes confusing and often chaotic change and turbulence in markets, technology, and availability of resources.

Given the complexity of new venture creation and the real-world environment, it is nearly impossible to determine where and how new venture creation should be stimulated and assisted to achieve the best end results. What we do know, is that although some of the new venture failures are unavoidable due to external factors, many of these failures could have been prevented. If any country can therefore turn the statistics around and increase the survival rate of its new start-up ventures, it can create a tremendous economic leverage. Consequently, one of the purposes of new venture development is to create an economic advantage by increasing the number of new ventures developed, increasing the survival rate of new ventures, and by stimulating the growth potential of new ventures.

With limited capital available to assist SMMEs, structures need to be developed to ensure that the optimum assistance is provided to firms with the highest growth potential. Continuing research suggest that only ten to fifteen percent of new firms are growth firms, but these technology-based businesses and other 'high status, high growth' businesses require a conducive environment in order to grow. *The challenge is, therefore, to identify the ventures with great promise, provide the assistance they need, and to help them achieve their potential.*

The model developed by Gnyawali and Fogel ³⁰, shows that each aspect of an environmental condition is related to a specific aspect of the core elements of new venture creation and they suggest the following propositions:

- ◇ “The higher the opportunity, propensity to enterprise, and ability to enterprise, the higher the likelihood to enterprise.
- ◇ The more favourable the socio-economic factors, the greater the propensity to enterprise.
- ◇ The greater the entrepreneurial and business skills, the greater the ability to enterprise.
- ◇ The more favourable the government policies and procedures, the higher the opportunity to enterprise.
- ◇ The higher the likelihood to enterprise, the higher the new venture creation.
- ◇ The higher the likelihood to enterprise and the greater the availability of financial and non-financial assistance, the higher the new venture creation.”

This has important implications for public policy and for the planning and implementation of programmes to develop entrepreneurship. The primary role of the government and other agencies that are involved in business development, should be: firstly, to increase the opportunities for new venture creation; secondly, to develop the motivation of potential entrepreneurs to go into business; and thirdly, to enhance potential entrepreneurs’ ability to start a business. Gnyawali and Fogel suggest the following points as guidelines for formulating policy and regulatory systems in the development of the entrepreneurial environment ^{xi}:

- ◇ Governments should aim to adopt policies and programmes that open-up a broader scope of opportunities to entrepreneurs. Examples include: laws and regulations to protect entrepreneurial innovation, such as patents and copyrights, and a liberal economic policy.

^{xi} Refer to Lalkaka and Bishop ¹ for more detailed guidelines on enabling policies.

- ◇ Governments should aim to adopt policies and programmes that improve the socio-economic dimension of the entrepreneurial environment to raise the country's propensity to enterprise. Examples of short-term programmes include: best-entrepreneur-of-the-year award and trade fairs. A long-term approach should aim to introduce entrepreneurial values and thinking into the educational system.
- ◇ Governments should aim to adopt policies and programmes that improve the business skills of the potential entrepreneurs to raise the country's ability to enterprise. Examples include: technical and vocational training, entrepreneurship development courses, and workshops aimed at enhancing specific business skills.
- ◇ Countries with a low propensity and ability to enterprise should be careful to offer broad-based financial assistance to potential entrepreneurs. This is because despite the financial assistance, people with low propensity and ability to enterprise may not venture into business or, even if they did, they may not be able to manage the enterprise.

Policies that ensure the provision of information, on for example local assistance programmes, can well be added to this list by Gnyawali and Fogel.

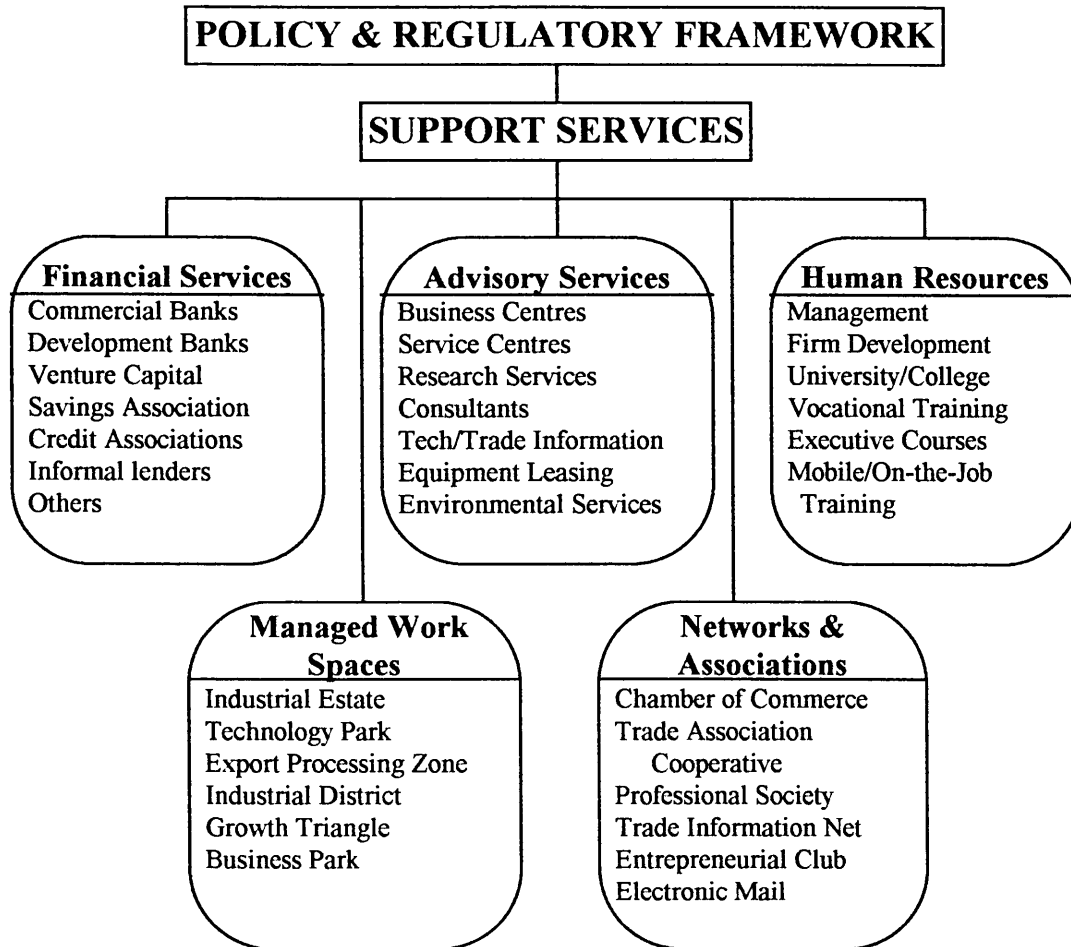
2.6 CURRENT INITIATIVES TO SUPPORT SMALL FIRMS

With a growing number of small businesses and increasing evidence of their contribution, involvement in the promotion of entrepreneurship and enterprise development and various forms of business support programmes are introduced across the world. In addition to removing the regulatory barriers and policy biases against SMMEs, business support programmes include ¹:

- ◇ supply-side assistance programmes — generally designed to provide financing arrangements, technical and management consultancies, and managed work spaces;
- ◇ trade and technology information; and
- ◇ mechanisms for networking among small businesses.

The range of support services is indicated in Figure 4:

FIGURE 4: TYPOLOGY OF SUPPORT SERVICES ¹



In Candace Campbell's report on the business incubation industry, she lists some of the current initiatives that exist to support small firms, viz. ³⁵:

- ◇ Business Expansion Scheme - tax relief to investors in small firms.
- ◇ Loan Guarantee Scheme - government guarantees for small business loans.
- ◇ New Enterprise Package - raised the threshold for tax-exempt.
- ◇ Enterprise Zones - eased planning restrictions in designated areas.
- ◇ Small Workshop Scheme - An industrial building allowance.

- ◇ Enterprise Allowance Scheme - allows an entrepreneur long-term unemployment to start a business, with unemployment benefits.
- ◇ Development Agency Loans - financing for workshops, industrial estates and business loans
- ◇ Manpower Services New Enterprise Programme - training programmes.
- ◇ Local Enterprise Agencies - public and private sector voluntary organisations set up to provide funds for workshops, training courses and advice to businesses.

It is clear that governments and other donors invest significant resources in establishing and maintaining small business service centres and a range of other schemes. However, most of these schemes have varying degrees of effectiveness and sustainability. As national budgets shrink, serious questions are raised regarding the increased amount of job creation, innovation and economic growth produced by support programmes. Most of these support programmes, however, leave much to be desired. Government-sponsored support mechanisms generally lack the needed flexibility, motivated personnel and political leadership to sufficiently support new ventures. It is in search of an effective support system where the business incubator enters the marketplace of policy ideas. The rapid proliferation of business incubators the world over is due in some measure to the dissatisfaction with existing support mechanisms. It is also due to the perception that incubators provide an integrated and affordable package of services, which enhances the chances of survival and growth of early-stage, knowledge-based enterprises. Coupled with favourable policy, infrastructure, and the entrepreneurial climate in industrial countries, some business incubators have been very successful in reaching their goals, as will be explained on later. The incubator should, however, not be seen as a replacement of other schemes, but rather as a complement to them.

3. BUSINESS INCUBATION

The disappointingly high failure rates of new business start-ups has seen the emergence of several forms of assistance programmes that attempt to improve the success rate of new businesses. Of these development programmes, the business incubator is one of the most intriguing concepts. Today, there are approximately 1,500 business incubators world wide in operation, and their numbers are still increasing all over the world, with one being added each week in the USA alone. Even though one of the first 'business incubators' was established in 1964ⁱ, the business incubator, as we know it today, is still a relatively new concept in entrepreneurship and economic development.

The rationale behind business incubation programmes in economic development can be seen in the contribution they have made to sustain new enterprises that might have otherwise failed during the early period of business formation, due to a lack of adequate support. In this sense, the business incubator has become a significant micro-economic tool to foster the growth of new ventures. The advantage of business incubation programmes above other existing business development programmes, lies in its flexibility. A business incubator is a remarkably flexible instrument, which supports fledgling enterprises in a variety of ways, and according to their needs. Business incubation programmes also have the additional advantage that they only need limited support from regional or national government agencies. The business incubator is therefore not a capital-intensive programme, since support is usually only needed to establish and maintain the facility's early operations, until the incubator can be managed as a business entity in itself. The business incubator can even reach break-even point in about three to four years under the right conditions, however, it would take considerable time to recover the initial investment.

The business incubator should be considered as one additional device in the tool-kit of small enterprise support modalities. It fills a special niche, that of nurturing selected

business incubation programme should therefore complement other policy instruments and be used as a sensible long-term strategy for economic development. The incubator concept has in itself undergone a series of transformations, responding to the needs of its market.

3.1 THE HISTORY OF BUSINESS INCUBATION

The first incubators spontaneously germinated at a time when the word incubator had not yet been used in connection with business development. These incubation programmes followed a total evolutionary process, since they had no models or tested concepts to follow. One of the earliest business incubators started in 1964 when the University City Science Centre (UCSC) in the USA began to redevelop cleared land in an urban renewal area adjacent to two major universities in Philadelphia for large research and development corporations and other private businesses³⁵. While this project was not explicitly set up to assist in the development and nurturing of new enterprises, UCSC housed small businesses in space 'as available' in its buildings. All along, UCSC was able to provide some of their excess capacity in terms of office services and equipment to start-up companies. Furthermore, this environment ensured that small companies were drawn by the resources of UCSC, the other firms in the area, and the proximity to the universities. Therefore, even though there was no specific facility that was managed as a business incubator, the environment created by UCSC had a comparative effect to that of the new business incubator, as first described by Smilor²⁰.

These early business incubators had three historical roots³⁵:

- ◇ efforts that aimed at developing inner-city blighted areas;
- ◇ an experiment funded by the National Science Foundation, in the USA, to foster entrepreneurship and innovation at major universities; and

◇ initiatives by successful individual entrepreneurs or groups of investors that sought to transfer their own new venture experiences to new companies in an environment conducive to successful technological innovation and commercialisation.

As the concept evolved further in the early 1980s, two broad strategies emerged ²⁰: The one approach focused on renovating vacant buildings. This strategy, however, focused more on leasing space at inexpensive rates, than on building companies, and was therefore rather a property development scheme. The other approach focused more on helping companies to grow. This strategy also provided space, but the focus was on providing support services for business development. As the business incubator concept evolved, the emphasis shifted more towards the second strategy. This evolution of the business incubation concept was not only limited to the USA. In fact, the first incubator in its modern form, appeared in the United Kingdom in 1972 at Covent Garden ³⁵.

Today, the numbers are increasing, with business incubators sprouting up all over the world. Approximately 1,500 business incubators are in operation, with roughly one-half in the United States and about 250 in industrialising countries. Considering the current trends, business incubators in industrialising countries may well double in number to more than 500 within the next five years ¹.

Business incubators go under a variety of other names across the world, including 'innovation centre', 'enterprise centre' and 'business and technology centre'. As can be expected, the size, management, location, and economic development goals of 'business incubators' across the world are quite diverse. Although these incubators vary in the scope of assistance provided and in the operational policies that are implemented, there are some components generic to the incubator concept. Consequently, it is necessary to define the term 'business incubation' and 'business incubator', to ensure that any misconception is avoided.

3.2 DEFINING BUSINESS INCUBATION

Since a definition can be viewed as the description of all the most determining factors, including all the boundaries, it is necessary to take a closer look at all the relevant terms of the existing definitions to define the terms business incubation and incubator for the purpose of this document.

3.2.1 General Definition of ‘Incubation’

3.2.1.1 Oxford dictionary :

Incubate: cause the development of (bacteria, babies, etc.) by creating suitable conditions.

Incubation: the act of incubating / brooding.

Therefore, to incubate means to maintain, under prescribed and controlled conditions, an environment favourable for hatching or developing. It also means to cause, to develop, or to give form and substance to something. In this context, an incubator is an apparatus for the maintenance of controlled conditions for cultivation ³⁶.

3.2.2 General Definitions of the Term: ‘Business Incubator’

The following list of definitions represents the general accepted view of what a business incubator is. There is, nevertheless, a few assumptions in some of the definitions, that need to be discussed before we define what an incubator in South African terms is.

3.2.2.1 Viewpoint of the National Business Incubator Association (NBIA)

“Incubators are projects whose purpose is to promote the growth and development of new enterprises by providing flexible space at affordable rates, a variety of support services, access to management, technical and financial assistance, and opportunities to interact with other entrepreneurs and business experts.” ³⁷

“Incubators are business assistance programs targeted to start-up and fledgling firms. They offer access to business and technical assistance provided through in-house expertise and a network of community resources; shared office, research or manufacturing space; basic business support such as telephone answering and clerical services; and common office equipment including copy and fax machines. Incubators support emerging businesses during their early, most vulnerable stages. They promote new firm growth, technology transfer, neighbourhood revitalisation, and economic development and diversification.”³⁷

3.2.2.2 Viewpoint of the United States Small Business

Administration

“Incubators are buildings in which a number of new or growing businesses can locate and operate at much lower cost than in conventional space where market rates prevail. Incubator facilities are characterised by access to shared, centralised facilities such as clerical and administrative help, receiving and shipping facilities, conference rooms, computers and word processors, and other business assistance.”³⁸

3.2.2.3 United Nations Development Programme:

“A business incubator is defined as a controlled work environment, designed to foster the growth of new and emerging companies. This environment is distinguished by particular characteristics, intended to create a collegial climate for the training, support and development of successful small entrepreneurs and profitable businesses. These characteristics include: careful initial selection of early-stage or start-up entrepreneurial firms with potential for growth; designated work spaces provided for each tenant; shared facilities necessary to operate a business, such as communications and administrative support; a small management team who train, develop and assist new entrepreneurs; access to critical professional services such as legal and financial assistance; affordable rents and fees for services; and businesses “graduating” after three or four years of residence at the incubator.”¹

3.2.2.4 Others

“An 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: secretarial support, administrative assistance, facilities support, and business expertise, including management, marketing, accounting, and finance. By controlling these conditions, the incubator seeks to effectively link talent, technology, capital, and know-how in order to leverage entrepreneurial talent and to accelerate the development of new companies.”

Raymond W. Smilor & Michael Doud Gill, Jr. ³⁶

“By definition an incubator is a business assistance program that provides entrepreneurs with appropriate advice and counsel and serves as a “switching centre” to other people and resources, as needed. Typically, incubator programs are housed in incubator centres in which companies can co-locate, rent space, and share business services and equipment. Hence incubators are comprised of three components: (1) a person (or staff) who provides advice /mentoring and access to a resource network; (2) shared services which means a company located in the incubator does not have to outlay funds for a secretary, phone, fax machine; and photocopying machine (3) flexible space, rented on a monthly basis, that can be expanded or contracted as needed.”

Mark P. Rice & Jana B. Matthews ³⁹

“In simple terms, the incubator is a micro-facility with a small trained management staff that provides the physical work space, shared facilities, and access to technical and business support services in one affordable package. Such support has been shown to facilitate business start-ups by reducing initial costs and delays, and to greatly increase the prospects for success of a fledgling enterprise.”

Rustam Lalkaka ⁴⁰

“The incubator is a flexible method of encouraging the development of new businesses, nurturing established businesses and fostering economic development. Incubators provide a facility where new and growing businesses operate under one roof sharing services, equipment, technology and having access at low cost to a wide variety of professional, technical and financial programmes, all of this at highly competitive rents with flexible lease arrangements.”

George J. Petrello⁴¹

3.2.3 Discussion

A generally accepted standard definition for the term ‘business incubation’, ‘business incubator’ or ‘innovation centre’ does not exist; nevertheless, incubation is better defined as a business development process, rather than facilities. The definition provided by the NBIA is a widely accepted definition, but is based on the assumption that wherever the incubator is situated, an entrepreneurial culture already exists. This assumption should be seen in the context that the United States is probably one of the most entrepreneurial orientated cultures in the world, with one in every seven adults in the working population self-employed³. The incubator should not only be seen as a business support centre, but as a tool to foster an entrepreneurial culture, increasing the participation of indigenous entrepreneurs in the national economy. If an incubator is seen in this light, the incubator becomes an asset for the whole nation, not just for the companies inside it. The incubator has therefore an even bigger responsibility than just providing business support services to the businesses inside the incubator.

Another common assumption that is sometimes made, is that new or growing businesses can locate and operate at much lower costs in an incubator, than in conventional space where market rates prevail. Although it is true that businesses can locate and operate in an incubator at a lower total cost, it does not mean that a business incubator has to subsidise all the support services provided. In fact, some incubators ask market rate rents to all the tenants for the space and services provided. This financial policy increases the

possibility that the incubator can reach, as a business in its own right, financial self-sustainability.

Any one of the above mentioned definitions can be used, but for the purpose of this document we will define the incubator in more generalised terms, trying to ensure that all the most important aspects are covered, but still excluding the projects that do not fall in this category.

3.2.4 Definition : Business Incubation

Business incubation is the flexible provision of a variety of support services and business assistance, under controlled conditions, to create an environment favourable for developing, nurturing and accelerating the growth of new, fledgling companies and an entrepreneurial culture.

3.2.5 Definition : Business Incubator ⁱⁱ

An incubator can therefore be defined as a centralised facility that provides a variety of support services, business assistance and flexible space at an affordable rate, to provide a favourable environment for successful incubation.

3.2.6 Incubator without Walls

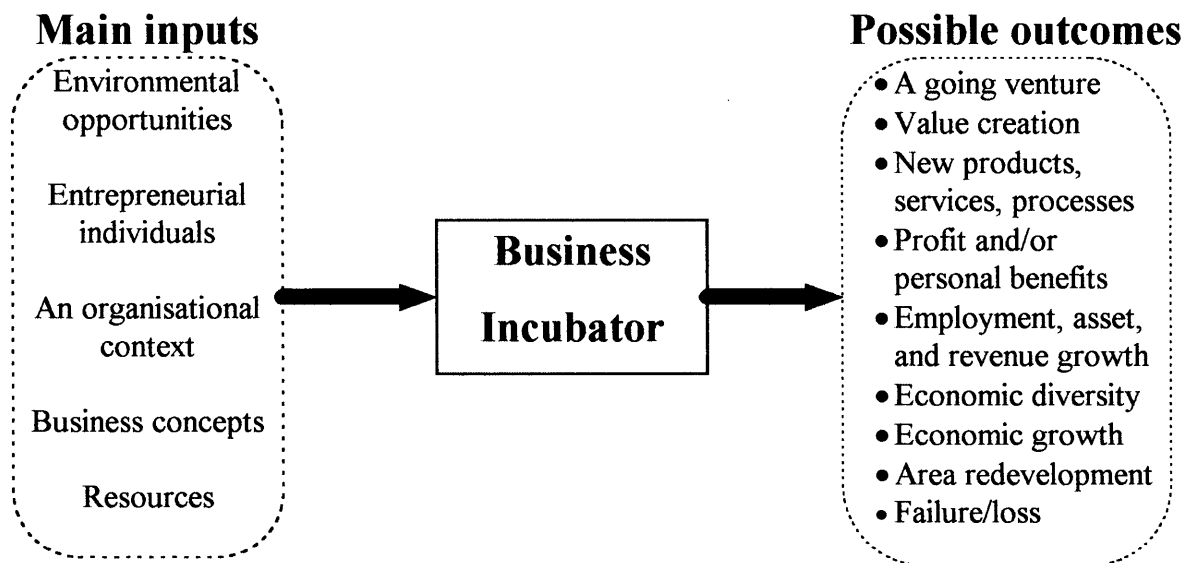
Special mention should be made of the term “*incubator without walls*”. An incubator without walls refers to incubation and not to an incubator. Organisations with no tenants on their premises, lack the critical distinction that makes incubators effective. Such institutions are more like traditional small enterprise development centres rather than incubators, and companies do not obtain the benefits derived from co-location in an incubator facility.

ⁱⁱ **NOTE:** For this document, the definition of incubator will refer to that of a business incubator.

3.3 THE BUSINESS INCUBATION PROCESS

One of the essential commonalities between incubation programmes, is purpose: to nurture fledgling firms into healthy businesses. That single purpose is the most important distinction between an incubator facility and other types of multi-tenant facilities. Business incubation is a dynamic process with several inputs and a variety of possible outcomes, as exhibited in Figure 5.

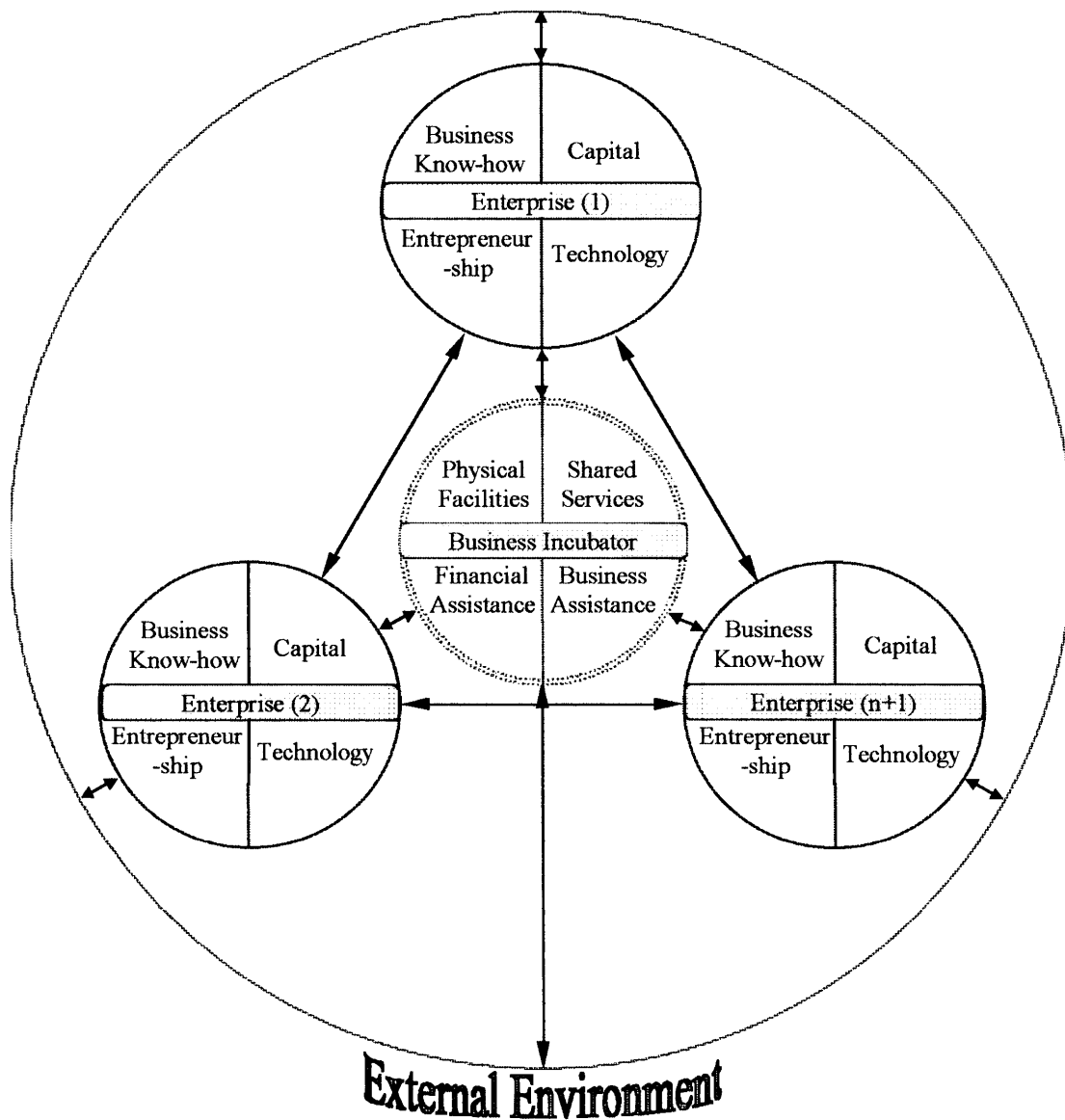
FIGURE 5: INPUTS AND OUTCOMES OF THE BUSINESS INCUBATION PROCESS



It is important to realise that the main difference between the business incubation process and other business development programmes, does not lie in the difference in inputs or outputs, but in the unique process of incubation. The uniqueness of the incubation approach is probably most apparent in the two unique functions that are not provided in other types of management assistance. *First*, the combination of on-site management and tenant interaction provides direct assistance when and where needed. *Second*, business incubators provide an environment that encourages entrepreneurs to improve their management skills and practices through an ongoing process. Nevertheless, it is the

comprehensiveness and the flexibility of the incubation process in addressing the problems that new ventures encounter, that makes business incubators such a success. This comprehensive development package focuses on the four cornerstones of any technological orientated business, viz.: entrepreneurship, business know-how, technology and capital, as shown in Figure 6. Figure 6 represents an attempt to provide a functional model regarding the nature of the business incubation process.

FIGURE 6: FUNCTIONAL MODEL OF A BUSINESS INCUBATOR



The small solid circles represent the enterprises within the business incubator. These enterprises do not necessarily have to be new ventures, since business incubators can host anchor tenants for a variety of reasons. Figure 6 also attempts to indicate that the business incubator is not just a development organisation, but a business in its own right, and is therefore represented by the same, but broken circle. The small circles are divided into the four cornerstones that form their foundationⁱⁱⁱ, and these are all again enclosed in a large circle that represents the total external environment. The arrows indicate the mutual interaction between the different entities. Most incubators provide networking. By establishing business-to-business linkages, the incubator begins the process of bringing the isolated entrepreneur into commercial society, setting both the standards and the opportunities for the development of growth orientated business. It is interesting to note that, although the incubator tries to provide a protective environment for its tenants, it still can not prevent the direct interaction between its tenants and the external environment, and is therefore limited to mainly three levels of intervention, viz.⁴²:

- I. passive environmental,
- II. reactive direct, and
- III. proactive direct intervention.

Intervention in the context of new venture creation and development was defined by Rice and Abetti as “the actions by an agency external to ventures that ‘come between’ entrepreneurs and their environment, directed at increasing the rates of new venture formation, survival and success”⁴². The protective environment should therefore rather be seen as an enabling environment, that assists entrepreneurs in their struggle for survival, and not as an environment that will protect them from failure. The premise underlying intervention is that the entrepreneurs and their firms do in general not have all the necessary requirements for success in place or fully functional. Intervention from an

ⁱⁱⁱ For more information, refer to heading ‘The Four Cornerstones of an Enterprise’, on page 30, and heading ‘The Four Cornerstones of Business Incubation’, on page 58.

incubation perspective, is a means of helping entrepreneurs and their firms to compensate for missing or deficient elements. From the entrepreneur's perspective, reaching out to an incubation programme represents an attempt to acquire resources that can assist him in filling the gaps.

The dominant forms of *passive environmental intervention* in incubators are facilities/shared services, two of the cornerstones of business incubation, and peer networking among incubator companies. This mutual interaction between the incubator tenants is one of the critical distinctions that makes incubators effective, and the importance incubator tenants attach to this interaction, is most of the time underrated by incubator managers⁴³. Organisations with no tenants on their premises are more like traditional small enterprise development centres rather than incubators, and companies do not obtain the benefits derived from co-location in an incubator facility. In fact, without any real hard evidence for the so-called 'incubator without walls' concept⁴³, it might be proven that this concept has no real link with business incubation at all.

Direct intervention most often takes the form of networking by the manager to outside people and resources or the form of one-on-one counselling, and mainly address the other two cornerstones of business incubation, viz.: financial assistance and business assistance. On average approximately 20% of the incubator managers' time is dedicated to direct intervention with the tenant companies⁴². When this time is spread out over the number of participating companies, the maximum time available per company is about 8 hours per month. Although there are some signs of experimentation with a proactive approach to direct intervention, by and large most direct intervention is reactive and does not take into account the potential value of allocation of intervention resources as a function of expected return on investment⁴². This is one of the aspects of incubation that incubator managers should constantly try to improve, especially bearing in mind the results of Rice and Abetti, that showed that "those managers who invest the greatest number of hours per week in direct intervention and who invest more time per intervention contact than their peers, are more effective"⁴².

3.3.1 The Four Cornerstones of Business Incubation

Successful entrepreneurial development requires a synergy among entrepreneurship, business know-how, technology, and capital. Business incubators provide a framework for focusing and binding the critical elements of the entrepreneurial process for new ventures in a congenial supportive environment that is designed to provide a combination of business assistance, financial assistance, flexible space, and shared services (the four cornerstones of an incubator) to increase the survival and growth rates of small businesses.

3.3.1.1 Business assistance

The major hindrance to small businesses' development is a lack of adequate management skills. However, finding competent counsel is not always easy, and when it is available in the private sector, it is expensive. Incubators address this problem in four ways:

- ◇ *Firstly*, they work with educational institutions and business management professionals to provide management education and assistance to owners. Often this occurs on-site through classes or individual consultation.
- ◇ *Secondly*, an on-site incubator manager, trained in business management, provides business people with day-to-day management, marketing and accounting assistance.
- ◇ *Thirdly*, business people in incubators, because of their proximity to one another, have increased opportunities to share advice and solve problems collaboratively.
- ◇ *Fourthly*, an advisory board or board of directors composed of local professionals and business people can offer tenants low, or no-cost expertise and advice.

Of these four different ways, on-site business expertise is probably the most important, and is listed by Smilor as one of the top ten critical success factors for business incubation²⁰.

3.3.1.2 Financial assistance

Business incubators lower the operational costs of its tenants in two ways. *Firstly*, they may have access to public subsidies or land and/or building donations that allow them to charge below market rents. *Secondly*, incubators lower operational costs by taking advantage of economies of scale and shared facilities. Tenants may share conference rooms, rest rooms, reception areas, copiers, etc., thus lowering the total costs.

Capital is the lifeblood of emerging new ventures. Many entrepreneurs are forced to rely on whatever savings and loans they can obtain from friends and family and struggle to obtain adequate amounts of debt and equity capital. This inability to secure capital often results in severe under-capitalisation that cripples a business' chances of survival and its ability to expand. With the range and complexity of financing alternatives in today's marketplace, new ventures need assistance in understanding the alternatives and in determining which alternative may be best for them. This process involves not only an understanding of the technical and financial dimensions of an alternative, but also the ability to recognise the attitudes, perspectives, and concerns — the mindset — of those providing funds. Consequently, access to working-capital financing and equity and debt capitalisation comprise the tier of consulting services considered most important to tenant companies. Access to loans and grants imply the ability to get to the right person and to move more expeditiously. Consequently, many incubators try to provide access to individuals, institutions, and agencies that provide loans and grants. Business incubators address this problem in several ways:

- ◇ *Firstly*, an incubator manager works with tenants and local lenders to increase loan availability to the firm in the incubator. Lenders may believe that the ongoing management assistance and lowered costs found in an incubator make participating firms better credit risks and, therefore, may be more willing to lend money.
- ◇ *Secondly*, incubator managers can bring prospective venture capitalists into contact with tenants. This is especially important after a company has developed in the

incubator for a time. Incubators can therefore provide an important link to the venture capital community by focusing early attention on tenant companies, by making introductions as the company proves itself in the marketplace, and, especially, by educating the entrepreneur to the venture capital process and the mind-set of the venture capitalist.

- ◇ *Thirdly*, some incubators have created angel networks. An angel network is a network of individuals that are willing to invest in high risk, high growth potential firms for the chance of getting a high return on their investment.
- ◇ *Fourthly*, the incubator can even establish its own revolving loan fund to finance tenants. This type of financing can play an important role, especially, if it is directed towards providing access to seed capital, the most difficult type of financing to generate.
- ◇ *Finally*, incubator managers can help firms apply for government support and other business loan programmes. Most entrepreneurs who start a new venture are not very experienced in dealing with banks and other lending institutions. The ability to package a loan or an application grant is therefore an important service that can be provided to tenant companies.

3.3.1.3 Flexible space (Physical facilities)

New and young firms face many problems concerning the space where they operate their businesses. Industrial and commercial space is often too expensive, too large, the wrong type or in the wrong location. Additionally, due to facility constraints, most firms cannot expand on-site. As businesses grow they incur the extra costs and disruptions of repeated moves and renovations. A key part of the incubation phenomenon is the concentration of firms and resources within a single location. Incubators can supply properly located, well-designed, and appropriately serviced small spaces for start-up firms. Incubators can also provide flexibly designed space that allows the business to expand or contract on-site, thus lowering the operating costs. If the space is available, businesses can rent as much space as they need at any given time.

Favourable rental rates and terms can be singled out as the most importantly considered advantage that incubators can offer its tenants. In an effort to determine if the services offered by incubators coincide with those considered important by the entrepreneurial tenants, Spitzer and Ford asked incubator tenants to rank 18 services normally associated with business incubators in order of importance ⁴³. Appendix A, summarises their findings, and is a clear indication of the importance that both tenants and incubator managers assign to favourable rental rates and terms.

Incubators usually start out as a single building or group of buildings in which participating entrepreneurs can be housed together to interact spontaneously. During the incubation period, the entrepreneur is associated with other entrepreneurs who are facing similar difficulties, providing an association that should help solve problems and stimulate the entrepreneur's drive for success.

3.3.1.4 Shared services

Small business owners generally encounter three problems with business services: availability, cost and quality. If certain services are unavailable locally, an incubator may provide them in-house to its tenants. In addition, incubators can develop referral lists that link providers of quality, specialised technical services with tenants. Often the most significant problem business people encounter with services is cost. Many small firms cannot afford marketing consultants or access to, e.g., a business computer. Incubators can lower costs by sharing these services among tenants. By assisting with secretarial, administrative, and facility services, incubators help provide a range of basic but much needed services that new ventures require, but cannot afford or often neglect or ignore. The most important secretarial services to tenant companies, in order of importance, are photocopying, receptionist duties, word processing, and general typing ²⁰. The key administrative services are equipment rental, mailing, accounting, help, and contract administration ²⁰. The most important shared-facilities services are the miscellaneous type, such as janitorial and parking, followed by security, computers, loading dock, and conference room services. Tenant companies can pay for the cost of these services in a

variety of ways. The incubator may charge a subsidised or competitive rent, but tie access to services into the rental agreement. It may provide these services for an equity share in the company, or the tenant company may be charged only on an as-used basis, which again helps to keep costs down. Incubators can also lower the costs of off-site services, such as marketing or legal consultation, by either providing tenants with a subsidy for obtaining them or by forming a network of service providers who agree to provide help at a reduced rate.

3.3.2 Other Aspects of Incubation

A report by a UK Enterprise Panel, 'Growing Success: helping companies to generate wealth and create jobs through Business Incubation', list the following four aspects as the four key features of an incubator⁴⁴:

- I. There is some form of selection or entry qualification to judge a business's viability and growth potential, e.g. a formal business plan.
- II. The incubator director has a close, hands-on relationship with client businesses.
- III. Businesses are encouraged to leave or graduate when they have established sufficient market share or maturity.
- IV. Their performance is judged not only by the number of client businesses, but more importantly by the performance of those businesses in growing.

According to this report '[T]he essential difference between incubators and managed workspace is that the incubator utilises managed workspace to encourage business growth – i.e. an incubator is more than a managed workspace, it has the additional aim of helping client businesses to manage their growth.'

3.3.2.1 Period of assistance

One of the unique aspects of the incubation process is the 'graduation' period of incubator tenants. Normally, the facility 'incubates' the business for a certain period of time. When tenants have outgrown their need for the incubator's services or do not

develop as intended, they may be asked to leave. The majority of business incubators surveyed by the NBIA ⁴⁷ had exit policies defined as a number of years and a maximum of three-year limit. More than half interviewed, also escalate rental fees periodically to encourage timely graduation. While the term incubator connotes a temporary environment, many incubators do not have a graduation policy or have at least a very flexible policy, with many incubator managers suggesting that arbitrary limits on tenancy are not necessarily in the best interest of the incubator tenants ⁴⁵. A fixed graduation policy in years is, therefore, not necessarily an indication of best practice, and it is recommended that incubators have a flexible exit policy, but nevertheless with a maximum time limit when there is a demand for space.

The incubation period is normally targeted towards new ventures that are in their first few critical years of establishment. This has an important implication for the development process, because it is in this particular growth period when new ventures experience the most troubles and it is also in this period when the most business failures occur ^{iv}. It is therefore important that incubators focus on new ventures, because they are normally not yet set in their ways and will be able to benefit most from this incubation period. There are, however, a few exceptions to the rule. When incubators strive for financial sustainability, they generally need one or more anchor tenants to ensure financial stability. An anchor tenant is a firm that is financially stable and that is not growing at a rate that will require it to leave in the near future. It can also be a firm that lures other new ventures to the incubator or that makes some kind of contribution towards other tenants' success. These anchor tenants are normally needed to keep the incubator's cash-flow stable when other tenants are unable to pay the rent or are leaving the incubator.

3.3.2.2 The screening of potential tenants

Based on the assumption that there is demand for space in an incubator, 'incubation' generally requires that potential tenants be screened on some set of selection criteria to

^{iv} For more information, refer to heading 'Period of Failure', on page 9.

determine their suitability. Most incubators have tenants with mixed characteristics, covering a range of services and products. The application process also varies in complexity from facility to facility—from a one-page form, to multi-page legal documents describing a specific contractual relationship, to requiring a complete business plan. The admission process also varies, from an interview with a single person who can grant a decision on the spot, to a multi-stage business and technical assessment with various committee reviews and approvals.

There are people that argue that a comprehensive and strict selection process is against the principles of incubation. They argue that the companies that need the assistance most, are prevented from obtaining it, and that those firms that are selected, will probably be successful anyway, and therefore they do not need to be in an incubator. They also argue that these ‘successful’ firms do not benefit as much from incubation, as would less successful firms. This makes incubation less effective, but more successful in terms of achieving its goals, than it would otherwise be. These arguments all have some validity, but it should be remembered that incubation is judged solely by ‘society’ on parameters such as job creation, firm growth, etc., and not on how much the firm benefits from being in the incubator. Society, therefore, ‘forces’ incubators to be more selective in their choice of tenants. With limited capital available, incubators are also ‘forced’ to be selective on how and on whom they can assist. However, according to the NBIA’s survey of ‘The state of the business incubation industry’⁴⁷, the six criteria rated most important by incubators, were as follows:

- I. The completion of an application package (51.7%).
- II. A business plan (45%).
- III. Compatibility of the business with the objectives of the incubator (43.9%).
- IV. Ability to pay for rent or services (39.6%).
- V. Demonstrated capability of principals (31.5%).
- VI. Projected growth potential of the firm (29.5%).

These criteria clearly show that incubators are actually looking more at the feasibility of the firm and its compatibility with the objectives of the incubator, rather than comparing firms on their potential of success, as venture capital firms would typically do.

3.3.2.3 Tenant clustering

Some incubators have been specifically developed to serve specific industry segments. In this sense, the incubators are attempting to implement a 'niche' strategy, wherein firms within the incubator form a business cluster. A business cluster is a group of companies that rely on an active set of relationships among themselves for individual efficiency and competitiveness, and generally focus on a single industry or technology area for economic growth in the community. This type of clustering is recommended as a means to improve targeting efforts, because it captures economic relationships among specific industry sectors, and because it provides a set of tools to help define economic development strategies. The focus on specific industry or technology tries to create an enhanced synergy among the cluster companies, and increased participation by established businesses in the local community. The relationships that develop between companies fall into three general categories, viz.:

- I. *Buyer-Supplier-Relationships*, consisting of core companies that produce goods and services that are sold to companies at a later stage in the value-adding chain.
- II. *Competitor and Collaborator Relationships*, consisting of companies that produce the same or similar goods and services at a specific level in the value chain.
- III. *Shared-Resources Relationships*, consisting of firms that rely on the same resources of raw materials, technology, human resources, and information to produce goods that may even be for very different markets.

These relationships help to develop more opportunities for technology transfer and licensing agreements with established corporations. The common factor in all these relationships is the premise that such relationships benefit from geographic proximity. The premise is that such relationships will be stronger if the distances separating

participants in the cluster are as short as possible⁴⁶. Although information technology has reduced the impact of physical distances, many activities, ranging from product design to contract negotiations, can only be accomplished by face-to-face exchanges. If close physical relationships are important in the effective operation of a cluster, then it naturally follows that an incubator, as a centralised facility, can make a huge contribution towards developing business clusters. The businesses within the cluster can of course also benefit from the variety of other services an incubator provides. The business cluster does not necessarily need to be limited to businesses within the incubator. Incubators can be developed to assist and strengthen existing clusters. The incubator will therefore be located near the existing cluster, and will primarily focus on firms that will be suitable and acceptable to the other firms within the cluster.

3.3.2.4 Technology transfer

Business incubation is often raised as a strategy for technology development in developing countries. In this strategy, one of the primary goals of the business incubation process is to help initiate innovation in small and medium-sized companies or to support their innovative efforts, as the case may be. However, technology transfer is usually only associated with business incubation when an incubator has strong relationships with external entities, from which incubator tenants can source or supply technology. The success of these relationships varies considerably and since technology transfer is so important for the incubation of technology intensive new firms it is discussed in more detail in Chapter 6 (Technology Transfer & Incubation).

3.3.3 Additional Advantages of Business Incubation

It is generally recognised that entrepreneurs will only enter an incubator if they believe that some benefit can be derived from their tenancy. The main benefits incubator tenants can expect, are based on the four cornerstones of incubation, viz.: business assistance, financial assistance, flexible space, and shared services. There are, fortunately, also additional benefits incubator tenants can expect, viz.:

3.3.3.1 Community interaction

Because there “is indeed some evidence that incubators contribute to the process of building indigenous companies”, meaning that “they can keep home-grown talent at home to develop companies that help generate jobs for the community”^{20,p. 28}, incubators do sometimes gain support from their local community. In fact, most incubators do 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. The support may be either financial or moral, and may come from private individuals, city government, private industrial councils, universities, or other local development organisations. The ability to involve the local community, however, depends a lot on the drive and effort of the incubator personnel and naturally on the success of the incubator in developing new ventures. Communities should, on the other hand, recognise that companies take time to develop and economies do not change overnight. One of the advantages incubator tenants obtain from the community interaction, is increased exposure. The incubator is therefore in effect not only marketing the incubator as such, but its tenants as well.

When incubators are associated/linked with other entities^v, e.g. universities or the local SBDC, the incubator and its tenants can most of the time get access to resources that are generally not available to everyone. One of the best examples, is the relationship between a university and an incubator. The advantages of being related and on or near a university campus are numerous: library facilities; exposure to state-of-the-art technical thinking and equipment; access to undergraduates—a relatively cheap and technically skilled labour pool; a creative environment; and potential employment in lecturing posts²⁰.

3.3.3.2 Increased credibility

A new venture faces a particularly difficult hurdle at the start-up stage: that of establishing credibility as a viable company. A paradox emerges, since the company needs to gain recognition to establish its credibility, but in order to establish credibility the company

^v For more information, refer to heading ‘Incubator Industry Interaction’, on page 123.

first needs to demonstrate that it has staying power, *secondly*, that it will be there next year, *thirdly*, that it can service its contracts, *and finally*, that it can fulfil obligations in the long run, not just on a short term basis. Therefore, without any credibility a new firm struggles to establish effective relationships upon which it can develop and grow.

Incubators can help to build this credibility for its tenants. If the incubator has a positive reputation, community support, and, especially, a demonstrated record of producing viable companies, then a start-up venture's association with the incubator establishes a strategic relationship for the new enterprise²⁰. This strategic relationship can be mutually beneficial to both the entities, with enhanced credibility for both that neither may have on its own. Each entity, is therefore both dependent on, and independent of the other. When the incubator admits a company that it believes will help fulfil its own goals and objectives, the tenant company automatically acquires the credibility of being chosen to be part of the incubator. The tenant company can now differentiate itself from other companies outside an incubator, because the company will have access to resources that the other companies will not have, and can therefore demonstrate a higher credibility. The incubator can, additionally, provide credibility by spreading the word on a new company through their own networks and contacts, the incubator manager, board of directors, advisors, and consultants.

3.3.3.3 Shortening of the development process

With today's short product and technology life-cycles, companies can gain a considerable competitive edge if they can solve problems faster than their competitors. Incubation addresses two aspects that help companies to shorten the development process, and in effect shortening the time they need to solve problems. *Firstly*, incubators can significantly telescope the learning process, by condensing experience²⁰. Incubators condense experience through entrepreneurial education, where management of tenant companies can tap the know-how of more knowledgeable and experienced business people, and in the process shorten their own learning curve. This shortened learning curve gives entrepreneurs more time to let their business grow and more opportunities to

learn from otherwise disastrous mistakes as they broaden their know-how. *Secondly*, incubators can help tenant companies to solve problems faster, by targeting the right problem, locating the appropriate people to assist, and then by helping the tenant to implement the solution ²⁰. In other words, the incubator helps its tenants to shorten the development process, giving the companies a greater chance to gain a competitive edge, and ultimately a higher likelihood of success.

4. DIFFERENT INCUBATION APPROACHES

Despite apparent similarities in sponsorship, no two incubators are exactly alike. Each incubator develops a unique personality and may be defined by a variety of variables, such as goals, operational guidelines, environmental variables, and funding. In many instances, the unique character of an incubator is determined by the personality of the incubator's management team. This is true because the establishment of an incubator is often as entrepreneurial an effort as the building of, for instance, a new high-technology company. Nevertheless, the different incubation approaches can be seen in the different objectives and categories that exist.

4.1 INCUBATOR OBJECTIVES

Even though there are generally more than one objective for an incubation programme, incubator developers need to agree on clear objectives for a specific incubator. These set objectives create the basis for developing an overall strategy, operational tactics, and measures for performance. The primary objective of any incubator should be to foster an entrepreneurial culture and to increase the participation of indigenous entrepreneurs in the national economy, including youth, women and other special groups to produce successful graduates: businesses that are growing, financially viable and independent when they leave the incubator, usually in two to five years.

4.1.1 General Objectives of Incubators

The NBIA survey lists the following common US incubator objectives ⁴⁷:

- I. Economic development / local employment opportunities, 91.3%
- II. Diversification of the local economy, 61.9%
- III. Commercialisation of research (new products), 32.6%
- IV. Transfer of technology (technical capabilities) to local businesses, 23.2%
- V. Income for sponsoring organisations through rents and services, 20.3%
- VI. Improving minority / women-owned business opportunities, 20.3%
- VII. Other, 13.8%

VIII. Neighbourhood revitalisation, 11.6%

IX. Positive impacts on sponsor (increased deal flow, education / research), 9.4%

X. Investment in tenant firms, 8%

XI. Income from, or acquisition of intellectual property rights 2.2%

4.1.2 Specific Objectives of an Incubator

The incubator has two main applications related to economic development: assisting small businesses' development in declining economies, and assisting businesses among specific industries, areas, or types of entrepreneurs within a local economy. Within the context of the above-mentioned general objectives, some programmes have individually articulated certain specific objectives. Some of these specific objectives are listed below:

4.1.2.1 Regional development

By decentralising economic activity away from large urban concentrations, mobilising local natural resources and enabling informal businesses to make the transition into the formal sector.

4.1.2.2 Industrial sub-contracting

By linking up with industrial estates, or facilitating the down sizing/privatisation of large conglomerates.

4.1.2.3 Technological innovation

By integration with technical universities and research compacts, for improving quality and productivity as well as initiating innovative products and services to domestic and export markets.

4.1.2.4 Globalisation

By helping foreign companies to start quickly and enter the domestic market with local partners, or to use the incubator as a base to export to third country markets. It could also

facilitate the re-entry of developing-country-origin entrepreneurs now settled abroad who wish to bring their know-how and capital back home.

4.2 CATEGORIES OF INCUBATORS

Organisationally, incubators differ from one another because of their varying priorities. Priorities differ, not only because of different funding sources, but because of different objectivesⁱ as well. Incubators can therefore have similar objectives, but different funding sources, or the same funding sources with different objectives (See Table 2). Nevertheless, incubators are generally classified according to their funding sources:

- I. University associated incubatorsⁱⁱ
- II. Non-profit incubators
 - ◇ Government sponsored
 - ◇ Public sponsored
- III. For-profit incubators
 - ◇ Venture capital incubators
 - ◇ Corporate-affiliated incubators

ⁱ Refer to heading ‘Incubator Objectives’, on page 70 for more information.

ⁱⁱ University associated incubators fall under a separate classification, because they can be either non-profit or privately sponsored, or even a combination of both.

Table 2: Incubator Goals and Orientations ⁱⁱⁱ

Type of Incubator	Main Priorities					
	Job Creation	Economic Development	Economic Diversification	Technology Transfer	Image	Investment opportunity
University associated			X	X	X	X
Public / Government	X	X	X			X
Venture Capital						X
Corporate-affiliated				X		X

4.2.1 University Associated Incubators

Many of the first incubators to be established were university related. The advantages of being on or near a university campus in the USA are numerous: Library facilities; exposure to state-of-the-art thinking and equipment; access to undergraduates—a cheap technically skilled labour pool; a creative environment; and potential employment as a lecturer. Companies within the incubator profit from the resources of the university in a variety of ways. They may, for instance, benefit from having the best available talent when they need it, without having to carry that high-priced talent on their payroll. These companies also receive the stimulus and catalytic effect associated with working alongside exceptional professionals from outside their organisation.

These incubators attempt to transfer findings of university research and development into new products and technologies, provide students with real-life experience in business management and play a role in a state's continuing industrial development.

University-affiliated incubators are geographically more suited for nurturing high-technology businesses, with high growth potential, and therefore give a higher priority to the objective of technology transfer than other incubators.

ⁱⁱⁱ Adapted from Smilor ³⁶

Example:

George Mason University

The George Mason University Entrepreneurship Centre was established in 1986 and is based in Virginia, near Washington, DC. The centre is designed to promote the growth of small, emerging technology companies and established, new-to-export firms, by providing them with services and programmes which give them a head start in developing and managing their businesses. The Centre's Incubator Programme serves as a starting point for potential high-growth companies. Support for emerging high-technology companies is the main concern of the Incubator Programme. The services provided range from seminars covering the basics of running a small company to more extensive business and technical advice from the Entrepreneurship Centre staff, volunteers from local businesses, George Mason University faculty, and graduate and undergraduate assistance. Product companies with information technology, aerospace, biotechnology, computer-aided engineering, environment, materials, science, and engineering technologies, are currently sought for entrance into the Incubator. Firms chosen for the programme participate as either Incubator Associates or Tenants. Tenants are supplied with modern office space on a six-month lease. Low overheads for start-up companies, and a collegial atmosphere, where experience and knowledge are shared with other tenants, are only two of the benefits offered. These companies utilise the centre's administrative resources, including computer access, secretarial support, photocopy and fax machines, and mail processing.

4.2.2 Non-profit Incubators

Non-profit incubators are mainly sponsored by a chamber of commerce, industrial development associations and community-based organisations. Generally *government* incubators or incubators sponsored by the *chamber of commerce* in the US are more

orientated towards economic development, job creation, neighbourhood revitalisation and according to the NBIA survey ³⁷, they generally give a higher priority to improve minority-owned business opportunities than other incubators. Incubators sponsored by *industrial development associations*, typically target economic development in specific industrial sectors, and incubators sponsored by *community-based* organisations typically target economic development in specific neighbourhoods.

Example:

Community Sponsored: The Fulton-Carroll Centre (FCC) for Industry ³⁶

The Fulton-Carroll Centre for Industry in Chicago, Illinois, was founded by the Industrial Council of Northwest Chicago (ICNC) in 1967 as a non-profit organisation. The incubator is located in an area designated by the city of Chicago as a blighted slum, a classic example of urban decay with a high crime rate. The incubator opened in 1980 when the ICNC received a \$1.7 million federal grant to buy and renovate an entire block of buildings. The centre has a flexible admission policy (it does not require a detailed business plan), accepts a wide variety of companies (predominantly light manufacturing), and provides a range of services from secretarial support to loading docks. The FCC also operates the Kinzie Industrial Security Patrol, which provides security, one of the more critical elements of the incubator's success. The rents charged at the incubator are considerably less than those charged by privately run incubators and are raised annually for current companies. For incoming companies, the rent remains substantially lower. This might be considered a type of exit policy, however, the incubator operates more on the basis that a new firm is effectively subsidised by the older, more established firms. Despite the initial consensus from city government, banks, and real estate developers in Chicago that this idea would never work, every available square meter was rented from almost the beginning. Economic development seems to have benefited everyone associated with the FCC, at least indirectly.

4.2.3 For-profit Incubators

Generally, privately sponsored incubators' main purpose is to make a profit. The distinction between a private sector incubator and a privately owned shared office space (found in many office buildings) may sometimes be in name only or in the type of tenants. Excluding 'property development incubators', privately sponsored incubators can be divided into Venture Capital and Corporate-affiliated incubators.

4.2.3.1 Venture Capital Incubator (VCI)⁴⁸

Venture capitalists provide equity or other types of financing for small-and medium size enterprises that have growth potential and are not quoted on stock markets. They combine access to cash not available elsewhere with active management support. Their main objective is long-term capital gains to justify their financial risks ⁴⁹. While most Venture Capital Firms think ^{iv} their capital is safely invested in companies that are shipping products and raking in revenues, a small group of brave firms are backing ventures even before the start-up stage. These pre-start-up financing initiatives are called Venture Capital Incubations.

Some VCIs support entrepreneurs who have ideas but do not have any knowledge of writing business plans. The really bold VCIs come up with their own ideas and hire engineers and entrepreneurs to develop the concepts into viable businesses.

^{iv} Contrary to the expectations of investors, Edward Roberts showed that the risks of failure do not decline substantially with the avoidance of early stage investments ¹².

Example:

The Rubicon Group³⁶

Founded in 1983, the Rubicon Group incorporates a high-technology incubator, located in Austin, Texas. Partly as a result of its private funding sources and partly because of its high-technology focus, the Rubicon incubator is perhaps a better example of a VCI than any other incubator. The Rubicon incubator sets up joint ventures with its client companies, providing most of the overhead services required by an emerging firm, in return for a significant portion of that firm's equity for its investment and services, and plans a two-year turnover of all its companies. Within the two-year period, each tenant will either fail, grow large enough to make it on its own, or expand outside the incubator with follow-on financing. Rubicon's profits come only through its ownership position in its client companies. Because it does not own a building, it does not receive rental income and does not refer to the companies with which it has joint ventures as "tenant" companies. Rubicon does not require that a prospective company submit a business plan to be backed by the venture partnership and the incubator. It was the feeling of Rubicon's organisers that the people they were seeking to help either would not have a business plan or, in many cases, would not be capable of producing a realistic one. Rubicon's staff performs most of the tasks of running a company. The staff performs far more services than an incubator typically provides. It has a panel of advisers, each with distinct expertise in the financial, marketing, legal, or technological areas.

The time spent in dealing with undeveloped technologies and unformed business concepts can be enormous. However, the investments required to whip an idea into shape are typically quite small, and the failure rate tends to be low, primarily because the VCIs handcraft the incubated companies from the start-up phase. The companies also have their VCI's full attention when they encounter financial difficulties and other hurdles that

often sink new businesses. The combination of a small investment at a relatively low risk (Incubation reduces risk of failure), with the possibility of an exceptionally high return, ensures an ideal investment opportunity.

Example:

The Mayfield Fund³⁶

“In our incubations, we come in before the seed capital round—when there is little or no flesh on the business plan”, explains Kevin Fong, a partner at Mayfield Fund. A good example of the incubation process is one of Mayfield Fund’s most successful hatchlings, Aspect Telecommunications of San Jose, CA. Now an established leader in automatic call distribution systems, Aspect was incubated from the raw idea stage in 1985. CEO James Carreker and two co-founders spent a full six months in Mayfield’s offices—honing their technology, sounding out potential customers, and finalising their business plan. Mayfield was involved every step of the way. “They didn’t hover over us”, says Carreker, “but they were always there when we needed them.” The time spent was worth it for all concerned. When Aspect went public in 1990, Mayfield’s \$2.7-million investment acquired a market value of \$14.8 million overnight. Aspect earned an estimated \$10 million on revenues of around \$100 million for fiscal 1993.

Because VCI’s plug themselves into a project so closely, they end up sharing a wealth of business experience, and even executive talent for brief stretches. Frequently, even after the new company moves into its own quarters, a VC partner will work on-site with the fledgling enterprise, sometimes in a salaried position.

“Seed funds run up against the demanding economics of venture capital” says David Gleba, president of Venture One, a San Francisco firm that tracks VC trends. “Say you have a \$100 million fund with four partners and eight companies. That’s about \$3 million to \$4 million per company, but they need to grow to \$50 million or \$100 million fairly

quickly to earn venture capital returns. Incubations just take too long to get there. They are better suited to small VC funds of \$25 million or so.”

4.2.3.2 Corporate-affiliated Incubators

With today’s ever increasing rate of technological change, large companies need to maintain their competitive position through superior technology, more proprietary products and services, and better products. Companies, therefore, need to increase the speed and cost effectiveness of innovation to be able to expand and create new market opportunities. Gains from the development and commercialisation of innovation are often enormous and generally far exceed the gains derived from static allocative efficiency.

“What did it take for an executive to make it into BUSINESS WEEK’S Top 25? Begin with product innovation—the hot new strategy of the managers who have already wrung out their corporate inefficiencies. When the bureaucratic layers are gone, when the marginal competencies are dumped, the only strategic assets left to corporations are the products they sell in the global market-place. This was proved in 1995, when the most reliable path to fast growth was to bring out new products adored by lots of consumers. Riding the technological currents was the favourite tactic used by many managers in bringing out their innovations in 1995.”⁵⁰

In order to assist innovation, large companies need to have an entrepreneurial environment^v. Most large companies are good at developing a new business from the idea stage on through research and prototype development. But, it is at the commercialisation stage where large companies falter more often than they should. Inefficient commercialisation by big businesses has created opportunity for venture capitalists.

^v For more information, refer to heading ‘The Entrepreneurial Environment’, on page 30.

In many large organisations there are exciting new technologies, but no broadly effective system of technology transfer. What is absent, are large numbers of intrapreneurs⁵¹ devoted to turning new technologies into profitable new businesses, cost reductions, new features, and competitive advantages. Cost-effective innovation happens when someone becomes the passionate champion of a new idea and acts with great courage to push it through the system despite the “Not Invented Here” syndrome, and all the other forms of resistance which large organisations supply.

Intrapreneurship is a basic philosophy of corporate life. It means that people at all levels who have the will to implement good ideas are given the opportunity to grow personally by contributing to the growth of the company. Intrapreneurship adds to traditional innovation by taking it out of the exclusive domain of a small group of idea people. It combines the resources that only a large organisation can provide, with the creative skill and motivation that only individuals can bring to an endeavour.

Corporate-affiliated incubators’ main goal is to establish an environment to assist intrapreneurship in the commercialisation of research (new products), within the company. Corporate-affiliated incubators also give large companies the opportunity to diversify, or commercialise technologies, products, or services that do not coincide within the company's core competencies or goals. This enables large companies to be more flexible, adapt quicker and to reduce the risk of losing key personnel.

Example:

Xerox Technology Ventures³⁶

Xerox Technology Ventures (XTV), a corporate-affiliated incubator, operated by Xerox in El Segundo, CA, was headed by Robert V Adams, a retired Xerox executive vice president. XTV is a \$30 million fund that was started to nurture promising technology that springs up within Xerox but do not coincide with the company's strategic thrust. To date, Adams has incubated twelve companies for which he has obtained outside start-up and expansion capital. At Semaphore Communications Corp. in Santa Clara, CA, a specialist in security and encryption for local area and wide area network systems, Xerox brought in an outsider, Charles Hart, former president of Nestar System Corp., whipped the product into shape and landed an original equipment manufacturing (OEM) deal with AT&T that got Semaphore off the ground. "They haven't mucked around much with the management, but, boy, do they give you credibility when you call up someone and say that you're a Xerox company," notes Hart.

4.2.4 Additional Categories

Lalkaka and Bishop divided the different types of incubators according to the incubator's theme. The theme of the incubator is derived from the specialised services, equipment and management relations the incubator needs to serve specific business needs of its target audience¹.

4.2.4.1 A Targeted Population Incubator

These incubators support the empowerment of specific population groups, e.g. social minorities, new immigrants, women, recent graduates.

4.2.4.2 An International Incubator

These incubators are created to encourage foreign investment, both financial and technological. Such an incubator often includes a range of services for international and expatriate professionals.

4.2.4.3 An Industrial Subcontracting Orientation Incubator

These incubators are created to build linkages for the development of new businesses as vendors for large enterprises. Key services include, e.g., ISO 9000 (international manufacturing quality standards) certification and 'Just in Time' (JIT) inventory management.

4.2.4.4 Single Business Incubator

These incubators have programmes specifically tailored to meet the needs of a particular class of industrial product, such as : biotechnology, computer software, etc.

4.2.4.5 University Incubators

These incubators specialise in supporting the development of business started by the faculty, staff of the university, and graduate students.

4.2.4.6 Technology Focused Incubators

These incubators focus on the development of high-technology businesses.

4.2.4.7 A Hub Incubator

These incubators try to reduce the operating costs and increase the impact of the incubation programme, by supporting a number of satellite incubators with minimal staff.

4.2.4.8 The Virtual Incubator (Incubator Without Walls^{vi})

These incubators have few residents, and focus on the provision of counselling to client businesses.

^{vi} For more information, refer to heading 'Incubator Without Walls', on page 53.

4.2.4.9 The Regional or Rural Incubator

These incubators focus on stimulating businesses that utilise local materials and other resources, primarily serving specified geographical areas.

4.2.4.10 The Hybrid Incubator

These incubators do not focus on a specified theme and can serve any combination of the above mentioned themes.

4.2.5 Types of European Incubators

Unfortunately, the nomenclature used to describe schemes that are similar to the term ‘incubator’, according to the U.S. experience, is totally unique in European countries. In Candace Campbell’s report on the business incubation industry, she lists some of the wide diversity of business incubator type schemes, viz. ³⁵:

4.2.5.1 Workshops

Working Communities - compatible firms who, through a limited company manage a building and joint services.

Community Workshops - also called a craft workshop where individuals learn a skill, use equipment for hobbies or business and are encouraged to start up a new enterprise.

Technology Centre - shared space and services designed to help entrepreneurs develop ideas into marketable products.

Flatted Industrial Units - multi-tenant industrial buildings with little or no common service provision.

Nursery Units or Starter Units - small, cheap and easily accessible workspaces for new companies with a minimum of communal support.

Seedbed Workshops - subsidised rents, short tenancy (usually one year) with communal workshop and equipment provision.

Enterprise Workshop - sheltered environment where prospective businesses develop their ideas, commonly offered with rent-free periods for full or part-time use.

4.2.5.2 Business Centres

Office Hotel - in urban locations, providing office space and services to small firms or small space users where quality of service is paramount.

Small Office Centre - operated by institutions interested in filling vacant space in new or 'white elephant' buildings, generally a short-term endeavour.

Opportunity Centre - developed by companies as secondary activity to offer surplus space and services to small firms.

Public Sector Centre - developed as a local economic development initiative to promote enterprise development, job creation, development of redundant buildings, etc.

Mixed Use Schemes - reuse of industrial complexes to meet needs of office/services and industrial sectors.

Studio Spaces - in large urban areas provision of low quality office- or high quality light manufacturing space to small firms.

It is important to recognise that in the various forms of development designed to aid the formation and growth of businesses, although each will seek to cover all aspects of support, each type has a prime focus which is a predominant characteristic ⁴⁴.

4.3 A COMPARISON BETWEEN INCUBATION PROGRAMMES IN THE USA AND EUROPE

While the extent of unemployment and participation by small firms differ in terms of scale from country to country, Candice Campbell found that there were many similarities between the US and European approaches in providing assistance to small firms through business incubators ³⁵. At the same time she found that there were also differences in approach and experience.

4.3.1 Similarities

Some of the similarities include:

- ◇ A very high importance is attached to the role of the incubator manager.
- ◇ It was consistently found that the quality of management is crucial to success.
- ◇ The management of the incubator is a significant cost factor.
- ◇ The need for community-wide support is vital.
- ◇ Non-profit organisations were often the catalyst for incubator development.
- ◇ The preferred development and management structure is a public-private partnership.

4.3.2 Differences

Some of the differences include:

- ◇ European corporations appear to have a much greater interest in enterprise development than large corporations in the U.S. The private sector involvement in the U.S. is dominated by successful entrepreneurs, real estate developers, investors and business organisations such as Chamber of Commerce and industrial councils.
- ◇ The European approach to developing incubators, attaches a greater significance to developing industry-specific incubators.
- ◇ To some extent the background, training, experience and motivation of the entrepreneurs differ between Europe and the U.S. One example is that American entrepreneurs are much more likely to be growth orientated than their European counterparts.
- ◇ Incubators in the U.S. do not necessarily affect the business formation rates. In Europe, however, in many cases one of the functions of the incubator is to encourage people to seek business opportunities using their crafts, work skills or other resources. In Europe there seems to be an “overt effort to transform individuals, unemployed and otherwise, from employees to entrepreneurs”. One example of this effort is that, in some European countries, incubators are specifically developed for youth enterprises,

paying an unemployed person a wage to start a business assisted by the incubator manager. Another interesting approach is the offering of part-time access to a facility to develop one's hobby into a viable business.

It is interesting to note that Campbell also states that this encouragement of the European incubators is perhaps not necessary in the U.S. because of its 'entrepreneurial economy'. This point is particularly important to developing countries, that should remember not to blindly adopt a specific incubation approach, but to adopt the incubation approach suited to their specific local needs.

5. INCUBATOR DESIGN

With the business incubator concept still being relatively new, incubator sponsors and managers should be very careful when designing an incubator not to just duplicate an existing incubator model. Most of the existing successful incubators were developed with no model to follow and went through an evolutionary process. The development of these incubators was influenced by variables such as geographic location, funding sources, management styles, resources available and other obstacles, resulting in totally different incubator models. As a result of these interacting variables and the set of circumstances that surrounded the initial development of the different incubators, there may be no one ideal incubator model, and an individual incubator model may not be transferable in its entirety to another area. Nevertheless, a great deal can still be learned from the experiences of other incubators, enabling sponsors to correctly plan new incubators according to the applicable circumstances, skipping some of the hurdles and shortening the development process.

5.1 EVOLUTION OF AN INCUBATOR

Even with the incubator industry still being relatively new, it is gradually moving out of its infancy stage as older incubators mature. It is therefore now possible to create a model to illustrate the development of an incubator. This model should typically be used for planning ahead the development of a new incubator or educating incubator managers and developers about the essential management issues that pertain to an incubator's evolution. With every incubator representing a response to local needs, resources, and opportunities, no model can be presented that can explain perfectly any one incubator's development experience. The model should therefore rather be seen as merely an abstraction of commonly held experiences, problems, and outcomes. One such model was developed by David Allen, from the Pennsylvania State University, and illustrates the development process with a three-stage life-cycle model⁵³.

The central idea for the model emerged from the recognition that incubator management activities and priorities differ depending on the programme's development stage. Neither learning and experience curves, nor life-cycle assumptions fit the incubator experience perfectly. For example, a firm's productive output can easily be quantified, whereas the productive output of an incubator is more subjective. Nevertheless, as a heuristic device the life-cycle concept helps frame a process model of development that uses reference points and ideas common to economic development literature.

Life-cycles can be devised into four different stages: development, growth, maturity, and the decline stage. Due to insufficient data, it was not possible for Allen to determine the forces that could possibly affect the decline in the incubator industry, but given the model, one would postulate an eventual decline.

The life-cycle model is summarised below, with some of the more important information highlighted, to indicate to policy makers the process involved in developing an incubator.

5.1.1 The Start-up Stage

The start-up stage of incubator development begins with the concept initiation and ends roughly when the facility reaches its full occupancy. This start-up period can continue for many years, but could be as short as a couple of years. The period of time in the stage and position on the incubator experience curve differ as a function of the number of forces affecting the process and the strength of these forces.

5.1.1.1 Concept initiation

Many of the first incubator sponsors' objectives were ill-defined, and had an old building in a state of moderate disrepair as the focal point of deliberation. There was therefore no need for a formal feasibility study early on in the concept initiation process. Today, however, it is widely accepted that the concept initiation should start with a formal feasibility study.

5.1.1.2 Facility renovation

Allen deduced from several case studies that the main focus of the start-up phase is on construction, renovation and real estate development. Control over the building and resources available for construction, marks the beginning of this period.

5.1.1.3 Initial development

According to Allen the initial development phase starts when the first small user space becomes available. It is at this stage, as the renovation proceeds, that it is in management's interest to fill the new space as soon as possible. The rents will generate revenue, and with little preleased space, potential tenants are in too great a demand to risk losing. The primary responsibility for features such as shared services and business consulting, falls on the manager of the incubator, at this stage. Generally managers work very little with individual firms, although hands-on consulting gradually does become part of their daily activities. As ratios of finished-to-unfinished space begin to tip toward space available to tenants, new pressures are placed on the managers.

5.1.2 The Business Development Stage

The second phase in the evolutionary process begins when the incubator building reaches its full capacity (or near capacity, given initial tenant turnover). Management should now shift their focus from the physical concerns of the incubator building to its tenants' business development needs. The focus on business development, however, can take on many forms, some more successful than others. Successful tenant assistance is therefore not the defining factor for the business development phase. It is rather the increased amount of time managers spend interacting with tenants, that signals the incubator's move into the new phase.

5.1.2.1 Emerging service provision arrangements

The incubator manager's time, previously spent with construction and courting potential tenants, is now available for working with the tenants. The predominant and desired role of managers is now to assess problems and direct entrepreneurs to available resources.

Incubator managers are strongly advised, especially at this stage, to strive towards increasing the time spent on direct intervention, whether reactive or proactive.

5.1.2.2 Networking

When the new firms mature, attended with consulting needs that are narrower and more specialised, tenant business advising begins to grow beyond managers and the staff of the incubator. It now requires fundamentally different expertise to help a firm. In some instances, managers or staff has sophisticated expertise, but given that one or two individuals' sophisticated expertise is still rather narrow, outside consultants are needed. At this stage the incubator starts developing a wider support network with outside consultants, new business contacts and academic relationships to assist the incubator tenants.

5.1.2.3 Stricter entrance criteria

The establishment of an enterprise support network leads to more than just consulting expertise. The growing support network increasingly refers new business contacts to the incubator; consequently, managers need to spend less time searching for high potential firms that will better meet the incubator's development objectives. When the need to fill space passes and quality leads are coming via the network, managers can be more selective when space is available. Entry criteria begin to have meaning at this time, in contrast to being benignly ignored during the start-up stage.

5.1.2.4 Synergistic trade relations and support

Another characteristic of the business development stage is the synergy that occurs in the incubator. As firms' operations begin to stabilise, they become familiar with the work, conditions, and potential of other tenants, especially as these affect their own operations. Synergy develops from mutually advantageous business operations, such as sharing equipment, employees, and expertise.

5.1.2.5 Graduation policies

As the incubator moves through the business development stage, the issue of graduation criteria becomes more important. Most managers, especially in the beginning of the business development stage, are counting on firms either leaving of their own accord because they need greater space, or need to leave the incubator since they are not able to pay for the space they rent. As the pressures for space in the incubator increase, the need for an explicit policy increases to ensure that firms that are not growing or whose principal(s) have no desire to change locations, move out.

5.1.2.6 Community participation

The business development stage is also characterised by greater involvement by individuals and organisations in the local community. When the community realises the importance of stimulating new business development and see the results of a successful incubator, they are more willing to get involved. This is most evident when incubator managers and staff are not able to handle sophisticated consulting problems. Consequently, outside resources are locally organised and, once organised, directed towards business management assistance.

5.1.3 The Maturity Stage

For an incubator to qualify as a mature facility, two conditions must be met. *Firstly*, the demand created by prospective tenants must be appreciably greater than the building's ability to supply space. *Secondly*, comprehensive and sophisticated business assistance services must be readily available to tenants. At this stage service provision gaps must be filled and the entire support network should be working in an effective fashion. The mature incubator is now in a position where it needs to actively consider expansion. This expansion is characterised by the expansion of the facility itself, and through the creation and stimulation of new incubators.

5.1.3.1 Tenants and space demand

Incubator maturity is characterised by a high demand for space. During the incubator's early years, existing small firms composed the tenant base; by maturity, firms in an early stage of development compose the new tenant base. The young firms typically have low space requirements. Seldom are more than two people employed, and standardised assembly or operations are unlikely to occur for a year or two, especially for high value-added products and services. If a tenant has been successful, it is common for the firm to move or to expand two or three times during its residency in the incubator. Space interests of firms compound internal pressures created by the growing tenants. Since the facility has by now been operating for at least five to six years, a considerable proportion of the tenants are creating internal pressures for expansion. This internal pressure can be seen as a clear sign that the incubator is reaching the maturity-stage.

5.1.3.2 Community extension

The maturation stage marks the fullest extension of the incubator into the community. At this stage in the life-cycle, the incubator becomes a focal point for local entrepreneurship development. The incubator now functions as the centre of the enterprise support network, acting as information and services provider. The guiding purpose is to help entrepreneurs find inexpensive resources and responsive assistance.

5.1.3.3 Service gaps

Even in mature facilities, service gaps emerge and incubator managers search for ways to fill them. In the absence of external resources, managers develop their own programmes or services to fill gaps. For example, mature incubators commonly sponsor workshops, seminars, and other educational programmes on new venture issues, such as financing, taxation, leasing, and so forth.

5.1.3.4 Expansion

The mature incubator is likely to be experiencing new challenges. As the demand for start-up space outstrips the incubator's space supply, expansion becomes a necessity.

Early indications of expansion are evident in graduates' spaces being subdivided for new entrants. Given space pressures created by growing tenants, space subdivision can only minimally handle the increased demand. Management may then be forced to accelerate the tempo of the incubation process by decreasing the graduation period, a policy change that has limited viability. Eventually, expansion of operations to larger or auxiliary quarters is necessary. This entire process presupposes that the entrepreneurial drive of the management remains intense.

At this period the economic development benefits of the incubator should be apparent. Firms that graduated a few years earlier should be making important contributions to the local employment base, and many promising firms should be ready to graduate. It should be remembered that the desired contribution of an incubator will not be realised until at least five years after its inception.

5.1.4 Implications for Incubator Development

According to David Allen, the life-cycle model should be used by incubator developers, as a tool to assist in planning the development of the incubator⁵³. The life-cycle model can especially be of substantial assistance when developers need to:

- ◇ Forecast the necessary financial support an incubator might need, until it achieves financial sustainability.
- ◇ Choose the right location or facility for an incubator.
- ◇ Educate new incubator managers to understand the change, or evolution, that an incubator goes through, with the subsequent management changes.
- ◇ Evaluate the incubator performance.

5.1.4.1 Evaluation of incubator performance

Although a flexible, trial-and-error management approach is appropriate, it presents considerable difficulty for sponsors that rightly require accountability and performance. Assessing the performance of incubator operations demands another form of calculation

than just counting jobs or graduated firms. Jobs may be the bottom line for economic development, but this is a short-sighted approach to evaluating incubator performance. For business managers, jobs are merely one indicator of the firm's health; if employment is increasing, the firm is probably healthy. At the early stages of firm development, every attempt is made to minimise employment costs, therefore, a more appropriate employment indicator would concern the long-term growth of a firm after it leaves the facility, when its operations reach a more mature phase, and not only the number of jobs created.

In stead of counting jobs, the evaluation of incubator performance must reflect the uncertainty inherent in the environment and not act as a disincentive to risk taking. One way to promote trial-and-error management learning, is to focus on the logical and conceptual basis of management rather than on rigid performance criteria. The research done by Allen, suggests some incubator milestones that present a logical sequence of development rather than a purely quantitative assessment, often resting on inflated numbers⁵³. The following could be some of the milestones:

- ◇ Completion of initial tenant space
- ◇ Arrangement of shared office services
- ◇ Reaching an occupancy level necessary for financial break-even
- ◇ Creation of a responsive business assistance network
- ◇ Development of inter-firm trade relations
- ◇ Graduation of first tenant
- ◇ Admission of primarily new ventures, not relocated, previously established firms

These milestones do not always occur in a sequential order, but for the incubator to make a contribution, each milestone must eventually be passed.

On the face of it, incubators represent a rather unique approach to economic development. Upon further investigation, one quickly sees that incubators are really a

reflection of integrated partnership approaches to new venture creation. To assess them from conventional ‘bricks and mortar’ standards ignores their uniqueness. The life-cycle model presented in this article suggests that economic development approaches should be considered as dynamic processes, and practitioners must embrace the very force that seems to frustrate them the most—change.

5.1.5 Conclusion

It is apparent from Allen’s study that the different phases of the life-cycle model have some distinct characteristics. It is also clear that, as these phases pass, management activities and requirements change. Increasingly, incubators can be seen less as a development programme and more as an ongoing organisational problem.

Regardless of its legal status as a non-profit or for-profit entity, incubator developers and managers must understand that the incubator is in itself, a new venture. The incubator must develop a viable business plan, select the right staff and location, secure financing, etc. Even when the incubator is established, the incubator manager will still need to manage cash flow, market the incubator, select replacement staff and modify the services provided to meet the changing needs of the client companies. By developing and managing the incubator as a business, the incubator will lead by example. It therefore naturally follows that the first step in the start-up stage, will be a feasibility study.

5.2 DETERMINING INCUBATOR FEASIBILITY

Success is crucial to the image of an incubator and it depends on a large number of divergent factors ⁱ. A feasibility study is probably one of the most critical determinants of an incubator’s success. It is all too common practice for incubator sponsors to charge ahead and establish an incubator without first conducting an adequate feasibility study. Consequently, they do not understand the business incubation process and are likely to make critical errors of judgement and planning. In the face of acute

ⁱ For more information, refer to heading ‘Successful Business Incubation’, on page 153.

financial stringency, it is imperative that the preparation process for incubators should start with a feasibility exercise and that the decision about whether to proceed or not, be based on a thorough and objective analysis of the information gathered.

A feasibility study allows sponsors to understand the climate for business incubation in their community, the market for services the incubator proposes to provide, and the commitments necessary to develop a viable programme. Information gained through the feasibility study, such as geographic location, type of tenant companies, type of financial support and target group, should be prioritised and used as a guide line in designing an incubator.

A feasibility exercise should typically include:

- ◇ A site selection study (geographic location).
- ◇ Market analysis (interviews with a significant number of potential candidates and community leaders).
- ◇ A financing plan (cash-flow projections).
- ◇ Mission statement.
- ◇ Measures by which the project will be judged.
- ◇ The identification of an appropriate project champion and incubator manager.
- ◇ A decision on the type of incubator and the type of tenant.
- ◇ The development of appropriate selection criteria for tenants.

Identifying and understanding the market of an incubator in the local community, is one of the most important steps in determining the feasibility of an incubator. The incubator founders should consider the entire community in the feasibility study, and try to persuade them to support the incubator. If the incubator founders cannot garner the support of community sponsors, it may be an indication that the community is not a good market for the incubator. Community leaders will typically include:

- ◇ entrepreneurs,
- ◇ bankers,
- ◇ lawyers,
- ◇ accountants,
- ◇ business leaders,
- ◇ educational leaders,
- ◇ investors, and
- ◇ state agencies.

Except for small communities and incubators that target specific industries or markets, the ‘supply’ of firms is not likely to be a barrier to starting up an incubator. If quality incubator services and resources can be provided at an attractive price, experience suggests that there will be enough candidate companies to enable the incubator to ramp-up to an established business in its own right ¹.

According to Jonathan Gorham and Jim Greenwood’s Developers’ Prep Course, an incubator project is probable most feasible when ⁵⁴:

- ◇ The sponsors understand the kinds of investment they will be required to make over time and their respective magnitudes.
- ◇ Adequate cash flow analysis has been performed and threshold levels of financing have been secured.
- ◇ A single project champion or group of advocates has been identified to marshal resources in the early stages of the project.
- ◇ The people testing feasibility complete a market assessment by talking with a significant number of potential candidates.
- ◇ The incubator offers business and technical assistance services, which meet the needs of targeted entrepreneurs.
- ◇ Adequate funds are available to staff the project appropriately.

- ◇ The project manager understands the role of the incubator within the context of other local and regional economic development projects.
- ◇ A building can be secured which lends itself to the needs of early-stage companies, e.g. can be modularised; can accommodate a variety of uses; has core utilities infrastructure, etc.

5.3 GEOGRAPHIC LOCATION

Business incubation is a location specific process and the geographic location of the incubator is therefore also one of the critical determining factors of an incubator's success. It is therefore essential that each incubator be custom-designed, with participation of the target groups and local consultants in the preparatory process, to meet the special needs, circumstances and culture of the locality. International experience, however, can be very useful in this respect to guide the project design and to avoid mistakes made elsewhere.

Since different types of entrepreneurs require different incubator settings and services, it is important that, when the objective of the incubator is to assist a specific target group of entrepreneurs, the best location is chosen to assist them.

5.3.1 Infrastructure

It is sometimes asserted that infrastructure characteristics are far less important to the location of high-tech industries than they are to heavy manufacturing. The importance to manufacturing production of bulky and heavy inputs and of shipping final products to market, places a premium on locating factories near good transport systems. These considerations first lead to the concentration of manufacturing operations near river or lake ports, then on railroad lines, and finally near interstate highways in the U.S. However, the emerging technology based industries are not entirely free from these access constraints. To high-tech industries, the quality of transportation, measured both in access to particular modes and their level of service, is very important⁵⁵. Toft⁵⁶ comments that:

“Communication and exchange of information and close proximity to young markets are of the essence in the development of high-technology activities. The special features of those firms and the activities that they engage in have important spatial requirements, which should not be overlooked in current planning efforts and programs to facilitate and support technological innovation through transportation initiatives.”

High-quality air service is well suited to the needs of high-tech industry. The process by which ideas are developed and adopted frequently requires an exchange of ideas nationwide among researchers and the entrepreneurs who provide venture capital to promising new firms. Both groups place a premium on their time. Airfreight is advantageous because it can efficiently accommodate high-tech goods, which unlike heavy durable products, have a high value to weight ratio.

“Cognisant of the drawing power of good airports, a \$130 million high-technology centre is under construction at Logan Airport in Boston, and will be the first major airport high-tech park.”

The quality of roads is also important. High-tech companies are considered to benefit from agglomeration economies, or from the critical mass of talent and trade information obtained from collocation. This has led to the phenomenon of high-tech company after company in suburban or rural settings⁵⁷.

Incubators can be categorised according to two main geographic locations, with each location having its own advantages and disadvantages.

5.3.2 Urban Incubators

The majority of incubators in the U.S., according to the 1991 NBIA survey, are located in urban areas³⁷. A good urban location gives an incubator the advantage of access to the critical mass of facilities and technical expertise not normally available in remote areas.

5.3.2.1 Inner City Incubators

Today, more than ever, businesses are decentralising, avoiding inner city areas, and locating in new business parks that are more environment friendly. Inner city areas often lack adequate or secure commercial space and, accompanied by the associated depressed economic activity, they struggle to attract new businesses. Incubators can be utilised, in this regard, as a strategy to provide the necessary structure for community revitalisation and employment growth. Inner city incubators, however, are extremely difficult to make financially self-sufficient, and sponsors should be willing to make a long-term investment. Inner city incubators will typically be community sponsored and be low technology and low-income orientated. Universities will, in general, typically not have a lot of synergy with the type of businesses that populate such an incubator.

5.3.2.2 Suburban Incubators

Suburban incubators are, arguably, the best located for business development due to the availability of resources and infrastructure, and can be divided into:

◇ Incubators located near a university

University-related incubators tend to be more high technology oriented.

◇ Incubators located in a technopark

- One of the main objectives of incubators located in a technopark, is to provide the technopark with good quality, high growth companies.

◇ Incubators located in an industrial area

Incubators located in industrial areas have a wide variety of objectives, but tend to be more suitable than other incubators to assist in cluster development, or to support specific industries.

5.3.3 Rural Incubators

Incubators in rural areas and small towns may face problems not shared by metropolitan facilities. The lack of physical infrastructure facilities, like proper streets, running water

or electricity, etc., is often the main reason why business and financial services are unavailable in rural areas⁵⁸. High transport costs or poor transportation networks may also prove disadvantageous and may preclude the location of some businesses in some rural areas. Incubators in rural areas can not provide all of these services themselves and are therefore limited to the areas where these facilities are available. Rural incubators, however, do present a centralised facility, making it easier to provide these types of services and will typically nurture resource-based industries, light manufacturing or agri-business activities. One critical factor is the existence of a large enough pool of potential entrepreneurs willing to start a business. A lack of potential entrepreneurs may be an indication that it is not feasible to start an incubation programme in the specific area or that the incubator will need an aggressive marketing strategy to recruit local and non-resident entrepreneurs. Smaller towns may also have difficulty obtaining the necessary financial and technical support needed, and government support is most of the time the only viable option.

5.3.4 Discussion

Political and strategic considerations require balanced regional development by pushing economic activity to the neglected periphery, and rural incubators can contribute to this objective. However, the initial pilot incubators in developing countries need the best conditions for success, and the entrepreneurs starting a new company, need a supporting infrastructure and access to technical services. It is therefore essential for pilot incubators to locate where such support is readily accessible, namely, in a good urban location with the requisite infrastructure and access to networks of professional services, in order to improve the incubator's chances of success as well as that of the businesses it is nurturing. Later, incubators could be tried in rural communities to help decentralise economic development.

It is interesting to note that, on average, graduation rates for incubation programmes are similar for rural and suburban locations⁴⁷.

5.4 THE INCUBATOR FACILITY

The physical characteristics of the incubator building goes hand-in-hand with the geographic location of the incubator and have a tremendous effect on the development of, not only the incubator, but also on the businesses inside the incubator. The building represents a tangible manifestation of the hard work and the financial investment that goes into getting an incubator started. The building is also one of the main sources of revenue for the incubator and if it is managed properly, it can provide the basis for financial self-sustainability and an environment in which the entrepreneurs and incubator staff can work together to develop new businesses. On the other hand, the wrong building can lead to failure even if it is managed well, and is often the underlying reason why incubators have not met expectations³⁹.

One-third of incubators surveyed by the NBIA in their ‘State of the Business Incubation Industry’ were located in new buildings, with almost nine out of ten new facilities specifically built to serve as incubators⁴⁷.

5.4.1 Site Options

Most incubator buildings are not new. In fact, according to the 1991 NBIA survey, about two-thirds of the incubators were located in old buildings that had been either dormant or under utilised. In most cases, especially in urban areas, it is more economically feasible to renovate an old structure than to build a new facility from scratch. Lower construction costs mean lower rents for tenants, an important consideration. Site options for renovation, include:

- ◆ Schools
- ◆ University buildings
- ◆ Down-sizing corporations
- ◆ Military base conversion
- ◆ Large, vacant commercial sites

- ◆ Commercial office build-outs
- ◆ Redevelopment sites

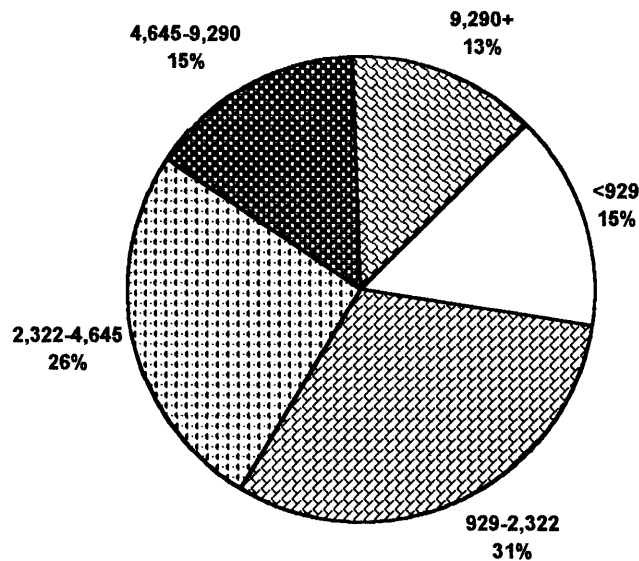
In some suburban or rural areas, however, developers may wish to investigate new construction. Land costs are often cheaper in those areas than in cities, and a relatively inexpensive structure may be erected on the site. According to the 1991 NBIA survey, almost nine out of ten new facilities were built specifically to serve as incubators.

5.4.2 Incubator Size

While small incubators have the advantage of intimacy and the concentration of services, they generally struggle to generate the scale of operations required to cover fixed costs and achieve financial sustainability. The total amount of space that is available to lease to tenant companies, determines the amount of rent the incubator will be able to generate. The amount of space, therefore, has a direct influence on the ability of an incubator to reach financial self-sustainability. According to the 1994 Coopers & Lybrand survey ⁵⁹, Figure 7, the median incubator facility is 2,787 square metres (30,000 square feet) and ranges in size from 140 to 204,000 square metres (1500 to 2.2 million square feet).

Facilities under 1,400 square metres (15,000 square feet) of useful space are generally perceived as too small unless they focus strictly on early stage firms with few employees and little need for manufacturing or assembly space. With limited space, few opportunities exist for firm expansion and the costs of shared services, facility administration, and business assistance may never be recovered with so few tenants among which to spread costs.

FIGURE 7: INCUBATOR SIZE ⁵⁹ — SQUARE METER



The size of the incubator can be determined using simple mathematics, for example:

$$Size = \frac{revenue\ required}{\% occupancy \times \% avg.\ collectionrate \times avg.\ rental\ rate\ per\ m^2}$$

5.4.3 Renovation

It is often the view that older buildings mean lower costs, with the savings passed on to tenants in the form of cheap workspace. However, all too often an unsuitable building is made available at no or low acquisition costs, but due to the rising costs of renovation and operation, acquiring this type of building can be more expensive than the costs of acquiring a more suitable building. If too much money is invested in renovation, it places an unnecessary burden on the short-term and long-term finances of the incubator. Entrepreneurs want space and surroundings that are adequate, but they do not need to be lavish. An adequate but not too comfortable facility can also help motivate client companies to move through the start-up stage quickly in order to graduate to more

upscale quarters. On the other hand, as incubators begin to incorporate technology-based businesses, new buildings give the promise of lower operating costs through appropriately designed facilities¹. New buildings have a certain symbolic value as well, providing visual evidence of the commitment of community leaders to the mission of the incubator.

5.4.4 Space Configuration

Incubators are better advised to start with mixed tenants, rather than to focus on a specific target group³⁹. The optimal tenant mix depends on the specific incubator and the tenants that are available in the start-up phase, nevertheless, the incubator will shelter a variety of businesses, requiring different size spaces. The 1991 NBIA ‘State of the Business Incubator Industry’, found that start-up tenants lease an average of 44 percent of the gross space — on average across all incubators — and anchor tenants take up to 12 percent of the space. Approximately 13 percent of space are used for administration or as common areas. The average amount of gross space per tenant is approximately 550 square metre (6,000 square metres)⁴⁷.

The incubator space must meet the needs of the tenants who are starting up their companies, and can naturally be divided into any size a tenant is willing to pay for. However, the incubator will be vulnerable if it leases too much space to a single tenant. Flexible space configuration is therefore essential to respond to the changing needs of companies as they grow.

When considering the allocation of space to prospective tenants, a 2800 square meter (mean incubator size) leasable space, might be broken down to represent something like Table 3.

TABLE 3: TYPICAL CONFIGURATION OF A 2,800 M² INCUBATOR.

Type of Company	Number of spaces	Size of Spaces	Total (m ²)
Small start-up firms (Service, software)	5	30	150
Micro- manufacturing start-up firms	10	50	500
Early stage growth firms	4	100	400
Growth and near graduation firms	5	200	1000
Anchor Tenants ⁱⁱ	5	150	750
Total Leasable Space			2800

5.4.4.1 Common areas

Entrepreneurs report that one of the primary benefits of being in a business incubator, is co-location ³⁹. Co-location provides entrepreneurs with the opportunity to talk and work with other start-up entrepreneurs, to learn from each other, to share experiences, to share resources, and to trade with one another. This interaction between the entrepreneurs forms the basis for networking. The opportunity for interaction between entrepreneurs increases when the distance between businesses decreases. It can therefore be naturally derived that the close proximity of the businesses in an incubator facility, will increase the opportunity for networking. However, there is no guarantee that networking will take

ⁱⁱ Note the high percentage (can be even higher) of space leased to anchor tenants in the early stages of incubator development. The space can naturally be divided into any configuration, e.g. two 150 m², one 200 m² and one 250 m² anchor tenant.

place and therefore, to effectively promote and increase the interaction between tenants, the incubator facility needs to have common areas, e.g.:

- ◇ a common reception area
- ◇ tea- or lunch-room
- ◇ conference room
- ◇ library
- ◇ etc.

Unfortunately many incubators, especially those that are located in older buildings, have too many wasteful, non-rentable common areas in the form of halls and stairways, and too little space that encourage entrepreneurs to congregate and communicate.

5.4.4.2 Expansion and flexibility

During the life-cycle of an incubator, incubator tenants may grow beyond their initial space requirements. A solution to the dilemma, is to pursue an early graduation policy. If the tenant is ready to move out of the incubator, it does not present any operating problems to the incubator facility. However, the problem associated with early graduation concerns the impact of a premature move on the tenant. In the absence of low-cost space for early graduates, the premature release of tenants into the local business environment may jeopardise their financial stability. A firm's transition from the sheltered incubator environment is necessary for a successful enterprise development programme, but if done too soon, the boost received by incubator residency could be lost in the necessity to meet appreciably greater space costs and the limited flexibility of a new lease. In the situation where a tenant is not ready to move out, the incubator has four options, viz.: *Firstly*, if space is available and if the incubator has some flexibility, such as partition walls, the tenant's local space can be expanded. *Secondly*, the tenant can be moved to another location within the incubator. *Thirdly*, if space is available and it is financial viable, the incubator facility may be expanded. *Fourthly*, if the demand for space is too high, it might be considered to move the incubator to a more suitable facility. This last decision

presents its own set of trade-offs. By selling the facility, the sponsoring organisation runs the risk of losing business incubation potential for the community, and mature incubators are not likely to generate sufficient income to appreciably help reduce the costs of developing a new facility, unless appreciable financial support for the new facility is available. It is therefore absolutely necessary that incubator developers plan ahead to ensure that the building be either large enough from the start, or the area set aside for an incubator expandable enough, to fulfil future requirements.

5.4.5 Problems Encountered

The following list represents some of the most common facility problems encountered by incubator developers and managers ³⁹.

- ◇ A focus on the building too early in the initiation process tends to skew subsequent thinking and foreclose enterprise development opportunities prematurely.
- ◇ Acquisition terms: A long, drawn-out set of negotiations about the building will sap the energy and enthusiasm of the incubator development team.
- ◇ Operating costs: Too often incubators are saddled with old buildings that are black holes with respect to energy consumption.
- ◇ Maintenance: The building needs to be maintainable, both within the context of the budgetary model and within the time and capacity of the staff and volunteers.
- ◇ Environmental hazards: Environmental hazards can kill an incubator. The costs of removing environmental hazards are mostly beyond the capacity of an incubator budget. Incubator developers must therefore be absolutely sure that the incubator has no environmental hazards.
- ◇ Safety and security: Some buildings and some neighbourhoods can create security nightmares for the incubator management.
- ◇ Parking: Real businesses provide parking for their employees, for their visitors and for delivery vehicles.

- ◇ Loading dock: The absence of a loading dock is another physical limitation for many prospective tenants, especially in facilities that support small manufacturing firms with high-volume, high weight products.

5.5 FINANCING

With the incubator managed as a business, it naturally follows that the incubator needs to strive for financial sustainability. Unfortunately too many incubators have been conceived and managed as subsidised development programmes, and nothing diminishes the energy and enthusiasm of sponsors, stakeholders and staff more than having to focus month after month, and year after year, on the financial survival of the incubator. When the sponsorship falls away, many of these incubation programmes have to be ended, unless of course they are able to obtain a new sponsor. However, even when an incubator is able to reach financial self-sustainability, very few incubators are able to disburse the substantial investment required to start the incubator, and therefore most incubation programmes require a substantial initial donation of some sort.

5.5.1 Sources of Income

Initial support by a sponsor is almost always needed and sponsors should expect to make a substantial financial investment during the incubator's planning, start-up and early growth stages. Sponsor investments, however, do not always come in the form of cash, for example:

- ◇ Sponsors often donate an existing building, that may for instance be under-utilised, on a low-rent, or no-rent, basis ⁴.
- ◇ Executives and volunteers from the sponsor can augment the incubator staff and take responsibility for some of the operational tasks.
- ◇ Sponsors can locate one of their own operational groups in the incubator to provide an anchor tenant that can serve as a reliable source of rental income to the incubator.

- ◇ Sponsors also often provide access to people, equipment, and services at a reduced rate to the incubator and its tenants ³⁹.

The term “investment” implies that a business judgement has been made and that there is a reasonable expectation of a return on investment. Sponsors should therefore benefit from making an investment to the incubator, e.g. ³⁹:

- ◇ “goodwill” generated by their donation;
- ◇ the upliftment of the community;
- ◇ the creation of a channel for technology transfer;
- ◇ a living laboratory for the study of entrepreneurship;
- ◇ a possible tax advantage related to the donation; or
- ◇ the creation of a market for their own services or products.

“The overall effect of these non-cash investments is to increase revenues or decrease operating costs—thereby diminishing the incubator’s need for cash” ³⁹. However, when sponsors require equity and/or deferred royalty positions for their investment, the incubator’s financial strategy can dramatically change. According to Rice and Matthews, there are two compelling reasons why an incubator’s long-term financial strategy should include deferred revenues ³⁹. *Firstly*, “the process of negotiating a deferred fee arrangement causes both the incubator management and the client companies to recognise that the incubator and the community are making an investment in the companies at a point of time”. *Secondly*, “incentive compensation tied to deferred revenue can be a significant part of the total compensation package of the incubator president”, and will therefore encourage “incubator presidents to maintain their commitment over the long haul in order to participate in the harvest of equity/royalty positions”. However, Rice and Matthews also warn that “for most incubators, the feasibility of achieving significant returns from equity and/or deferred royalty positions is low and the time to harvest long”. Consequently, the financial viability of the incubator should not depend on deferred revenues.

5.5.1.1 Operating income

Incubators have two broad sources of operating income: first, revenue from their own operations, and second, subsidies from external organisations or individuals. “Subsidy” refers to a grant, donated to an organisation, that is perceived as having some kind of benefit to the public, but which needs cash to survive. Table 4 reflects the typical percentage of total operating income, incubator developers and managers can expect from each of the different sources available.

TABLE 4: INCUBATOR REVENUE ANALYSIS ⁴⁷

	Average % of total revenue
OPERATING REVENUE	
Tenant rental fees	45.5
Tenant service fees	6.4
Income from royalties	1.0
Interest income	0.9
Other operating income	7.3
Total Operating Revenue	60.9
OPERATING SUBSIDIES	
Federal Agencies	3.6
State Agencies	10.7
Local Agencies	7.8
Corporate contributions	2.2
University contributions	5.0
Individual contributions	0.7
Other operating subsidies	9.1
Total Operating subsidies	39.1
Total Revenue	100

With an average of 60% of the total revenue generated through the incubator's own operations, incubation programmes have a huge advantage above other development programmes that require a 100% subsidy.

With rental fees as the single largest contributor to revenues—45.5 percent of the total revenue—it is critical that incubators attach a high priority on their rental rates and collection policy.

5.5.1.2 Rental rates

The 1991 NBIA survey reports that rural, urban, and suburban incubators have median rental rates that are well below market rates, and that the maximum rental rates are equal or close to the average market rate of the area in which the facility is located ⁴⁷. These incubators offer below market rents to start-up firms in an effort to reduce the costs associated with new business development, and often have a rental escalation policy where rental rates slowly increase over time. This type of policy has the additional advantage that it encourages tenants to exit the incubator as their ability to pay increases. The rental rates can sometimes even begin to slightly exceed those of the local market, creating additional rental income that can provide at least some of the cash-flow necessary to allow incubators to offer lower rates to start-up firms.

In their book on the principles and practices of successful business incubation, Mark Rice and Jana Matthews advise that incubators should be positioned as “success environments”, rather than being known as “low rent space” ³⁹. They further state that incubators should strive for financial self-sustainability and that, in the process, “Entrepreneurs should be expected to pay market rate rents for space—and even a small premium for flexible leasing terms, and for access to all elements of this success environment”. This approach may be appropriate to reach financial self-sustainability, however, it focuses too much on the incubator as a business, and too little on maximising the assistance provided to new ventures. Furthermore, in the process of reaching financial self-sustainability, the incubator may limit its assistance to only those firms that are able to

pay for it, and not providing it to those firms that may be needing it the most. Incubator developers must therefore understand that they must find the delicate balance between assisting new ventures, and maximising the incubator's independence.

Once the rentable space is fully occupied by the third or fourth year, the incubator's operational expenditures for management staff, building utilities and related costs should be balanced by income from rentals and services. However, while under optimum conditions, an incubator should be able to break-even after a few years, roughly two-thirds of all incubators continue to receive support ^{4,47}. This continued support can be contributed to the business incubation process that requires an incubator to secure credit-worthy tenants on a month-to-month basis, however, to entrepreneurs who are generally not credit-worthy. Once tenants do become financially secure, the incubation process requires them to graduate.

There are however, in the course of striving to be financially self-sufficient, a number of tactics that can be employed by managers, viz.:

- ◇ By increasing the use of donated labour and materials. Local suppliers, contractors and other professional assistance can be approached through an external service network to give their time and services as a way of reinvesting in the community and helping to create jobs.
- ◇ To generate revenue, managers have reported pursuing many opportunities, including renting out conference facilities, running seminars for non-resident firms and extending programming and services to these firms via affiliate membership in the incubator ⁴⁷.
- ◇ Board members can be approached to take a more active role in fund-raising, tapping into their familiarity with the local business community to obtain more support. In larger incubators, one person is sometimes given the sole responsibility for fund-raising.
- ◇ Most incubators bundle services into their rental rates ⁴⁷. However, the need to generate a positive cash flow requires that incubators partially separate the two and ask

a nominal fee for specific services that are delivered. Therefore, while a few facilities (e.g. receptionist, conference room) may be covered by rentals, other frequently-used services (e.g. fax and copying machines) may be on a cost-recovery basis. With careful pricing, marketing, and management of these services, excess revenues can be generated to help defray other programme costs. Tenants are generally willing to pay a premium rate for the convenience of using a copier, fax machine, or telephone system, especially if they can avoid capital expenditures³⁹. Incubators should, however, try not to totally separate all the service fees, otherwise, tenants may try to keep their costs as low as possible, and in the process avoid attending/using the necessary services that are generally provided, or in other words, the incubator might tend to target the services to those tenants who can afford to pay and not provide as much assistance to those who cannot pay. This will diminish an incubator's capacity to provide assistance to high potential tenants who cannot afford to pay for services at a time when they need them the most. One example of this practice is where incubators charge a separate fee and/or require an additional compensation in the form of royalties or equity participation, for the management assistance they provide.

5.5.1.3 The rent collection policy

With rental income playing such an important role in an incubator's drive to achieve financial self-sustainability, it is absolutely critical that incubators avoid running into cash-flow problems by not being able to collect the necessary rental income. Rent collection problems often reflect a possible conflict between maintaining a minimum level of cash flow in the short term, and preserving a healthy tenant base in the long run, with solutions tending to be reactive rather than proactive⁴⁷. **Reactive solutions** include an interest charge on late payments, a daily late-payment penalty, withholding grants from tenants, an initial deposit of the first and last month's rent and use of the statement on the bill that charges would be levied on late payments. The use of this type of punitive measures against tenants normally tends to worsen rather than alleviate the situation. **Proactive approaches** include a quarterly examination of tenant finances and the use of a consultant to identify and rectify tenant problems. However, one problem noted by the 1991 NBIA

survey, was “how reluctant tenants are to talk to outsiders regarding their business”⁴⁷. These proactive approaches recognise that the root cause of non-payment is often the result of ineffective tenant business practices and this strengthens the argument that the level of interference in incubator tenants’ business activities can have direct effects on the viability of an incubator. Incubator managers are, therefore, recommended to have a flexible but firm attitude, nevertheless, allowing for adaptability according to the circumstances.

5.5.2 Financial Requirements

It is absolutely critical for an incubator’s survival, that incubator developers and managers understand the capital requirements of the incubation process, especially if the incubator is to achieve financial self-sustainability. Sponsors often get the numbers wrong, either by being overly optimistic or in making unrealistic assumptions³⁹.

5.5.2.1 Start-up investment

The initial investment for an incubator varies considerably, from less than US \$100,000 to more than \$ 1 million. Nevertheless, the initial investment is, in general, modest compared to that of a research park, but substantial if compared to the development of a training programme¹. Ideally, an incubator should be fully capitalised, including the costs of establishing the incubator as well as the subsidy component for start-up operations. Establishment costs include a number of essential functions, viz.:

- ◇ a feasibility study;
- ◇ business plan development;
- ◇ facility acquisition and renovation; and
- ◇ office equipment and furniture.

Given that the initial operating costs should be added to the initial investment, incubator developers and sponsors often incorrectly assume that an essential activity can be ignored or accomplished later, with fatal consequences.

5.5.2.2 Operating expenses

Operating expenses are the costs associated with running an incubator, and can be divided into three categories: labour, plant/major equipment, and other operating costs. Table 5, obtained from the 1991 NBIA survey, provides an indication of a typical distribution of the operating expenses ⁱⁱⁱ.

TABLE 5: INCUBATOR OPERATING EXPENSES ⁴⁷

	Average % of total expenditure
LABOUR COSTS	37.0
PLANT/MAJOR EQUIPMENT COSTS	
Rent	6.0
Debt service	7.0
Other plant/equipment costs	3.1
TOTAL	21.1
OTHER OPERATING EXPENSES	
Professional services	3.1
Insurance	1.7
Utilities	10.8
Property taxes	3.0
Office expenses	5.5
Tenant programmes/services	2.3
Maintenance	8.4
Staff development/training	0.4
Other expenses	6.8
TOTAL	41.9
TOTAL OPERATING EXPENSES	100

ⁱⁱⁱ For the actual US\$ values, refer to the 1991 NBIA survey ⁴⁷.

The single largest expense, 37 percent, can be contributed to staff salaries. For many incubators, staff salaries even represent one half or more of the total incubator budget. To ensure that the incubator tenants receive the necessary level of assistance they require, a competent incubator manager must be employed. This competency, however, also carries a certain price tag with it. Therefore, to obtain the services of a competent full time incubator manager, the incubator must be willing to pay a market rate salary plus the appropriate fringe benefits. Assuming that none of the staffing capacity is provided pro bono by the sponsors, the incubator will also need to include at least the salary and fringe benefits for a receptionist or business operations manager. Coopers & Lybrand found that the following additional compensation was most often offered to incubator managers^{iv,59}.

- I. Health/Medical Benefits
- II. Association Dues
- III. Life Insurance
- IV. Disability Insurance
- V. Educational expenses
- VI. Retirement Benefits
- VII. Liability Insurance
- VIII. Car allowance
- IX. University Privileges
- X. Performance Bonuses

According to Rice and Matthews, real estate related costs will typically include: ongoing build-out or facility conversion costs, building repairs and maintenance, cleaning, security, maintenance of landscaping and parking, utilities, property and other taxes, and insurance and security costs³⁹. Costs related to providing shared services are usually simply passed

^{iv} Ranked according to the number of times it was mentioned as an additional compensation method.

through to the incubator tenants who use the services, often with some mark-up to cover administrative costs. Like in any other business, these incubator administrative expenses include: office supplies, marketing materials, professional fees, telephone and fax costs, mail, and staff training³⁹.

Costs of facilities and operations can readily be estimated, but shadow prices can often not be calculated. One such cost is the informal support system in which the incubator must invest to develop the network of individuals and institutions that can provide the necessary expertise and resources that are required.

In the end, the incubator itself may not make vast profits, but under ideal situations it can overcome initial operating losses if the rental and service income (based on the tenants ability to pay) is carefully calibrated against operating expenses (based on generous community support).

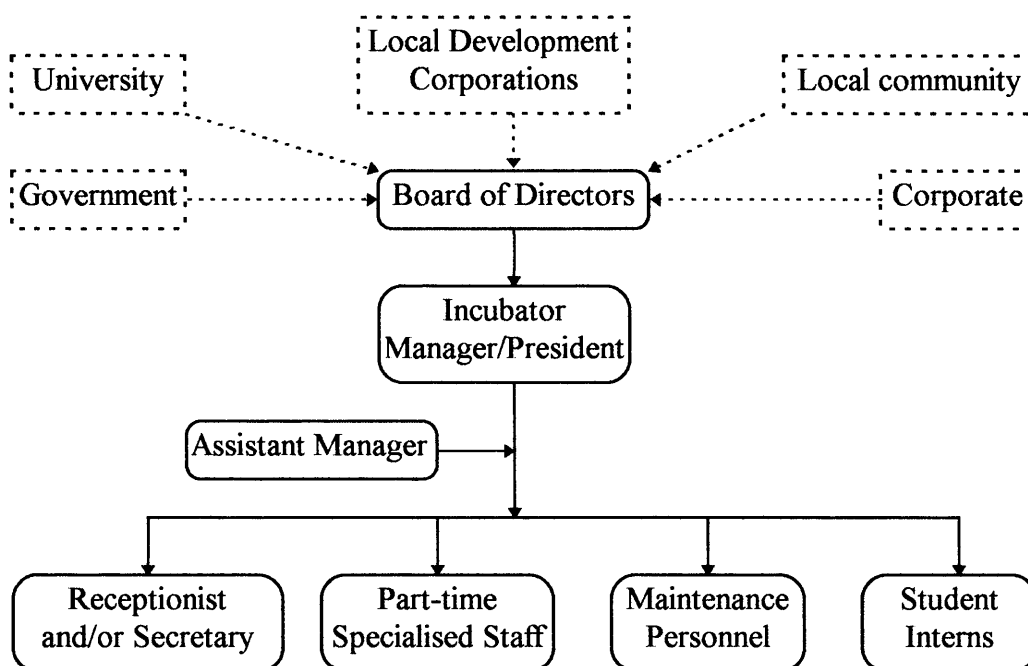
5.6 INCUBATOR STRUCTURE

There is no formula for creating an optimal organisational structure for an incubator. An incubator operating structure requires the involvement of not only the incubator staff, but also sponsors and other “friends” of the incubator. This involvement usually accompanies quite a few additional advantages to the incubator and its tenants, and usually comes in the form of individuals representing their respective organisations in the board, and in assisting incubator tenants on a part-time (specialised assistance) basis. Figure 8 shows an organisational chart of a typical university-related incubator. It must, however, be remembered that this structure can vary quite extensively from university to university. Nevertheless, the main differences are in the configuration of the board, and the total number of incubator personnel.

Many incubators in both industrialising and industrialised countries operate as departments either of a state agency or of a university¹. These incubators operate as embedded organisations, which do not exist as a separate legal entity but operate within

the context of a larger organisation. Most often this larger parent organisation operates as a non-profit entity³⁹. In some cases embedded incubators work on a separate budget, and in others they are treated as a cost centre, with an allocation from the parent. It is also not uncommon for the parent organisation to assume some administrative responsibilities and their related administrative costs. Nevertheless, embedded incubators generally have their own board of directors, which often differs from that in figure 8, in that the majority of the board consists of individuals from a specific department.

FIGURE 8: ORGANISATIONAL CHART



A more equal and wider representation of people on the board is probably more desirable, however, it is often inefficient. When the operating structure of an incubator consists of different parties that have different goals, strategic issues can often become disruptive unless, of course, there is an early harmonising of the respective divergent expectations. For instance, co-sponsorship by a state-agency (looking for job creation), and by a university (seeking high-technology tenants) can create conflict. The state may feel pressured to support high-employment, low technology businesses, while the university would press for the commercialisation of technology, i.e. high-technology businesses,

which often create fewer jobs. It is therefore clear that the incubator has to compromise its capacity to act as an independent business and to be entrepreneurial, against the bureaucracy of the parent or sponsor. The challenge for the incubator board in this previous instance, therefore, lies in securing the political, and initial financial support of the government, without relinquishing control.

Board members may typically include any combination of individuals that can contribute towards the incubator or its tenants' well being, e.g. individuals representing:

- ◇ Government
- ◇ A university/universities
- ◇ Science councils
- ◇ Development corporations
- ◇ Real estate developers
- ◇ City council(s)
- ◇ The local community - entrepreneurs, bank officials, and other professional service providers, etc.

It is therefore quite clear why Rice and Matthews view the right board, if structured correctly and focused on the mission of the incubator, as a critical success factor³⁹. For more information on the role and responsibilities of the board, refer to chapter 4 of 'Growing New Ventures, Creating New Jobs'³⁹. Nevertheless, some of Rice and Matthews' key recommendations are summarised below:

- ◇ The board must be the keeper of the flame.
- ◇ Important responsibilities of the board include: to develop a strategic plan; develop the necessary policies; hire the right incubator manager; manage external relations; and to evaluate the incubator periodically.

- ◇ Policies should allow the incubator manager as much latitude as possible in implementing the board's intentions.
- ◇ It is of critical importance that the board should include people with some experience of entrepreneurial business practice.
- ◇ The board should focus on managing the business of the incubator and working with incubator companies.

5.6.1 Incubator Staffing

Figure 7 serves only as an example of a typical university organisational chart. Incubator staffing can vary quite extensively, especially with the incubator staff size being related to the facility (Appendix B). The 1991 NBIA survey reports a maximum of 22, and a minimum of 2 paid staff across US incubators⁴⁷. However, with only an average of 3.1 and a median of 2, the most incubators are limited to only an incubator manager and a receptionist who has to fulfil the rest of the miscellaneous tasks. This is not necessarily an indication of best practice, but serves rather as an indication that many incubators must use volunteer or donated staff to do the additional work. It is therefore also recommended by Rice and Matthews that incubators should not expand beyond the core staff (an incubator manager, an operations/business manager, and a secretary/receptionist), unless the incubator receives funds from sponsors to do so or are provided with executives on loan.

5.6.1.1 The incubator manager

With responsibilities such as providing business advice to tenants, building external resources and networks, fund-raising, building management, recruitment, educational and training programmes, and other daily incubator operations, the incubator manager can be singled out as the one person that can, or rather should, have a very large influence on not only the incubators' success, but also on the firms within the incubator. Experience, therefore, also teaches that the incubator manager is one of the critical factors that can determine the success or failure of an incubator^{1,39}.

It is interesting to note that, even with the important contribution an incubator manager makes to the success of an incubator, from 1990 to 1994 the number of full-time managers were decreasing⁵⁹. Coopers and Lybrand, however, also report that part-time managers were found more often in incubators that are smaller in terms of square-metres and number of tenant businesses. Their incidence was also higher among incubator facilities sponsored by community colleges. The shrinking percentage can be seen as an indication that the smaller facilities are not able to support an incubator manager with the necessary expertise. Furthermore, it can also be seen as an indication that these facilities do not want to sacrifice the quality of the expertise, and therefore they rather opt to hire a part-time incubator manager. It can therefore also be understood that a serious problem exists in developing countries, where it is often hard to find incubator managers with the requisite entrepreneurial and business background, familiarity with the problems faced by tech-based companies, and a network of local contacts, and especially, that are willing to work for a relatively small salary. The Coopers and Lybrand survey also shows that high intellectual rewards a significant contribution make towards manager compensation. Nevertheless, it is often not enough, with eighty percent of full-time managers reporting that they receive additional compensation in addition to their salaries^v.

While no study has been undertaken to identify the specific characteristics that makes a successful incubator manager, some of the desirable traits can be found in and in Rice and Matthews' book, 'Growing New Ventures: Creating New Jobs'. Unfortunately, individuals with the combination of qualities and capabilities that are needed are scarce, and one may have to compromise on some of the requirements. Successful incubator programmes are therefore generally led by people with enough of those qualities and capabilities to be effective. It is therefore necessary to identify the best available persons at an early stage, train them at home and abroad, and provide the challenging conditions and incentives for them to work with dedication.

^v Ten measures of additional compensation are mentioned in 'Operating expenses', page 116.

It is interesting to note that Lalkaka and Bishop did find some evidence that point towards engineers as being the best professional choice for incubator management, presumably because the field of engineering lies between the analytical understanding of science and the practicalities of business ¹. Smilor and Gill, additionally found that 88.6 percent of all the incubator managers that responded to their survey, had at least a Bachelors degree.

6. INCUBATION & TECHNOLOGY TRANSFER

The role of innovation and new technology in economic growth has been widely recognised. For example, innovators and innovation are central sources of economic growth in Schumpeter's analysis⁶⁰. Business incubation, on the other hand, is often raised as a strategy for technology development in developing countries. The rationale behind this strategy is twofold. *Firstly*, stimulating businesses to develop technologically based products and services will hopefully serve as a catalyst for the wider development of technology in universities and in government agencies⁶¹. *Secondly*, there is an untapped reservoir of technology in research institutes both inside and outside academia, and all that needs to be done is to transfer this know-how potential to the corporate world⁶². In this strategy, one of the primary goals of the business incubation process is to help initiate innovation in small and medium-sized companies or to support their innovative efforts, depending on the respective requirements.

From a business perspective, technology can be the most important source of competitive advantage. Technology is therefore an essential element of a firm's success in a competitive world where every firm is attempting to create and sustain, at least in the mind of the consumer, an image of difference between itself and others, to allow a larger profit margin. Thus there are times when a tenant or group of tenants within an incubator have the need for technology that they can not afford as an in-house resource, or they may even have some technology that they want to offer to the outside world. In the *first* case, the tenant may want to consider obtaining technology from an organisation, university or any other research institute. In the *second* case, the tenant may want to consider transferring technology to an organisation that can promote the technology. This type of promotion is usually done with a corporation that is well established and that has adequate resources. Consequently, it becomes necessary at times to link with some outside agency to transfer technology to the respective incubator tenants.

To understand the incubator's involvement in the technology transfer process between incubator tenants and other institutions or corporations, one first needs to define technology and the technology transfer process. However, to provide a detailed definition or discussion on technology is beyond the scope of this study. Technology is therefore concisely defined as the knowledge about the ways in which processes and products are designed, made or organised⁶³. In addition, Van Wyk defines technology as "created capability: it is manifested in artefacts, the purpose of which is to augment human skill"⁶⁴.

Technology transfer designates a process whereby this specific created capability of a particular region or firm is transferred to another region or firm in a maximally efficient way, if there exists a technology gap between the respective parties. The technology transfer process is generally thought of as being product-embodied, process-embodied, or person embodied⁶⁵. Technology can therefore be transferred in many ways, i.e. through: published literature, conferences, education, training, personal exchanges, imitation and copying, and commercially. Today, the most technology is transferred through the latter method⁶³. It comes with the sale of machinery and know-how, through training and technical assistance, or through participation in the construction, operation and management of a foreign firm.

Simon distinguishes between three different classes of technology transfer⁶⁶. *Firstly*, there is material-transfer, which consists of the transfer of materials, final products, components, equipment, and even turnkey plants. *Secondly*, there is design-transfer, which basically involves the movement of designs, blueprints, and the know-how to manufacture previously designed products or equipment. *Thirdly*, there is capacity-transfer, which involves in its crudest form the provision of know-how and 'software' that are gained through experience (or 'inherited'), and that are required to manufacture existing products, but more important, to use this know-how to innovate and adapt existing technologies and products, and ultimately design new products.

Technology transfer is usually a two-way process and we can therefore also define it as a type of information exchange⁶⁷. Additionally, one should not think of this process as an act or an event, but rather consider it as a continuing process. For example, a private firm may develop a close relationship with a set of researchers that is maintained over a period of several years and that fosters the exchange of technology. The technology transfer process is therefore very complex and is the product of many ingredients. Furthermore, the process engages economic, cultural and technical dimensions at one and the same time, and can therefore not be captured by a single formula or model.

It is not always recognised that technology transfer, both through market mechanisms and within a multination enterprise, involves heavy costs⁶⁸. However, there is technology available in the world that can be acquired free of charge by reading scientific articles, by participating in international conferences, and by reverse engineering. To use the wealth of available information, one has to at least possess a minimum level of knowledge of the field. Therefore, each firm absorbing technology must have a core of technical personnel with certain minimum educational and training-acquired capabilities that will make the transfer possible and effective. Together with knowledgeable personnel, technology transfer obviously requires the existence of applicable technologies to transfer. One main source of both personnel and technology is research institutes, inside and outside academia, whose main function is to conduct research and to develop capable personnel or train graduate students.

6.1 THE ENTREPRENEURIAL NETWORK

Entrepreneurs must most often rely on personal contacts with individuals in other companies or institutions to obtain technological information. As such, new ventures require links, or relationships, not only with individuals, but also with a variety of institutions. The stronger, more complex, and more diverse the web of relationships, the more the entrepreneur is likely to have access to opportunities, the greater the chance of solving problems expeditiously, and, ultimately, the greater the chance of success for a new venture. The Silicon Valley model is proof of the efficiency of this type of less

formal system of technology transfer that rests mainly on a system of informal personal networks among technical people⁶⁷. In fact, according to Rogers and Valente, personal networks in Silicon Valley enabled entrepreneurial individuals to a great extent to create spin-off companies around a technological innovation. However, only in a high-technology industry characterised by a rapidly expanding market and a high degree of agglomeration could technology transfer take place so effectively⁶⁷.

Personal networks are built up when the initiating individual talks about a particular topic, to other people, which may include people that one meets through random contacts at work, at school, and socially. People are themselves repositories of knowledge. They can also guide others to information resources in their fields that otherwise would remain unknown, buried or forbidden. Furthermore, people 'know more than they can say', and possess skills as well as knowledge. The only way to communicate such tacit knowledge and know-how from one institution or one part of the innovation process to another is for people to learn from each other and to move from one locus to another.

Personal networks not only provide the opportunity for technology transfer, but also provide role models for building entrepreneurs. If an individual's co-workers create successful start-up companies, the individual may envision himself in such a role. A young engineer working side-by-side with someone who later becomes successful in such an entrepreneurial venture, is likely to perceive such achievements as attainable.

6.2 ADDITIONAL MECHANISMS

The following mechanisms are also associated with some degree of technology transfer. However, most of these mechanisms are usually limited to larger organisations that have the necessary personnel, resources and know-how.

6.2.1 Licensing

The classical means of transferring technology involves licensing the rights to use industrial property rights or know-how of the donor, in return for a fee or royalty⁶⁹.

6.2.2 Acquisition

Taking over a business which is already familiar with and operating new technology is obviously a faster process than developing the capability in one's own organisation. However, the management and integration of acquisitions into an organisation, can be difficult and requires special skills ⁶⁹.

6.2.3 Joint Venture

The pooling of skills, resources, budgets, to address a common aim can also provide an opportunity to become familiar with new technology via association with a collaborator who has already mastered it. A joint venture is one mechanism that SMMEs often use, however, it can have considerable risks associated with it if a larger organisation dominates the relationship ⁶⁹.

6.2.4 Purchase

Re-engineering is another method to obtain new technology that is embodied in a large number of products. The use of such products, or incorporation of them in one's own product is also an effective way of taking advantage of technology benefits ⁶⁹.

6.2.5 Recruitment

One of the most effective means of technology transfer derives from the movement of skilled personnel. However, recruitment of suitably skilled staff is in itself a specialised task⁶⁹.

6.3 INCUBATORS AND TECHNOLOGY TRANSFER

According to Miller and Cote, there are four points that define the technical inputs necessary to activate and accelerate high-tech cluster formation ⁷⁰.

- I. Pertinent technological know-how.
- II. Active research, both generic and applied.
- III. Entrepreneurs — active developers of high technology.
- IV. Market orientated applied research.

Incubators provide the entrepreneurial aspect of technological development, and when linked to a research institute which is actively involved in research and development work, incubators can make a considerable contribution by assisting with the establishment and management of technology transfer. In his article ‘Situation and perspectives of technology transfer in Germany, with emphasis on the Berlin Transfer-Model’, Jürgen Allesch recommends that the following areas should be activated for technological transfer ⁷¹:

- ◇ Information transfer
- ◇ Technology transfer
- ◇ Transfer of personnel
- ◇ Start-ups of enterprises
- ◇ Qualification consulting

The incubation process is probably the only development effort that is actively involved in all of the above mentioned areas simultaneously ⁱ. It must be understood that the incubator, as such, is not involved in research or technology development, but rather helps to facilitate technology transfer by establishing formal and informal relationships with a

ⁱ Refer to the ‘Four corner stones of business incubation’.

variety of institutions and firms to accelerate the growth of a new venture's entrepreneurial network.

FIGURE 9: THE ENTREPRENEURIAL NETWORK

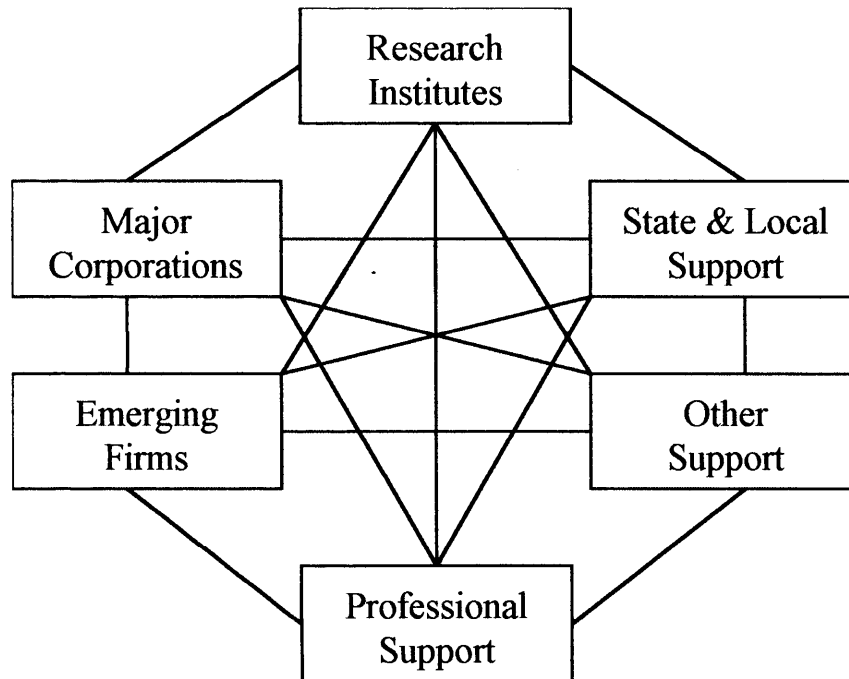


Figure 9 illustrates some of the potential links and relationships Smilor and Gill depicted in the entrepreneurial network, that a business incubator can help to establish and manage for its tenants³⁶. According to Smilor and Gill a research institution provides continuing education and a potential base for research and development that also helps develop entrepreneurs. Major firms provide key credibility to emerging companies as customers and are sources of spin-off opportunities. Through networks, professional support comes from accountants, lawyers, and financiers. State and local government provide incentives, direct aid, and access to contracts, whilst responding to the creative pressures of emerging business interest groups. Other support networks take a variety of forms: key individuals, consultants, workshops and business education programmes, social and civic groups, and collective efforts to improve quality-of-life factors. Emerging firms are also provided with a tier of peer support from other new ventures within the incubator, and can therefore find critical help in peer organisations, and establish important links with

suppliers and customers. All these links and relationships can only improve the chances for the transfer of appropriate technology of any new venture. Some of the relationships may not be directly involved in technology transfer, however, they can all assist in the facilitation of technology transfer, i.e.: professional support from lawyers can ease some of the burden of the various legal aspects that are involved in technology transfer. It is important to notice that incubators are not some kind of magic tool that will suddenly increase innovation, create technology transfer or ensure a successful technology transfer relationship. The business incubation process was in the first place not developed to focus on technology, and therefore neither technology transfer nor innovation is one of the corner stones of business incubation. Innovation and the technology transfer process are far too complicated to be controlled by any specific process. The establishment of personal networks is therefore the main contribution that incubators make towards technology transfer. The advantage of personal relationships and other links is that they can continue even when the incubator tenant graduates from the incubator. The incubation process, therefore, assists innovation and technology transfer by creating the possibility for technology transfer through the creation and maintenance of personal relationships, and by focusing on the more critical aspects of business survival, such as management and financial assistance, the incubation process relieves some of the pressures associated with innovation and technology transfer.

The distinct difference between an incubator that assists technology-orientated businesses and other incubators, lies in its selection of tenants and the more active approach of the incubator to establish the necessary relationships for technology transfer⁷². *Firstly*, these incubators give a higher priority to possible tenants that are involved in high technology and other technology development work. *Secondly*, there is a two way interaction between the research community and the business community, and an important openness as to what is happening in the wider environment in the form of new techniques and potentially applicable research acquired through technology scans or in the form of market needs.

According to George Petrello, the possibility of technology transfer is a major source of attraction to tenants, since most do not have the know-how or the funds to avail themselves of the modern and most appropriate technological support methodologies⁷³. However, many of these technology transfer linkages between incubator tenants and external agencies, do not last or just do not materialise⁷³. Petrello contributes the lack of sufficient human leadership and capital as the main reason for this. He then goes on to recommend the following guidelines for the successful development of technology transfer relationships:

- ◇ It is absolutely necessary to find common areas of interest (complementary goals) of both parties.
- ◇ There must be leadership interest and motivation in both camps.
- ◇ Costing must be specific and realistic and funding must be available.
- ◇ The travelling distance between the incubator and the other party must be no more than about one-hour to travel, otherwise the success of the linkage (human relations) will begin to erodeⁱⁱ.

Rice and Matthews confirm that the development and maintenance of an entrepreneurial network can be a tremendous asset for both incubator and its tenants³⁹. However, they also warn that it can be a tremendous drain of energy and capital for the incubator, because each network relationship requires investment of staff, time and resources. On the positive side, they state that the incubator board can lift most of the burden by taking a secondary role, i.e. co-ordinating some of the relationships.

Very little research exists on incubator-industry interaction compared to the research on incubator-university relationships. On the surface, it seems as though investors might have an interest in setting up an incubator as a business unto itself, and reaping potentially

^{ii ii} Physical proximity not only improves the control of technology transfer, but also allows more interaction, and thus more technology transfer⁷⁰.

lucrative benefits from tenants with high-demand businesses. However, Bishop and Lalkaka point out that in practice, the private sector in industrialising countries generally does not, for a variety of reasons, finance the establishment of incubators¹. In the US, only a small percentage of incubators are set up by the private sector on a for-profit basis. Private companies do, however, provide operational support through participation on incubator boards and by serving as mentors to new ventures. A partnership between an incubator tenant and private companies can, however, be a win/win situation for both parties. In order to create the necessary synergy, Willey enumerates certain conditions that must be present⁷⁴:

- ◇ Complementary goals which usually mean growth for the incubator and marketing expansion for the corporation.
- ◇ Co-ordinated activities on the part of both partners.
- ◇ Mutual respect for technology and a willingness to meet deadlines and budget restraints.
- ◇ Adaptability, because change is inevitable, due to dynamic market and economic conditions.
- ◇ An established mission and agreement to meet mutually established objectives.

Bishop and Lalkaka additionally recommend that the incubator must be structured, from the start, to enable private interests to participate as investors, not as donors or charity¹. Government agencies are receptive but often not flexible to deal with⁷³. Research institutes can be more flexible and are often more market orientated than educational institutions. Venture capitalists are also receptive partners but they usually drive very hard bargains and it is difficult for the small incubator tenant to feel comfortable in such an arrangement⁷³. Nevertheless, relationships with educational institutions can be very beneficial to incubator tenants, and because many highly successful incubation programmes are linked to educational institutions, it is important to discuss this type of relationship in more detail.

6.4 INCUBATOR-UNIVERSITY INTERACTION

Universities can have a tremendous impact on business through the transfer of technology⁷⁵. Technology transfer from academia to industry sometimes involves the unlocking of vast stores of research and development and embryonic technology, which exists in many universities and other higher educational institutions. Some of this knowledge is not immediately ready for commercial application, but its potential with further development could qualify it for further development support. Policies aimed at promoting university-based technology transfer include less stringent legislation on research finance by third parties, intensive application-oriented research in specific areas and the founding of industry-oriented research institutes⁶². The establishment of useful co-operation between universities and SMMEs is, however, often constrained by the lack of information on both sides, as well as by a fear of contact. Nevertheless, when Coopers & Lybrand L.L.P. interviewed CEOs of 424 product and service companies identified in the media as the fastest growing US businesses over the last five years, they found that those growth companies that do use university resources boast productivity rates 59 percent higher than their peers without such relationships, in terms of revenue per employee⁷⁶. This active group also had higher projected annual revenues (21 percent higher), as well as more recent bank loans (32 percent more) planned in the next 12 months. The problem is that only four in ten of these fast-growth companies surveyed have ever availed themselves to college and university resources.

According to John Preston, university-based technology transfer can take on various forms, including faculty communications (such as lecturing and the publication of research results), faculty consulting activities, and the direct transfer of technology through the licensing of patents, copyrights and other intellectual property. Nevertheless, in general the universities' greatest contributions to industry are in the form of well-trained students and professional staff who leave the university to work in industry⁷⁵. These persons can stimulate creativity and bring new ideas and perspectives into industry.

Coopers & Lybrand report that growth companies with university relationships said they most frequently use students as a resource: 70 percent employ student interns for business projects and 40 percent recruit employees from the student population ⁷⁶. It is interesting to note that more than one-third of these growth companies send their own employees to nearby universities for training. Of the growth companies with university relationships, 44 percent said they employ faculty as technical resources. A sizeable number of growth companies have expanded their university relationships beyond training and recruitment, with 29 percent involved in research and development, 20 percent using university laboratories and equipment, and 5 percent licensing a specific technology from the university.

Coopers & Lybrand also found that although most growth company CEOs are satisfied with specific aspects of their university involvement, more than half with such a relationship said that they experienced significant barriers that limited or hampered operation ⁷⁶. Barriers include:

- ◇ concern that faculty culture is not committed to a business collaboration (mentioned by 18 percent);
- ◇ lack of active support in co-ordinating programmes and resources for business (17 percent);
- ◇ a technology or research focus inappropriate for their business (14 percent);
- ◇ lack of expertise in working with growing companies (13 percent); and
- ◇ course material which is not appropriate for employee training or recruitment needs (12 percent).

The most dramatic form of technology transfer from universities is the internal creation of new businesses. However, the problem with business creation within a university environment is the conflict of interests that sometimes arises between university goals (mainly education and research) and the goals of an enterprise (mainly to make a profit). Business incubators, on the other hand, can integrate and expand a university's activities

to include business development, whilst maintaining the new venture's identity as an independent business. Incubators can also help to reduce most of the barriers that were mentioned by Coopers & Lybrand, if only by obtaining the university's commitment and in focusing university officials and other personnel's attention on business development.

Smilor and Gill found that over 80 percent of the incubators they surveyed in the US have some kind of affiliation with a university³⁶. The ties have mainly developed because the relationship has proved to be mutually beneficial. However, very little research exists that focuses on university-sponsored incubators. Sarfraz Mian surveyed more than 30 five-year old university-sponsored technology incubators, focusing on six facilities that are generally viewed as being successful. Most of his results agree with what we already know about business incubators, nevertheless, he did provide the following valuable information regarding university-sponsored incubators⁷².

- ◇ Although the incubator facility may be located on or off the campus, most are located on or very near the campus.
- ◇ There are two main types of organisational design, viz.: a formal relationship and an informal relationship. In the *formal relationship*, the incubator is virtually an organisational component of the university. In this case, the incubator can even be part of a particular faculty or department and is subject to the rules and regulations of the university system. These incubators are often maintained like a special programme of studies within the university, which ensures the flow of funds that are predominantly obtained from government⁷². Consequently, their dependence on the sponsoring university is heavy, with resultant direct influence on their policies. In the *informal relationship*, the incubator operates as an independent entity that leases space from the university. These incubators tend to depend heavily on private and local funds provided by some of the major private sector interests in their respective communities. The university, however, often provides the necessary supervision and emergency financial and other in-kind support⁷².

- ◇ Many of the incubators targeted a specific technology, with software and information technology dominating in tenant numbers.
- ◇ On average, the entrepreneurs of the university-sponsored incubators had a higher education level than those of small business entrepreneurs in the US.
- ◇ Intellectual property safeguards for the client firms are generally available in the form of an unspoken trust between the incubator management and their client firms. Some incubators also provide a non-disclosure agreement on demand. However, contrary to popular belief, Mian found that most of the responding clients expressed no concern about any violation of their intellectual property rights at the hands of the incubator management. Therefore, they did not express a need for any formal written policy.
- ◇ A period of three years seemed to be the norm, however, the graduation policy was flexible and depended on the need for space.
- ◇ Universities with research parks allowed their incubator tenants to move on to the park, while still retaining use of most of the services. The need to build a research park was also expressed by some of the universities that had no such parks. Some incubator tenants also expressed a desire to stay close to the facility and to continue using the services even after graduation. The development of a joint university-sponsored incubator and research park project seems to offer several potential benefits, including breaking even and greater synergy.
- ◇ One of the more interesting results from this study is the high correlation between the perceived value of the services offered by the university and the number of tenants that made use of the services. Technology transfer programmes and related research and development work, however, scored relatively low compared to most of the other services provided. There is some indication that the incubator tenants are more interested in the additional services provided by the university, such as student employees, library services and faculty consultants, than in technology transfer. Nevertheless, technology transfer is still perceived as having some importance to the tenant firms. Another interesting point is that more than 80 percent of the respondents in Mian's survey, valued the university image conveyance.

- ◇ Perhaps the most important insight gained from the study is the impact of the tenant firms, measured in terms of sales and employment. Sales growth varied from an average of 45 percent to an average of 400 percent per year at one facility (the average of the six facilities was 166 percent per year). Similarly, the employment growth varied from an average of 11 percent to an average of 79 percent per year (the average of all six the facilities was 49 percent per year). The study therefore provides a relatively good indication that university-sponsored incubators in general have a positive impact on their client firms' growth.

Although it is clear that incubator tenants can benefit from the direct and indirect support from a university, there are also advantages to a university from a relationship with an incubator ³⁶. *Firstly*, the incubator provides a mechanism for the commercialisation of university research. *Secondly*, the incubator helps the university to partake in economic development. *Thirdly*, the incubator provides the opportunity for research in entrepreneurship and business development. *Finally*, the incubator provides graduate students with the opportunity to obtain valuable hands on experience by working or assisting incubator tenants.

Other relationships between the incubator and the university include former university professors as managers or advisors, university faculty entrepreneurs in the tenant companies, and graduate students assisting incubator tenants or doing research on business development. It is also interesting to note that many of the universities with strong relations with an incubator, still have a separate technology transfer programme, such as: technology/industrial extension services, industrial research institutes, industrial research laboratories and information technology centres ⁷².

Mian recommends that universities should build their technology incubator programmes by setting reasonable objectives, following policies and management practices that will encourage tangible results consistent with the new mission requirements of an entrepreneurial university ⁷².

7. EVALUATING BUSINESS INCUBATION

Evaluating the incubation process presupposes an understanding of what would count as “success” and an understanding of what would be an adequate measure of that success (or failure). The ultimate test of success will (normally) be whether an incubator can be self-sustaining. However, a market-driven approach will not in every case be congruent with the ultimate goals of the incubator programme. This chapter takes a look at the effectiveness of incubators in economic development, as well as the problems experienced by incubators and the factors that contribute to their success.

7.1 THE EFFECTIVENESS OF INCUBATORS

Although the number of incubators has mushroomed, it does not necessarily follow that this concept has proven its effectiveness. Udell argue that the enthusiasm around business incubators may be attributable to the fact that the concept is easy to understand and easy to implement at a local level³⁸. He further argues that the growth of the concept may be due in part to the ubiquitous nature of its primary ingredients (the availability of unused industrial space and a need for new jobs) and its simplicity (supplying space and support services). It is therefore absolutely critical that the impact of incubation first be investigated before any recommendations are made on incubator development.

There are basically two units of analysis that serve as the benchmarks for consideration when the effectiveness of incubators are evaluated, viz.: the *business incubator* (the extent to which an individual incubator or specific programme assists its tenants must be evaluated) and the *incubation process* (the extent to which an incubator achieves economic development outcomes must be evaluated). Since no specific incubation programme is being evaluated, the evaluation is limited to the latter. However, it is very difficult, if not impossible, to evaluate the total impact of incubation on economic development. The main problem lies in the many complex relationships that exist between the measures of effectiveness. In some cases it may be possible to establish a causal

relationship between one feature of the incubator and its economic development impact. In other cases, the features are so closely inter-related that no clear relationship emerges. Some can be measured quantitatively and others only qualitatively. Simple measures such as the numbers of jobs created, wages paid, women and minorities employed or assisted, and sales made are only rudimentary measures of the incubation process' effects. These measures may be important benchmarks, but they are not yet a complete set with which to evaluate the economic development impacts of incubator projects ³⁵.

In an attempt to evaluate incubation programmes, Bishop and Lalkaka suggested the following cycles of feedback ("loops" — Table 6) in which incubators operate, as quantifiable and non-quantifiable performance measures. Unfortunately, Bishop and Lalkaka's initial review does not include a complete assessment and they then also state that the "reality is far more complex than depicted" ¹.

7.1.1 Enterprise Creation

Although some incubator facilities have a bias towards new firms and others allow firms at any stage of development to enter, the majority of incubator firms are actually start-up ventures. In her study 'Change Agents in the New Economy', Candice Campbell found that nearly two-thirds, (64.8 percent) were new firms, having started their business within one year of moving into the incubator ³⁵.

It is interesting to note that, when asked whether they would have started the business without the assistance of the incubator, only 8 percent of the entrepreneurs said they would not have started the business ³⁵. The responding entrepreneurs ranked self-employment as the primary influence for establishing their own business, and 'market opportunity' topped the list as the major reason behind starting the specific venture. It is therefore doubtful if incubators play any distinct role in stimulating entrepreneurship. On the other hand, the contribution that incubators make towards stimulating entrepreneurship may not necessarily be recognised by the entrepreneurs, who typically start new ventures for a variety of reasons.

TABLE 6: ASSESSMENT CRITERIA

Loop	Criteria	Measurement
1	Enterprises created by the incubator, and their increased success rate through the incubation process.	Numbers of firms incubated and number of discontinued businesses.
2	Jobs generated by tenants in the incubator.	Employment years [Ⓟ] through the end of year 3.
3	Jobs and economic activity created by companies after leaving the incubator.	Employment years [Ⓟ] and value-added totals through the end of year 6.
4	Public investments in incubator establishment and initial operations.	Total investment per year.
5	Research commercialised through product development by tenants.	Number of projects and total economic activity [Ⓝ]
6	Surveys of tenant assessment of assistance received.	Response rates and evaluation of specific activities.
7	Sustainability of the incubator.	Revenue and cost performance to plan, including break-even time schedule as appropriate.
8	Taxes and other “social” contributions by incubator tenants and graduates.	Property, income, employment, and other direct tax revenues attributable to the incubator itself, tenants, and graduates.
9	Capacity building, and developing the entrepreneurial “mind-set”; enhanced research-industry linkages and entrepreneurship development.	Public opinion surveys, numbers of collaborative research contracts between industry and universities (value generated, number of faculty and staff involved).
10	Changes of state policies to enhance support for private entrepreneurial activity.	Number of policies, and financial commitment to their design and implementation.

[Ⓟ] one job lasting one year = one employment year

[Ⓝ] employment year + total cumulative revenues

Incubators, nevertheless, do play a role in enterprise creation, if only in addressing entrepreneurial issues and in serving as a local statement of recognition of the importance of small business. This is especially evident in Campbell's study that shows that the largest group of incubator graduates, thirty-nine percent, had been operating their businesses out of their homes before they moved into the incubator. Incubators serve, therefore, as a magnet by drawing entrepreneurs from their closets (their garages/homes), into a more professional business environment.

7.1.2 Employment Creation and Enterprise Success

Incubators' popularity derives, in part, from the popular perception that small businesses create an inordinate share of new jobs. However, it is worth mentioning that the role of small businesses in creating jobs is anything but clear. This is especially true for non-metropolitan areas, since new research indicates that larger branch plants might be more important than small businesses in creating jobs⁷³. The lack of agreement among researchers should make local officials wary of automatically jumping on the small business bandwagon. It is also true that the highest job growth occurs after companies hatch from the incubator, and that this period of growth can take many years³⁵. It is therefore easier said than done to determine the number of jobs generated after graduation, especially if secondary relationships are considered such as firms that were formed or jobs created in other firms, because of the graduated firm or entrepreneurⁱ. These relationships are then also the reason why most of the incubators focus on technology-based and/or manufacturing firms. Technology-based and/or manufacturing firms tend to have a multiplier effect, thereby creating other new jobs in especially the retailing, service and the public sector of the economy³⁸.

While the global impact of business incubators are uncertain at the present time, some incubators appear to be making significant contributions at local level. The first study,

ⁱ In his study on 'Job Creation and Entrepreneurship', Robert Ronstadt found that higher levels of employment exists for follow-on businesses created by business owners.

completed in 1984, 'Business Incubator Profiles', counted a total of 887 firms in 40 incubators, in the US. The study reported 9678 employees in these 40 incubators. Based on aggregate data, the number of firms per incubator was 22, with almost 11 jobs each, creating 242 jobs per incubator⁴⁵. On the other hand, the survey by Smilor and Gill reports that incubators generally have a capacity for less than 20 firms and the majority of tenant firms have fewer than 10 employees each³⁶. Another study, 'Home-grown Entrepreneurship: Pennsylvania Business Incubators', focused on 12 facilities in 1984⁷⁷. These 12 incubators housed 126 small firms, 56 of which responded to a questionnaire. The incubator companies were generally small, with two thirds employing five people or less. While incubator firms reported an average annual job growth of three employees, of the firms operating prior to 1983, 30 percent did not grow, 40 percent expanded employment by 3-21 jobs, and 28 percent expanded by 1-2 jobs in the year prior to the study. A study by Allen during late 1984 and early 1985, identified a total population of 70 incubators in Pennsylvania, with an estimated 910 companies⁷⁸. The median size of incubator firms was reported at 2.3 employees, reporting very little growth from 1983 to 1984. A more recent report by Jim Loughney, indicates a more impressive record, considering that most of the incubator firms surveyed were less than three years old⁷⁹. While 97 or 46 percent of the firms entered the incubator with one employee, only 16 percent of these firms are currently a one-employee operation. Perhaps more significant is the fact that only 10 firms or 4.7 percent of the graduates entered the incubator with more than 9 employees. Currently 53 firms (25 percent) fall into this category. The average successful graduate entered the incubator with 3.7 employees, left the incubator with 7.6 employees and currently has 11.4 employees. The average number of jobs per firm has therefore more than tripled since these firms first located in a small business incubator.

In the international arena, a study (1995) by the European Business Innovation Centre Network (EBN) of 86 business innovation centres, determined that they launched 5,600 companies with a very low failure rate of 11,2 percent¹. In five years the 86 incubators have helped to create 28,000 jobs—that is, each incubator can be said to have sustained in the order of 68 firms, each with over 330 jobs. However, it must be remembered that on

average each business innovation centre had a staff of 9, compared to an average of only 3.1 in the US, and a high operating subsidy. In their assessment of 'Business Incubators in Economic Development', Bishop and Lalkaka provided the following information on employment creation ¹:

- ◇ Since its inception, the Tianjin incubator in China has created 890 jobs.
- ◇ The Shanghai incubator produced 2,100 jobs in its three years of existence.
- ◇ Each direct job in the incubator produces approximately one indirect job.
- ◇ It is also expected that companies leaving the incubator accelerate employment creation.
- ◇ The Wuhan incubator, which began in 1987, now has 148 tenants with a total of 2,814 employees.
- ◇ Direct employment recorded by Mexican incubator tenants averages some 80 per facility, plus another average of 40 persons as part-time employees.
- ◇ The 19 incubators surveyed in Poland, reported some 283 tenant businesses in the incubator process, employing 1,670 people at approximately five employees per tenant.
- ◇ With operations yet to fully reach maturity in Turkey, employment totals are at least equal to 145 jobs.

In total, Bishop and Lalkaka estimated that incubators in aggregate have contributed in the order of 85,000 jobs to developing and transitional economies. Despite criticisms such as evaluation bias by researchers, altogether the research confirms business incubators' potential for local economic development: nurturing home-grown businesses and creating new employment opportunities.

A particular strength of an incubator is its ability to aid companies that fulfil specific needs: technology transfer, revitalising neighbourhoods, creating minority jobs, among others ⁸⁰. It is interesting that the national study by David Allen in 1985 found an average of 5.9 employees per firm (median 2.3), with university incubator tenants having a slightly

higher rate of job creation than those in private and public incubators in the US⁷⁸. His estimates of firms per incubator varied by sponsor with medians at 21 for private incubators, 14 for university incubators, 7.8 for public incubators, and 13 overall. Candice Campbell's research supports Allen's findings to some extent. She found that the highest rates of job creation among incubator firms occurred at light industrial-related incubators, with the second tier of higher than average job creation at technology-orientated incubators³⁵. On average she found the rate of job creation among incubator tenants as 6.8 jobs per firm, and for graduate companies the average was 20 full-time equivalent jobs per firm. Of the 1444 jobs, 8.3 percent were part-time jobs. Both Allen and Campbell's research partially confirms the focus of economic development on manufacturing and technology-based firms for job creation. However, planners who count on incubators alone to revive regions are often disappointed. "Entrepreneurship is a solution to job creation, not *the* solution". On the positive side, incubator firms are far more likely to survive than typical start-ups.

Business incubation is a sensible strategy for economic development only if it can cumulatively assist in the survival, and accelerate the growth of new enterprises. The National Business Incubation Association believes that four out of five incubator tenants survive. However, this type of statement must be backed-up by concrete research. Allen rated the performance of incubators according to a ratio of success to failure of firms in these facilities. Success was defined by Allen as leaving the incubator and failure was defined as discontinuing operations while still a tenant. The resulting ratio was 2:1 (on average two-thirds of the incubator companies were successful)⁷⁸. However, in the article 'The Small Business Incubator Industry: Micro-Level Economic Development', by Campbell and Allen, they argue that this measure was not necessarily a good indicator of the impact of incubators⁸¹. *Firstly*, firms in the incubator are either self-selected or selected by admission criteria that may indicate that they are generally better suited for success than those who are not incubator tenants. Therefore, it may underestimate the failure rate of new companies. *Secondly*, not all incubator companies are new, thus their probability for failure is reduced by their later stage of development. *Thirdly*, not all

incubators encourage graduation; therefore, it may underestimate success. Long-term studies of firms operating during and after tenancy in an incubator are necessary to evaluate the effects of the incubator on company success. Nevertheless, in the following study 'Change Agents in the New Economy', Candice Campbell found that, of those firms which left the thirteen incubators, over forty percent are continuing as the same business entity, one-quarter have discontinued operations and six percent have been merged with or sold to another firm³⁵. Despite the fact that some of the criticisms mentioned before also apply in this study; with only 25 percent of the graduated firms discontinuing operations, 14 percent of the total firms entering the incubators, the success rates of incubator firms are likely to be as good or better than that of firms operating outside of the incubator environment.

Contrary to Smilor and Gill's findings that indicated that the majority of incubator tenants stayed less than two years in an incubator, Campbell found that incubators do not turn over businesses as aggressively as expected, with only 52 percent leaving the incubator in the five year time frame of the study³⁵. This result does not come as a surprise, because, with more focus on management assistance to improve incubator tenants' success and growth rate, it is imperative that the tenants stay longer than two years in the incubator. This increased graduation period will hopefully increase the influence of the incubator on its tenants. Business incubation has therefore limited potential for short-term economic growth, but they are vitally linked to long-term economic development.

7.1.3 Cost Effectiveness

The investment to start an incubator can often be quite substantial, especially if a new facility is purposefully built or require substantial funding for renovation. Allen's research suggests that this initial investment can vary widely — from an amount of less than US\$ 20,000 to as much as US\$ 7.6 million, with an average cost of US\$ 1.5 million⁸². Nevertheless, the initial investment in this type of development programme is small compared to the continued financing (subsidising) costs of maintaining similar development programmes that may be operating indefinitely. From a policy viewpoint it

is important that one does not look only at the initial investment, but should include the operating costs.

In the NBIA's survey on 'The State of the Business Incubation Industry', 60 percent of the sample's total revenue came from operations⁴⁷. The remaining 40 percent was provided by subsidies. It is interesting to note that the analysis of revenue, expense and net income according to incubator age, location and size showed no correlation between these characteristics and financial outcomes. This suggests that these variables do not influence incubator finances. Instead, the NBIA suggests that it is more likely that the financial structure is determined by such factors as the nature and operation of the facility, the types of service, programmes and activities offered and the relationships to and motivations of the sponsors or funding sources. Although financial problems were often mentioned explicitly by managers, it was found that the problems were linked to areas such as: low occupancy rates, poor pricing strategy, under-staffing, scarce resources and inability to meet tenant service demands⁴⁷. The important point is that at least 60 percent of the total revenue should be covered by the incubator's own operations. The sponsor, therefore, only needs to provide the additional 40 percent of the operating costs.

Job creation is often the bottom line in economic development projects. This bottom line therefore often translates into a cost per job figure. While the costs per job is not necessarily comparable from incubator to incubator, Candice Campbell found that the majority of incubators created employment at a cost of US\$ 3,500 to US\$ 7,000 per job³⁵. Those facilities with greater investment per job included costs of new construction or long-term leases on new buildings, or a broader programme for technology advancement, of which the incubator was a small part.

Two surveys were administered to gather data about the effectiveness of the Michigan Incubator programme in 1990, including a mail questionnaire to 75 incubator graduates. The major findings reported include rising average numbers of employees at graduate companies (from 4 to 6), and job creation occurring at an estimated cost of US\$ 1,600

per job¹. However, the survey question, “Are Michigan incubators cost-effective to the agencies/organisations that fund them?” remains unanswered. It is, nevertheless, believed that the Michigan incubators are cost-effective as tools for state and local economic development¹.

In their assessment of incubators in developing countries, Bishop and Lalkaka found that the available data were imprecise and difficult to compare¹. Nevertheless, the Tianjin incubator in China has an estimated cost of US\$ 1,460 per job, while the Shanghai incubator generates employment at a cost of US\$ 2,000 per job. The median incubator represented in their study developed one person-year of employment for approximately US\$ 835, however, since the jobs developed by tenant businesses appear to last more than one year, the actual cost per employment-year relative to the initial investment decreases with time. This cost per job does not play a part in the related costs of affiliated programmes.

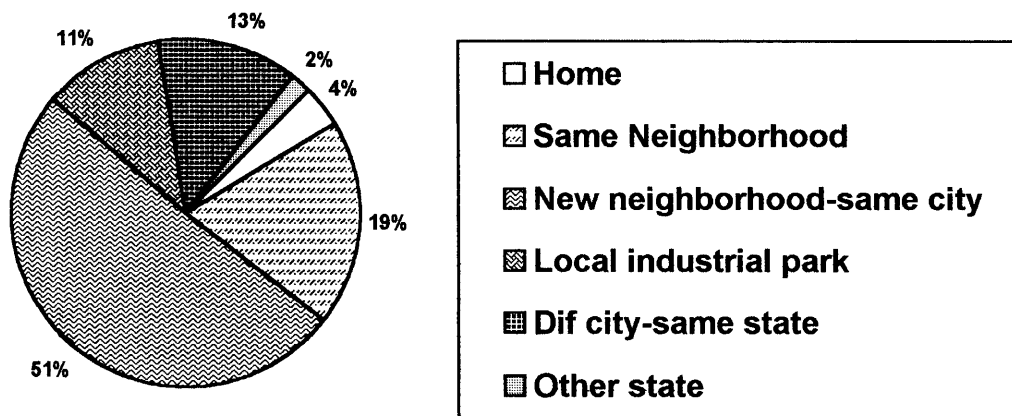
An interesting point is that all the job creation costs were calculated from an incubator’s perspective, which means that the costs were calculated to determine how much the development of one job, cost an incubator. A more appropriate measure will be the cost per job for the sponsor. Government, for instance, will then be able to compare their development efforts. Additionally, since sponsorship only represents 40 percent of an incubator’s total revenue, the cost per job may be considerably lower, especially if sponsorship is shared by more than one sponsor.

It must be remembered that, in addition to jobs created, there also were other impacts on the local business climate. This cost per job does also not indicate the condition of the local environment, i.e. in one particular business environment the community have lost 1,100 jobs³⁵. The jobs created in this community are, therefore, a lot more worth than a simple cost per job figure can reflect.

7.1.4 Incubation's Contribution to Local Economic Development

Relocation of graduate firms within the local area is one economic development objective of incubators. Figure 10 shows the results obtained by Campbell in her survey³⁵.

FIGURE 10: LOCATION AFTER INCUBATION



As shown in figure 10, 85.7 percent of the companies relocated within the same city, suggesting that incubator firms do not only contribute to local economic development during the incubation period, but also after they have graduated from the incubator. However, incubators that are located in inner-city locations tend to struggle keeping graduate firms in the neighbourhood.

7.1.5 Non-Quantifiable Benefits

Very few benefit-cost analyses of incubators, or of other SMME development programmes, provide complete feedback to policy makers, partly because such analyses are not designed to capture non- or semi-quantifiable benefits, such as:

7.1.5.1 Capacity building

Tenant businesses and their personnel are able to raise their technical and managerial skills significantly by the end of the graduation period. At the same time, by demonstrating the

venture creation process at work, other emerging entrepreneurs may have had successful role models to follow.

7.1.5.2 Technology transfer and commercialisation

Incubators can be instrumental in the process of technology transfer and commercialisation by maintaining strong relations with universities and other research institutes. In the NBIA's 'The State Of The Business Incubation Industry', 8 percent of the tenant sample had applied for patents⁴⁷. The median number of patents applied for was two. However, because this figure represents all the incubator tenants, it is not a fair representation. A more appropriate figure will be the number of patents applied for by incubator tenants at incubators with strong relations to a research institute, over a certain period.

7.2 BUSINESS INCUBATION OBSTACLES

Business incubation is not always a success, and there are various reasons why the incubation process does not always work. These reasons can be divided into two categories, viz.: endogenous factors and endogenous factors. *Exogenous factors* can be contributed to market forces and other forces the incubator and its tenants have no or very little control over. Governments can, however, sometimes influence these forces and it is therefore important that governments consider them when creating and shaping policies. *Indigenous factors*, on the other hand, depend on the operations of the incubator and its tenants. New venture failures can most of the time be contributed to indigenous factorsⁱⁱ. Business incubation failures can also be mostly contributed to indigenous factors, however, these failures do not always result in the end of the incubation programme. Instead, these indigenous factors result in a lack of quality business assistance that can lead to the unnecessary discontinuation of a new venture.

ⁱⁱ Refer to 'Reasons for Business Failures', page 15.

7.2.1 Exogenous Factors

First we take a look at some of the exogenous factors, most of which governments can influence to some extent. Bishop and Lalkaka provide the following reasons ¹:

- ◇ Economic and political instability, and the resulting limits on finance and markets;
- ◇ The relative newness of the incubation concept, as many incubators have been in operation for only a few years, meaning their management and their sponsors are still at the near end of the learning curve;
- ◇ In the industrialised countries, governments recognise the cost/benefit advantage of supporting (and subsidising) venture creation; in industrialising countries, governments are not yet similarly persuaded to make such investments, given the acute nature of other needs and priorities;
- ◇ As financing is still hard to find, tenant companies are often unable to invest in their own growth, much less pay appropriate rents and fees to the incubator;
- ◇ Managers, often as a result of the above, have to spend a disproportionately large amount of time pursuing government support to sustain operations — time which should properly be spent on serving tenants both in and outside the incubator, enhancing its image and developing creative ways of raising funds from the private sector and other sources.

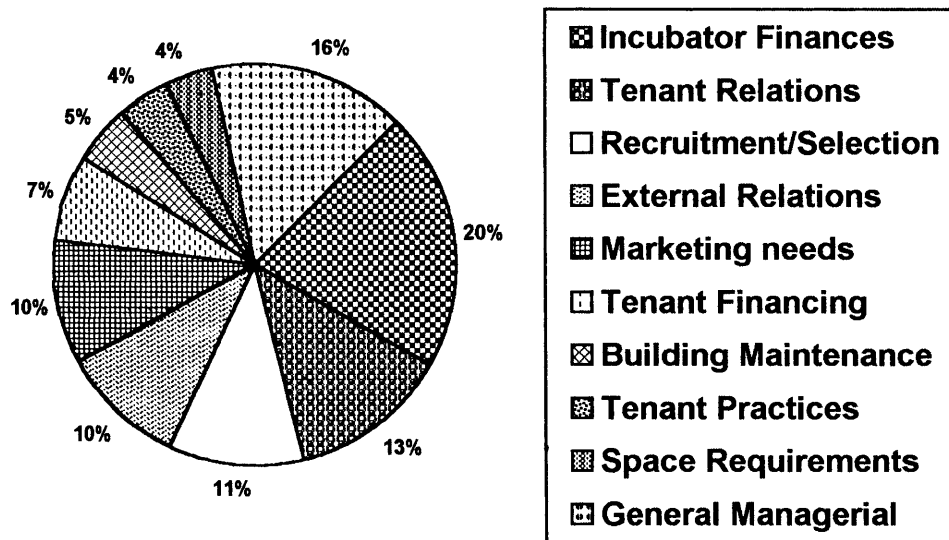
7.2.2 Endogenous Factors

In the NBIA's survey on 'The State of the Business Incubation Industry', they categorised the most common problems experienced by incubator managers according to ten categories (Figure 11). Figure 11 illustrates the major problem areas.

Not all of these problems result in incubator failures. According to many incubator managers, the most common causes of failure are lack of sustained funding, lack of tenants, and inexperienced management ⁸⁰. Incubators are businesses in their own right, and incubator failures can therefore often be attributed to management related problems,

the most common cited reason for business failures. In the NBIA's highly acclaimed Fall Training Institute's 'Incubators Developers' Prep Course', presenters Jonathan Gorham and Jim Greenwood presented some of the many problems that have resulted in the failure of incubation programmes (Appendix D).

FIGURE 11: COMMON INCUBATOR PROBLEMS



7.2.3 Criticisms

A close relationship between the incubator personnel and the incubator tenants provides the opportunity for quality management assistance. However, Udell argues, considering the size of staff at many incubators, their salary levels and apparent lack of linkages, coupled with the claimed variety of services offered, that the often referred to general counselling may well be little more than generalised hand-holding³⁸. However, Udell makes an exception for incubators that are turning to outside sources for management and technical assistance. Udell then also recommends that incubators must place greater emphasis on providing financial, management and technical assistance to their tenants by developing solid linkages with competent outside sources of counsel, especially incubators that focus on technology-orientated businesses that tend to have greater

Udell also claims that the availability of counsel in the public sector is exaggerated³⁸. University faculty are frequently too busy with teaching or research to be involved in small business or new venture consulting. In addition, the rewards for doing so are often pitifully small or, in some cases, negative. He further argues that the problem lies in that entrepreneurship and industrial innovation are interdisciplinary topics. As such, there is frequently a problem of fitting them within academic departments and an overall lack of enthusiasm for such topics.

Rice and Matthews, on the other hand, criticise, what they call, the ‘great networking myth’ — incubator managers that believe they have to maintain an extensive community network in order to operate a successful incubator³⁹. Rice and Matthews claim that there is a widespread belief in the incubator industry that the more extensive the network, the more value the president can deliver to incubator companies, i.e. “incubator presidents often boast about how many bankers, professors, lawyers, consultants, government officials, accountants, student interns and so forth are part of their stakeholder network”³⁹. Rice and Matthews have a valuable point; “having access to hundreds of network contacts is a far cry from having the ability to tap those individuals who can have a significant impact on the growth of a particular company”. Nevertheless, Rice and Matthews also point out that having a good network, does offer new ventures access to resources and know-how that they often do not have, but definitely need. Therefore, the challenge is to maximise the benefits while minimising the cost of networking.

7.3 SUCCESSFUL BUSINESS INCUBATION

Success and failure are opposite sides of the same coin, and therefore the reasons attributed to the failure of incubators are often also the reasons for success. Business incubation is a complex process and, taken together with the management of incubation programmes, other exogenous factors and the relationships that exists between the respective forces, is it impossible to attribute the success of an incubation programme

to a single number of factors. Campbell contributed the effectiveness of business incubators to the following salient features ³⁵:

- ◇ Low costs of developing and operating incubators — government grants, donations of buildings and volunteer effort were important to achieving these effects.
- ◇ Quality management — providing professional assistance and guidance to incubator firms, being flexible in operations and policies, and developing an environment conducive to camaraderie and mutual support among entrepreneurs.
- ◇ A market for goods and services — Campbell found that employment growth was highest among firms that sold to large local corporations and governments, and among branch operations with substantial market experience rather than start-up businesses.
- ◇ Development as part of a larger strategy or organisation — such as an industrial park, job training and placement programme, small business lending programme or technology transfer programme.

According to David Allen, there are five main forces that affect the incubator life-cycle model⁵³. These five forces are interdependent and should be considered whenever the model is used for incubator development planning. These forces can also be seen as the five forces that have the greatest influence on the success of the incubator and summarise all the above mentioned success factors, viz.:

- I. The local entrepreneurial market.
- II. The physical characteristics of the incubator facility.
- III. Funding
- IV. The degree of local co-operation supporting entrepreneurial development.
- V. The incubator manager, together with the management philosophy.

However, these salient features are not even the tip of the iceberg. The following is a more comprehensive list of factors needed for successful incubation¹. These factors should not only be used for the successful management of incubation programmes, but also by policy makers and incubator developers in the development of incubation programmes.

7.3.1 A National Enterprise Development Strategy

An incubation programme should be only one tool in a broader economic development plan^{39,35}. It has also been shown that, in general, the development of an incubation programme as part of a larger strategy or organisation - such as an industrial park, job training and placement programme, small business lending programme or technology transfer programme, had the greatest effects on local economic development³⁵. Business incubation should therefore be a catalytic component in a national enterprise development strategy. However, the incubation programme has to be designed within the context of long-term policy and legislation to support national SMME development^{1,35,53}. Sponsors, both government and private, must therefore be willing to devote time and financial resources to this concept, as part of an overall small enterprise development programme. Furthermore, in the development of incubation programmes, governments must look at the total macro-economic policy framework that encourages entrepreneurial activities and also stimulates the market for new goods and services¹.

7.3.2 Infrastructure

Political and strategic considerations require balanced regional development. However, a sound technical infrastructure is an absolute pre-requisite. Entrepreneurs, therefore, need a supporting infrastructure and access to technical services. It is therefore best to locate

¹ These success factors were mainly obtained from Bishop and Lalkaka¹, Campbell³⁵, Smilor and Gill³⁶, and Rice and Matthews³⁹. Rice and Matthews' research represents probably the most comprehensive study on best practices of incubators.

where such support is readily accessible, in order to improve the chances of success of the incubator as well as the businesses it is nurturing ¹.

7.3.3 A Feasibility Study

It is all too common practice for incubator developers to charge ahead and establish an incubator without first conducting an adequate feasibility study. The decision to set up an incubator should be based on a thorough and objective analysis of the information gathered from a feasibility study, to verify the demand from entrepreneurs and/or small businesses, to identify potential best locations, and ensure the availability of financial and other resources ⁴⁴. Rice and Matthews therefore recommends that the decision about whether to proceed or not will be based on a thorough and objective analysis of the information gathered through this process ³⁹. However, this feasibility study should not be limited to the initial development of a national incubation programme, but included in the development of each incubator.

7.3.4 Community Support

Early in the process of developing an incubator, the incubator staff and board need to establish a healthy relationship with the community. Managers often refer specifically to the need to establish credibility of the incubator's goals and demonstrate its successes ⁴⁷. Community support is crucial in gaining additional assistance from professionals and others in the community who may be able to provide business expertise to the tenant companies^{39,44}. All key players (state and city government authorities, business associations, banks, funding agencies, education and research institutions) need to have a clear understanding of their respective roles and responsibilities, that is, to try nurturing the entrepreneur (not to demonstrate their personal power, or enforce territorial claims, or promote their own agendas)⁴. Community and State involvement is essential, expressed in the form of both moral and financial support for the incubator itself as well as for its tenants. Community support also plays an important role in sustaining incubator development. 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 economy³⁹. Success, therefore, depends on inter-active community support.

7.3.5 Expectations and Schedules

Incubators take time to produce results. While the incubator concept is relatively straight forward, its implementation is especially difficult in an environment where the entrepreneurial culture is still latent and technical infrastructure is weak¹. Furthermore, part of the process involves recognising that companies take time to develop³⁹. Policy makers and incubator developers must therefore be realistic in expectations and schedules, and should not expect immediate payoffs.

7.3.6 Location

Different types of entrepreneurs require different incubator settings and services⁸⁰. Business incubation is therefore a location specific process and requires that each incubator be custom-designed to meet the special needs, circumstances and culture of the locality, and with participation of the target groups and local consultants in the preparatory process. There are no fixed models, but many different approaches. International experience can be very useful to clarify some of the various operational aspects and to guide the project design to avoid mistakes made elsewhere¹. Bishop and Lalkaka then also suggest that the initial pilot incubators in developing countries obtain the best conditions for success, namely, a good urban location with requisite infrastructure and access to networks of professional services¹.

7.3.7 The Incubation Facility

The incubation facility enables the incubator to achieve its revenue goals through sub-leasing portions of the building to tenant businesses. The building also represents a tangible manifestation of the hard work and financial investment that goes into getting an incubator started. According to Rice and Matthews, the right building can provide the basis for the financial self-sustainability of the incubator and an environment in which the entrepreneurs and incubator staff can work together to grow new businesses^{39,44}. The

wrong building can lead to failure — and wrong buildings are one reason why some incubators have not met expectations³⁹.

7.3.8 Management

An incubation programme has a long-term social purpose of creating jobs, increasing business survival rates and technology transfer and commercialisation. However, in order to accomplish its mission, an incubation programme itself must do more than survive. If it's going to serve as a strong, stable launch pad for start-up companies, business incubators must be successful businesses in their own right³⁹. The incubator itself does not make vast profits, but it can overcome initial operating losses if the rental and service income (based on the tenants' ability to pay) is carefully calibrated against operating expenses (based on generous community support).

One problem is that far too many incubators are managed by college administrators with no business training or instinct⁸⁰. It is important that managers and developers alike, recognise that the incubator, itself, is a new venture that will undergo the same trials and tribulations as a start-up company. The incubator must develop a business plan, select the right staff, secure financing, then develop and modify its services to meet the needs of its tenants. Even after becoming established, incubators will still need to update their business plans, select replacement staff, manage cash flow, and develop new services to meet the changing needs of their client companies. The only way to do this is to manage the incubator like a business, regardless of its legal status as a not-for-profit or for-profit entity³⁹. Quality management is therefore the key to success; and together with professional assistance and guidance to incubator firms, and flexible operation policies, an incubator can develop an environment conducive to camaraderie and mutual support among entrepreneurs³⁵. An additional problem is that if an incubator is operated like a business, it is nearly impossible to have flexible policies regarding rent collection and other operational procedures. Flexibility, on the other hand, is often seen as a critical factor in the successful operation of an incubator, and it is then also often recommended that incubators should take a flexible approach from the beginning and be prepared to

make changes if a need for improvements becomes apparent³⁹. However, it should rather be recommended that incubators find the delicate balance between flexibility and financial sustainability for the specific local conditions, i.e.: there is no reason to be flexible if a tenant does not pay his rent, month after month, risking the financial stability of the incubator.

7.3.9 Financing

The 1991 NBIA 'State of the Business Incubation Industry' survey identified financing the incubator as the number one challenge facing incubators⁴⁷. For most incubators, a large proportion of revenue is derived from leasing or sub-leasing portions of space in the overall facility to client companies who are tenants. With a substantial proportion of its revenue dependent on start-up companies that may not have enough money to pay the rent, or may be late paying the rent, many incubators experience severe cash flow problems. Hence, understanding the sources and uses of funds to support the incubator and its mission is crucial³⁹.

Nothing diminishes the energy and enthusiasm of sponsors, stakeholders, and staff more than having to focus month after month, and year after year, on the financial survival of the incubator. If the incubator is to be around long enough to have an impact, it needs to be financially self-sustainable³⁹. Sponsors therefore need to develop a realistic financial model that adequately reflects the operating characteristics of the incubator and the business environment in which it must operate^{39,44}. The model should account for both the operating and capital expenses, as well as the revenues. Only when an adequate cash flow analysis has been performed and threshold levels of financing have been secured, can the incubator board and personnel concentrate their energies and capacities on developing successful new ventures.

7.3.10 Organisation Structure

Where sufficient care is not taken to establish an efficient and effective organisational structure, the discord within the board and between the board, the incubator personnel

and the incubator sponsors can be a significant barrier to success³⁹. There is no magic formula for creating an optimal organisational structure. Nevertheless, a number of variables affect the decision-making process regarding structure, including the orientation and capacities of the incubator manager and members of the board, as well as the nature of the incubator's community environment. Each incubator must therefore find its own structure and operating procedures that promote the maximum assistance to the new ventures within the financial budget of the incubation programme³⁹.

7.3.10.1 The incubator board and sponsors

Often, incubator board members and sponsors consume large amounts of the incubator manager's time and fail to effectively deliver resources and expertise that help develop the incubator tenants^{39,44}. The board members and sponsors should be engaged to help companies and support incubator operations by adding maximum value to the companies with minimum involvement in the operations of the incubator manager. The sponsors can be an additional resource, especially if they act as the workhorses of the "know-how" network. However, if the sponsors assume a direct and continuing role in supporting the development of the companies, they need to work through a board committee or a designated board member with the responsibility for co-ordinating the relationship between the incubation programme and the sponsors. Co-ordination is especially important when there are multiple relationships between a given incubator and those who are trying to help it.

7.3.10.2 The incubator manager

Management is crucial to an incubator facility, as it leads to camaraderie and the entrepreneurial environment highly valued by incubator firms³⁵. The incubator manager is the one person that is directly involved in the management of the incubator and also forms the interface between all the various parties involved in the incubation process and the incubator tenants. The incubator manager can therefore, to a high degree, determine the success of the incubator. Managers would therefore need to be carefully selected, trained, motivated and supported^{4,44}. No single individual is likely to have all the

qualities and capabilities that are needed, but successful incubator programmes are generally led by people with enough of those qualities and capabilities to be effective. Nevertheless, the ideal incubator manager must first and foremost be an expert at providing business assistance to start-up companies³⁹. The person must also be dedicated to the concept, push to overcome all obstacles and harmonise relations between competing interests until success is achieved, and should preferably have business experience together with a network of contacts in the local community⁴.

7.3.11 Networking

Incubators can advance tenant company development by providing the interface for a broader and richer range of networking opportunities to entrepreneurs. The stronger, more complex, and more diverse the web of relationships, the more the entrepreneur is likely to have access to opportunities, the greater the chance of solving problems expeditiously, and, ultimately, the greater the chance of success for a new venture. However, networking is only a success factor in the operations of an incubator if it can be efficiently utilised and managedⁱⁱ.

7.3.12 Collocation

Entrepreneurs report that the possibility to collocate with other entrepreneurs, is one of the primary benefits of being in a business incubator³⁹. Collocation provides the opportunity to talk and work with other start-up entrepreneurs, to learn from each other, to share the ups and downs, to share resources, and to trade with one another. It is this psychological support for entrepreneurs that help them to persist. Although most incubators need to minimise the amount of common space that is not revenue producing, creating a few common areas that foster interaction is a critical part of the incubation process that should not be neglected³⁹. This support is often seen as the incubator's unique place in economic development. Collocation allows incubators to "create role models, create a culture for entrepreneurship, and increase company survival"⁸⁰.

ⁱⁱ Refer to 'Criticisms', on page 152, for a more in-depth discussion.

7.3.13 University Linkages

When incubators focus on technology-intensive new ventures, they often need linkages to technical universities and research complexes, and the related access to faculty, graduate students, scientific facilities, documentation and the creative ambience. Campbell found that employment growth was slightly higher in university related incubators, and for those tenants located in university incubators, interaction with the university was rated highly positive³⁵. Coopers and Lybrand also determined that those growth companies that use university resources boast productivity rates 59 percent higher than their peers without such relationships, in terms of revenue per employee⁷⁶. This active group also had higher projected annual revenues (21 percent higher), more recent bank loans (32 percent more), and more major capital investments (23 percent more) planned in the following months, the survey found. It is therefore obvious that those new ventures that do become involved with a university can reap substantial benefits. It is therefore no wonder that Smilor and Gill list a tie to a university as a critical success factor for incubation²⁰.

7.3.14 Educational Programmes

An important additional element in establishing the incubator as part of the community and business network is to develop educational programmes for schools, colleges, businesses and the public⁴⁴. The aim of such programmes is to create greater awareness, understanding and above all, greater interest, in what business and starting a business involves, particularly in terms of technology based businesses.

7.3.15 Recruitment

If an incubator seeks to build companies, it must have a selection process through which it evaluates, recommends, and selects tenant firms. The criteria for tenant selection are important and may vary with the mission and objectives of the incubator. Too much selectivity can restrict the flow of incoming companies and sooner or later create cash flow problems for the incubator. Since the resources of most incubators are limited, the incubator president needs to target different types of assistance to companies depending

on their needs³⁹. Smilor and Gill, therefore, also list the selection process as a critical factor for success³⁶.

7.3.16 Customised Assistance

It is critical to the success of the business incubation process that the delivery of business and technical assistance services be customised to address the development needs of each tenant⁴⁴. Rice and Matthews then also suggest that achieving best practice in counselling requires special attention to the following two factors³⁹:

- ◇ Specificity of advice
- ◇ Follow through and persistence

Unless there is some set of criteria by which to evaluate tenant company development, there is no frame of reference for determining whether a company is on or off track and no way to decide whether and to what degree it may need additional resources. Therefore incubator managers also need to monitor the incubator companies and regularly assess their progress and development. Hence, Rice and Matthews advise incubator managers to take a proactive approach to providing assistance, especially with new ventures³⁹. Often the greatest challenge in achieving impact is stimulating and then sustaining the participation of the incubator entrepreneurs. Lalkaka confirms this and states that it is essential for success that incubators provide follow up assistance⁴.

7.3.17 On-Site Business Expertise

Regardless of the form incubators take, on-site business expertise remains one of the four corner stones of the incubation process. It is therefore critical to the success of an incubation programme that they provide on-site business expertise³⁶.

7.3.18 Concise Programme Milestones with Clear Policies and Procedures

All new ventures experience problems and uncertainties. To help minimise the difficulties, it is important for incubator management to inform tenant companies. 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. These issues become all the more important for tenant companies in those incubators that take an equity position in the incoming firms³⁹.

The relationship between the incubator and the tenant company can be a sensitive one, especially if the expectations of each party should be different or if there is confusion over what each contributes to and what each gets from the association. Consequently, the more concise the programme milestones and the clearer the policies and procedures, the greater the likelihood that expectation on both sides will be met, that misunderstandings will be minimised, and that each side will benefit from the relationship³⁹.

7.3.19 Continuous Evaluation

As incubators and the tenants in them mature, their needs change, and consequently incubator managers need to change as well and focus on later stage services. To keep up with times, incubators have to engage in continuous evaluation and improvement as the incubator progresses through various stages of development and as the needs of client companies change over time. It is therefore critical to the success of the incubation programme that those that are responsible engage in periodic and systematic assessment, i.e., assess the incubator's strengths and weaknesses, how it is changing over time, and to what extent the needs of the client companies are being addressed^{39,44}.

7.3.20 Perception of Success

An important, intangible element in incubator development is the need to create the perception of success. This perception can help establish the incubator as a resource for

the community. It can also help position the tenant companies in the market. If the incubator is perceived as successful, it can attract resources more easily, get stronger start-up ventures interested, and help tenant companies build credibility. There are a variety of ways to establish a perception of success³⁹:

- ◇ A new attractive facility
- ◇ Affiliation with key institutions, both public and private, in the area
- ◇ An experienced (successful) incubator manager
- ◇ A board of key directors
- ◇ A noted advisory council
- ◇ A group of promising start-up companies
- ◇ Successful graduated firms
- ◇ By inference (who is associated with the incubator), by reference (what others say about the incubator and its tenants), and, ultimately, by evidence (what the incubator actually produces), a perception of success can be established that serves both the incubator and the tenant companies.

8. CASE STUDIES

Business incubation is still a new concept in South Africa and consequently there have been very little research on local business incubation programmes. This lack of information on local business incubators initiated a study to determine what is available in South Africa. With international experience indicating that incubation programmes are operating under a variety of names (i.e. innovation centres, research centres, etc.), it was decided not to limit the study to business incubators, but to include several local development programmes with similar objectives.

In addition to the local incubation programmes, three ‘successful’ university-related incubators in the US were also studied. The aim of this second study was to obtain additional information on the relationships that exists between incubators that focused on enterprises involved in technology development, and their sponsors.

8.1 RESEARCH PROCEDURE

Since business incubation is still a relatively new concept in South Africa, the information regarding the different incubators tended to be gathered mostly through exploratory research. According to James Barnes, exploratory research is appropriate when there is a need to learn more about the nature of an unknown subject⁸³. Such research is usually quite flexible, involving a compilation of existing data, small surveys, or interviews. Analysis is generally subjective and will likely provide insights for a better understanding of the subject. The process is designed to point the researcher in the appropriate direction and to identify future information needs. However, with considerable international research done on the subject of incubation, it is not a totally new concept. The research is therefore a combination between exploratory and descriptive research. Descriptive research is intended to provide a description of the situation and of the variables that contribute to success⁸³. Unlike exploratory research, which is generally subjective and often used to generate hypotheses, descriptive research is factual, accurate, and usually survey-based.

There exists various methods of collecting primary data: by way of mail surveys, personal interviews, telephone surveys, completely self-administered surveys, panels, omnibus studies, focus group interviews, interactive research, and observation. These methods can be categorised as either observation or communication methods⁸³. As the terminology implies, observation methods involve merely observing the subject of research, without making any personal contact, and communication methods involve some form of direct communication, either in person or at a distance over the telephone or by mail.

For observation to be a practical alternative in a research project, a number of conditions should be satisfied⁸³. Firstly, it must be physically possible to obtain the information needed. Secondly, the cost of collecting the information should be reasonable. Finally, the same scientific approach should be taken to the use of observation as is applied to other types of research. With all this information in mind, it was decided that the information regarding the incubation facilities should be collected partially through observation, communication and, if available, from brochures on the respective facilities, and the rest of the information should be collected solely through undisguised communication.

With the research being both exploratory and descriptive, a combination between the structured and unstructured approach was used to collect the necessary information on the South African Incubators. The combination of the two approaches involved a questionnaire (Appendix H) that was the same for all the respondents, containing a series of fixed-response questions that were always asked in precisely the same way. However, rather than solely being characterised by fixed-response questions, the questions and answers were sometimes discussed, and it was therefore more open-ended than a normal structured approach would be. The personal interviews clearly offered more interaction than would be possible with any other form of survey. This approach, however, has the disadvantage that it is not totally objective, because the researcher's judgement is linked to the results. Nevertheless, the increased amount of interaction is considered to have outweighed the potential for bias that exists.

With very limited time available, the research on the university-related incubators in the US was conducted solely on an unstructured basis. This approach, however, had the disadvantage that it was not objective and, because the questions were not asked on a structured basis, the results could not be compared. Another disadvantage that was only realised during the interviews, was that, because of limited time, incubator managers tended to cut interviews shorter by shifting the responsibility onto assistants. The assistants, on the other hand, did not always have the knowledge or time to answer all the questions. This could, however, be prevented if a more structured approach was used that obliged them to complete the process.

The profiles of the incubators give only a broad impression and is insufficient as a complete sociological assessment of the disparate dynamic processes operating in their unique local environments, but it is potentially useful in illustrating the strengths and weaknesses of the various development efforts.

8.2 SOUTH AFRICAN INCUBATORS

The objective of the study was to gain insight into the nature, similarities and shortcomings of business incubators in South Africa. The study does not attempt to provide a comprehensive analysis of each incubator, or undeniably accurate or even complete statistics. Instead, it tries to provide the basis for future research, and additionally serve as an indication for incubator managers and developers as to what is available in South Africa. The study, however, does not try to provide a complete record of all the incubation efforts and Internal Corporate Ventures (ICVs), are for instance not considered.

The incubators studied in South Africa were classified according to their main objectives and according to the type of firms they target. However, because there are very few operating incubators in South Africa, only two categories emerged. The first category belongs to those incubators whose main objectives are economic development and job creation, and that give a very high priority towards manufacturing firms. The second

category belongs to the remaining group of incubators whose main objectives are technology transfer and industry development. The incubators are therefore categorised as either:

- I) Job Creation Incubators (JCs), or
- II) Technology Development Incubators (TDIs).

The reason behind the new classification for incubators is that many incubators receive funding from a variety of sources, and it is therefore preferable not to classify them according to their main funding source. Instead, the incubators are classified according to both their objectives and target groups. One might now tend to classify them either as a low-technology incubator or as a high-technology incubator. However, since many firms are very sensitive about the issue of being classified as a low-technology firm, as they may be using very high technology, the terminology changes to Job Creation Incubators (JCs) and Technology Development Incubators (TDIs). JCs, therefore, refer to incubators that focus on firms that mainly use technology to provide a service or for manufacturing. Technology Development Incubators (TDIs), on the other hand, refer to incubators that focus on firms that develop technology use it. The classification might even be extended to include Industry Development Incubators (IDIs) that focus on supporting a cluster of firms that might, for instance, focus on a specific industry. Nevertheless, because incubators are still a new concept in South Africa, it may still be some time before this type of incubator is established.

The descriptions of the various programmes were mainly derived from available brochures, published articles, and information obtained through the questionnaire.

8.2.1 Job Creation Incubators

8.2.1.1 *The SBDC's Hives of Industry*

The Small Business Development Corporation Limited was created as a partnership between the private and public sectors and was incorporated as a public company in February 1981. The primary objective of the SBDC is the development of entrepreneurship among all population groups in South Africa.

The incubators operated by the SBDC are known as “hives of industry”, and represent an attempt to bridge first and third world economies in South Africa. The hives were developed by the SBDC and are essentially a large number of independent workstations that are grouped together to form a honeycomb, or cluster of workshops. The SBDC’s first hive was established in Port Elizabeth in 1985, and is therefore now more than ten years old. Such was the success of the hive concept that the SBDC established more than 45 hives across the country (as Table 7 indicates), in the years that followed, and is planning to increase the number according to demand.

TABLE 7: DISTRIBUTION OF HIVES IN SA

Region of Location	Number of hives
Gauteng	9
Mpumalanga	2
Western Cape	13
Eastern Cape	13
Kwazulu-Natal	5
Free State & Northern Cape	3
Total	45

An important factor which has facilitated the growth of the hive concept is that, in terms of the Temporary Removal of Restrictions on Economic Activity Act (Appendix E), they are exempt from having to comply with much of the red tape and other regulatory controls that have tended to stifle small entrepreneurship and informal businesses in the past.

The independent workstations range in size from 30 square metres to 100 square metres, and are often under only one roof. The largest hive established by the SBDC is at Pennyville, on the border of Soweto, and accommodates 200 individual small businesses. The smallest facility is located in the Strand area, and has 10 tenants whose activities are concentrated on furniture restoration, leather work and television repair. A wide variety of activities are supported in the different hives, e.g.: panel-beating; motor repairs; concrete block manufacture; cut-and-trim clothing manufacture; plumbing; pottery; toy manufacturing; upholstery; carpentry; furniture manufacturing and restoring. The main activities that are supported include: woodwork, metal work and sewing.

The SBDC Hive's appearance varies from hive to hive and depends mainly on the type of accommodation that could be obtained and the type of tenants it attracts. The majority of hives created to date by the SBDC have been developed inside redundant factories, warehouses and other buildings which the Corporation has bought, upgraded and remodelled at minimal cost, to suit the requirements and necessities of the hive. There are also some buildings that have been purposely built from scratch and there are combinations of the two. The latest SBDC initiative is the Community Hive - basically smaller buildings that are being converted with the communities' assistance, to suit the communities' needs.

Apart from providing basic accommodation at minimal rental rates, tenants are, on a full-time basis, provided with the SBDC's collective support services such as loans, business and legal advice, marketing assistance and often, where circumstances warrant it, bulk buying facilities. The SBDC has found that most business failures in industrial parks may

very well be attributed to a lack of experience. In the hive a prospective tenant, after demonstrating his skill, say in carpentry or welding, may be granted a loan from the SBDC, or, as a first step, receive training to upgrade his skill, with a view to obtaining a loan at a later stage. Tools, machinery and other equipment that can in general not be afforded by most SMMEs, are also available for hire. This arrangement not only reduces the capital requirements of the tenants, but means that such equipment is productively and efficiently used, as it is shared among several people. Common equipment is not available at all the hives (the majority of equipment is for woodworking), and the availability is, therefore, dependent on the requirements of the hive tenants. Services such as bookkeeping, typing and even the use of a telephone are available at a small cost to the tenants, thus further reducing overheads.

According to the SBDC, the hives have not only provided the means of stimulating self-employment and job generating opportunities, but have also provided a platform for spawning a host of small infant businesses which are beginning to have a material influence in the regional economies where they are located. The hives are also playing an important role in facilitating sub-contracting partnerships between big and small businesses; however, it is still a relationship that needs to be further fertilised. This “platform” for subcontracting, complements another of the SBDC’s schemes, which aims to develop what has been labelled a “satellite economy”, viz. the greater use of sub-contracting. Its activities to date have aimed at complying with four elements: contracting; sub-contracting services; networking and special projects linking large and small businesses. In practical terms, the SBDC has established a contracting arm, which includes bridging finance of R250 000 by the Anglo American (AAC) and De Beers’ Small Business Unit.

8.2.1.2 The Technology for Development Incubator

One of the latest Job Creation Incubators, the Technology for Development (TfD) Incubator was established by the Council for Scientific and Industrial Research (CSIR) in 1996. Compared to the CSIR’s Technology Development Incubator that focus on firms

involved in Technology Development, the Tfd Incubator focus on firms that use technology for development. However, compared to the SBDC Hives, the Tfd Incubator gives a higher priority to technology transfer and industry development and therefore serves more as an intermediate incubator between the SBDC Hives and the TDIs.

The Tfd Incubator is located on the CSIR premises in Pretoria, in an existing building that is currently being renovated specifically for the purpose of business incubation. The Tfd Incubator differ from the CSIR's Technology Development Incubator, where different firms are located in different buildings, in that all the firms are located together in one building. The incubator asks a below-market rental rate, and also subsidises the other services that are provided. At this stage, various departments of the CSIR have shown interest in the incubator and have also provided a variety of services to the incubator's first tenant.

8.2.2 Technology Development Incubators

In the search for incubators in South Africa, one aspect stood out like a sore thumb: the lack of TDIs. There are currently two TDIs in operation and a few are in the development stage. However, the lack of any co-ordination among the development efforts confined the investigation to a limited number of development efforts. The possibility therefore exists that there might be more development efforts. Nevertheless, these development efforts will be limited to incubators in the beginning of the start-up stage.

8.2.2.1 The Stellenbosch Innovation Centre

The Stellenbosch Innovation Centre is located on a technopark just outside Stellenbosch. The technopark is operated by the Stellenbosch municipality. The incubator, however, forms an independent, not-for-profit entity, and serves as a platform for the development of technology orientated businesses for the technopark. The facility was specifically designed for this purpose, and has 1600 square metres leasable space, with a wide variety in size of closed office spaces. The incubator offers its tenants a full range of services,

such as a tea-room, conference facilities, a common reception area, and counselling to help them achieve growth, stability, and commercial success. The incubator programme does not focus on a single technology or specific industry, but rather tries to attract a broad diversity of ventures that can serve the community. The main source of entrepreneurs for the incubator is the Stellenbosch University, located only a few minutes' drive away from the incubator. However, a formal linkage does not exist between the University and the incubator, and technology transfer is therefore based on informal relationships that exist between the tenants and the University. The incubator has been criticised by some people, to be a failure. However, the incubator is now only 6 years old, is fully occupied, has supported 32 firms during its life span, with four firms graduating and only three failures, and can therefore not really be judged at this stage.

8.2.2.2 The CSIR Technology Development Incubator

Compared to the TfD Incubator, the CSIR Technology Development Incubator is the 'opposite side of the same coin'. The only similarity between the two incubators is their location on the CSIR premises, in Pretoria. The Incubator's tenants are, unlike in most incubators, not located in the same building. However, the only reason for not operating in one building is the current lack of available space. Space is being cleared in one of the buildings, but it is unlikely that all the incubator's tenants will be located in one building. As mentioned before, the disadvantage of this approach is that the incubator's tenants may not realise the advantages of co-location. Nevertheless, because all the incubator's tenants are still located on the same premises, only a few minutes walk away from each other, it is unlikely that it will hamper the incubator's operation.

The CSIR Technology Development Incubator focuses mainly on technology transfer and industry development, and provides a full range of services. Unlike the TfD Incubator, the TDI has a tougher approach and tends not to subsidise the services provided. Nevertheless, the rental rate and the cost of services are still below market related prices. The TDI has its own part-time manager and receives most of its funding from rent received and support from the CSIR. The TDI, however, does not receive any

government grants as such, except for the grants that the CSIR receives and in turn distributes among the various departments.

With the vast amount of resources and talent available at the CSIR, and the additional industrial approach, compared to for instance an educational approach, the TDI seems to be ideally geared for technology transfer. However, only the future will be able to tell if it can be successfully administered.

8.2.3 New Incubation Programmes

In addition to the above mentioned three operating incubators, there are a few incubators in the start-up stage in South Africa. However, because there is no co-ordination between the development programmes, there is a possibility that more efforts exist, but that they are not necessarily called incubators or that they are in a very early stage of development. The existing development efforts include:

- ◇ The Capricorn Project
- ◇ The Pre-Competition University Technology Incubator at the University of Pretoria

8.2.3.1 The Capricorn Project

The Capricorn Project is probably the largest and most encompassing development effort in South Africa, that has a combined focus on SMMEs, education, high technology research and development programmes and other outreach programmes, for a specific region. By acting as a seed bed for new technology based firms, the Capricorn Foundation wants to raise the economic profile of the Western Cape area, create jobs, provide education and training and improve the technological capabilities of existing industries⁸⁴.

The Capricorn Foundation is a Section 21 Company (not-for-profit), and has been constituted specifically to facilitate links between industry, commerce, education and training. The activities of the foundation are diverse and encompass a comprehensive

attempt to provide this close linkage. One of its objectives is to establish incubator facilities for high-level technology development and the transfer of technology from Universities and Science Parks in the UK, USA and elsewhere in the world. The incubator will be located in one of the largest research/industrial parks in Africa, and will also include the Foundation's offices, training facilities, lecture and seminar rooms, a SMME development centre, a resource centre, research laboratories, and the offices of a number of other constituents of the Foundation.

Capricorn Foundation constituents, include:

- ◇ Cape Town
 - ◆ Cape Technikon
 - ◆ Peninsula Technikon
 - ◆ University of Cape Town
 - ◆ University of the Western Cape
 - ◆ University of Stellenbosch
- ◇ UK Universities
 - ◆ University College, London
 - ◆ Bristol University
- ◇ US Universities
 - ◆ Duke University
 - ◆ University of North Carolina, Chapel Hill
 - ◆ North Carolina Central University
 - ◆ State University, North Carolina

The Capricorn Foundation has also identified a number of industries that they will focus on, viz.:

- ◇ Telecommunications research and assembly
- ◇ Computer hardware and software development

- ◇ Electronic manufacturing
- ◇ Pharmaceuticals
- ◇ Agro Industries
- ◇ Value added distribution
- ◇ Clothing and footwear
- ◇ Food processing
- ◇ Human resources

8.2.3.2 The Pre-Competition University Technology Incubator

The Pre-Competition University Technology Incubator (PCUTI) will be situated at the University of Pretoria (UP)^{85, i}. The establishment of the PCUTI will seek to bridge the gap that exists with present engineering students that are taught all the theoretical skills of being good design engineers, yet have limited exposure to management, innovation, manufacturing, ecology, social, economic and other factors involved in entrepreneurship. By spending a year or two at the PCUTI the young engineer (“intern”) will learn entrepreneurial and innovation skills through experience, example and training. Training will include all aspects of starting a high technology enterprise, e.g.: management, marketing, business plan preparation, etc. The “on-campus” PCUTI will, therefore, act as an entrepreneurial and innovation “laboratory” for the students and participating graduates, stimulating the inherent desire of engineering students to be young innovating entrepreneurs. This additional education and inspiration will then hopefully create a new, more rapid, flow of young entrepreneurs into industry, and inspire the young undergraduates to join the PCUTI. After the successful completion of a period of “experimental learning”, the successful entrepreneur(s) will have the option to be transferred to the Persepor Technopark where a fully competitive University Technology Incubator will be operated.

ⁱ This section quotes extensively from Wilhelm Leuschner’s presentation on ‘*The University Technology Incubator to Start and Support Entrepreneurial Activity*’⁸⁵.

It is foreseen that the PCUTI might initially be established as part of the Laboratory for Advanced Engineering (Pty) Ltd (LGI), an R&D consulting company on the campus of the University of Pretoria. LGI is owned by a trust that is controlled the University of Pretoria, and has been operating for more than 15 years. Many lecturers in the Faculty of Engineering act as consultants for LGI. This contact with industry through LGI is essential for the development of engineering lecturers to stay in contact with commercial projects and challenges. The experience of LGI in acquiring and managing development projects can therefore be of exceptional value to the PCUTI. It is envisaged that the PCUTI will, at a later stage, move away from LGI, and be established in the Faculty of Engineering, with various other departments and/or individuals from the University joining the PCUTI or assisting the incubator as required.

The Institute for Technological Innovation (ITI) will also play an important role in the operation of the PCUTI. The Institute for Technological Innovation was established in October 1994 in the Faculty of Engineering at the University of Pretoria. The ITI is a research institute, which concentrates on research in the management of technology, the management of innovation, technology transfer, technology policy and related fields. The most important function of the ITI will be to assist the PCUTI in determining and optimising the projects on which the incubator must concentrate its efforts to ensure effective innovation of products and systems.

It is envisaged that the initial financing for the start-up stage will probably be shared between the Government, the University and the Private Sector. Private companies that are interested, will be asked for initial funding in return for exclusive access to certain (or all) of the R&D projects undertaken by the PCUTI. From all the successful entrepreneurs produced by the PCUTI, a certain amount of royalties will also be collected to make the PCUTI self-supporting. By making infrastructure, equipment and personnel available to the PCUTI, the University will be the main sponsor of the incubator.

Aspiring young entrepreneurs (e.g. newly graduated engineers) will work together in groups in the PCUTI to establish the feasibility of manufacturing and marketing of identified products and/or services. They will be provided with office space, infrastructure and a basic salary. Report-back meetings will be held regularly and training will be provided in the form of lecturers, visits and talks by successful entrepreneurs. Every project will be reviewed at specific intervals to establish its continued viability and the level of success achieved. Once the project is ready for exploitation, the product and the group (business unit) will be transferred to a possible future incubator at Perseus Technopark. The PCUTI will therefore act as an educational and training facility for young engineering entrepreneurs and innovators with a reduced risk of expensive failure to the individual or a sponsor.

8.2.4 Similar Development Efforts

8.2.4.1 *The Cape Technikon development effort*

A chemical engineering business development working group was formed at the Cape Technikon in 1994^{86, ii}. The primary aim of the group was to create an environment in which groups of students can initiate, develop and establish their own independent chemical business units.

The curricula for the four-year bachelors degree and three-year national diploma in chemical engineering both involve 12 months of experimental training. The option of using this time to work within the environment of a business development group was introduced in January 1994, with the main objective being to provide experimental training opportunities for students who were unable to obtain suitable employment in industry. All students requiring experimental training, who are interested in becoming involved in the activities of the group, initially help in the activities of an established

ⁱⁱ This section quotes randomly from Donald Cook's article, '*Identifying Entrepreneurial Projects For Chemical Engineering Students*'.

project. When people work well together, they usually tend to form subgroups within the project teams. These subgroups can then sometimes move on to a new project, provided that a project is identified that suits the personality of the group. This group can then form a business unit and lecturers act as consultants to the different business units. Regular group meetings are also used to discuss technical and business problems, with additional laboratory training by technical staff (as required) to facilitate experimentation and routine testing.

Projects ideas are obtained through various approaches, however, the experience gained indicates that the best ideas have come from people in industry. These ideas often represent projects that have been investigated but found to be uneconomical within the framework of a large corporation. In these cases the most valuable component of the business proposal, the market, has usually been established, already.

To date, one project is likely to produce a positive cash flow, with two remaining projects that have greater financial, but longer term, potential. According to Donald Cook, the most important contribution of the working groups “is the shift in mentality that has taken place in our school”, plus that “we are now better able to deal with the tension between business and science”. Additionally, valuable experience was gained in contract procedure, close corporation registration and product quality assurance.

8.2.4.2 Local Services Centres

A two tier non-financial infrastructural and technical support system for the provision of real services to SMMEs is being developed in South Africa ⁸⁷. The first tier consists of a co-ordinated network of community based Local Business Service Centres (LBSCs) providing generic business support for small and micro enterprises. The second tier involves a network of decentralised Manufacturing Advisory Centres (MACs) aimed at improving the growth and competitiveness of small manufacturing enterprises via the provision of technological and technical services.

8.2.4.2.1 *Local Business Service Centres*

Services provided by the LBSCs will include business information, general business management advice and counselling, aftercare and networking to other services.

8.2.4.2.2 *Manufacturing Advisory Centres*

MACs will provide business and technological services to small manufacturers and assist in creating clusters of co-operating small manufacturers. The centres will pay special attention to developing the manufacturing base from disadvantaged communities and will create an enabling environment for new, developing and established small manufacturers.

8.2.5 Results from the South African Survey

The results from the questionnaire (Appendix H) were not statistically analysed because:

- ◇ very few operating incubators were discovered, limiting the information that was available; and
- ◇ international experience indicated that very few incubator managers keep good records³⁸.

The results have therefore more of a descriptive nature and portray the current status of the incubation industry in South Africa.

8.2.5.1 *A comparison between the objectives of JCI and TDI*

Table 8 shows the difference between the priority JCIs and TDIs give to their respective objectives. While there is no real difference between the priority that JCIs and TDIs give to economic development, industry development, small business assistance and community development, there is a considerable difference between the priority JCIs and TDIs give to technology transfer. This difference in priority is then also the main justification behind the new classificationⁱⁱⁱ. With technology transfer as one of its highest

ⁱⁱⁱ Refer to discussion on page 170.

priorities, it is no surprise that neighbourhood development and rural development have almost no priority in TDIs.

TABLE 8: INCUBATOR OBJECTIVES - RANKED ACCORDING TO IMPORTANCE.

Job Creation Incubators	Technology Development Incubators
Economic Development	Technology Transfer
Job Creation	Industry Development
Industrial Development	Small Business Assistance
Small Business Assistance	Economic Development
Community Development	Job Creation
Technology Transfer	Community Development
Neighbourhood Development	
Rural Development	

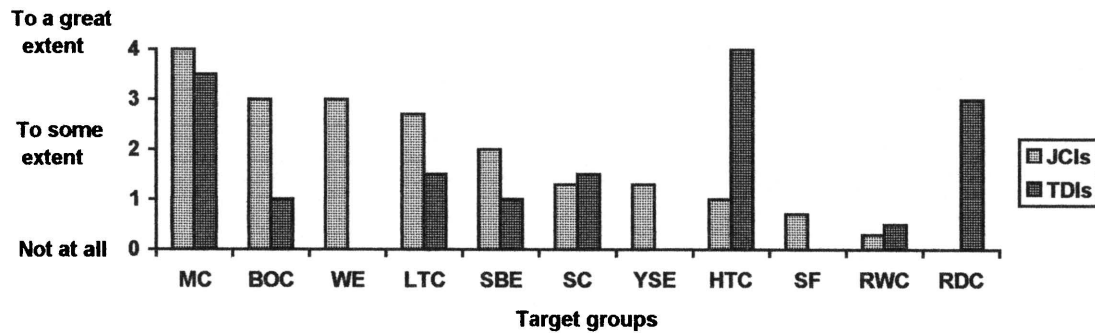
Table 9 complements Table 8, because the type of firm in the incubator depends on the selection criteria used for evaluation. The selection criteria, on the other hand, are supposed to be mainly derived from the incubator's objectives. Table 9, therefore, also serves as a cross reference for table 8, and confirms that the main difference between JCIs and TDIs' lies in the priority they respectively give to supporting firms involved in the development of technology.

TABLE 9: TARGET GROUPS - RANKED ACCORDING TO IMPORTANCE.

Job Creation Incubators	Technology Development Incubators
Manufacturing firms (MC)	High technology firms (HTC)
Black-owned/controlled enterprises (BOC)	Manufacturing firms (MC)
Woman entrepreneurs (WE)	Research and development firms (RDF)
Low technology firms (LTC)	Service firms (SF)
Small business exports (SBE)	Low technology firms (LTC)
Service firms (SF)	Small business exports (SBE)
Youth self-employment (YSE)	Black-owned/controlled enterprises (BOC)
High technology firms (HTC)	Retail and wholesale firms (RWC)
Retail and wholesale firms (RWC)	
Small farmers (SF)	

Figure 12 provides some indication of the difference between the degree of support JCI and TDIs give towards a specific target group of tenant firms.

FIGURE 12: THE DEGREE OF SUPPORT TOWARDS A SPECIFIC TARGET GROUP^{iv}.



8.2.5.2 Incubation facilities

The TDIs tend to be located in suburbs, while the JCIs can be found in city centres, industrial areas, suburbs, and even in rural areas. Of all the incubators, only the Stellenbosch Innovation Centre and a few of the SBDC hives are located in facilities specifically designed for the purpose of business incubation. The rest of the incubators are all located in renovated facilities, and especially in space vacated by downsizing corporations. Nevertheless, most of the new facilities were only built because there was no other feasible facility available nearby. Furthermore, as can be expected, the survey also indicates that most of the incubators are located in areas where the necessary infrastructure already exists, with the exception of a few rural SBDC hives.

All the facilities showed an acceptable degree of flexibility, with a wide range of office space available to their tenants. Sizes ranged from 25 square metres up to a 100 square meters that tenants could choose from. All the facilities have at least a common reception area and a tea and/or a lunchroom available for the tenants. Conference facilities were,

^{iv} See Table 9 for definitions of abbreviations.

however, more important to TDIs, but were nevertheless available to most firms, even though it was not always available on the premises of the incubation facility.

8.2.5.3 Funding

All the facilities aim to be financially self-sustainable, however, because most of the facilities are still very young, it is difficult to determine their success in achieving it. The greatest source of income to the TDIs is rental income, with the Stellenbosch Innovation Centre depending entirely on rental income and a small fee for the services provided. The CSIR Technology Development Incubator, on the other hand, depends also on additional support from the CSIR, and on equity shares from successful companies. However, with no graduates it might still be a considerable period before any substantial income will be realised.

Even though both incubators are related to the CSIR, the Tfd Incubator has a different policy and therefore does not take up equity shares in its tenants, but rather depends on additional government grants and public support (donations). The distribution of income for the SBDC hives varies from hive to hive, but compared to the TDIs, the SBDC hives rely more on government grants and private financial support from the SBDC. Nevertheless, the hives also depend on rental income and on equity participation in specific companies.

The TDIs tend to ask a market related (compared to the surrounding area) rental rate, whereas all the JCI require only a reduced (subsidised) rent. The market related rental rate required by the TDIs, can however, be justified in that they are more dependent on rental income, than on any other funding source. On the other hand, JCIs depend more on government grants, because they focus more on the underprivileged^v that are in general not able to obtain the necessary financial support that is needed, and it is therefore more important that they receive subsidised rental rates and services.

^v Refer to the following heading, 'Target groups'.

Financial support is in general limited to subsidised services for the TDIs, except for the CSIR Technology Development Incubator that does offer operating funds and/or seed capital. The SBDC hives, as such, do not provide financial support, except for subsidised services and rent. However, the firms in the hives can obtain funding from the SBDC, but have to compete for it against other firms that might not necessarily be in the hives. It is uncertain whether or not the firms in the hives obtain any advantages above firms that are not in a hive.

From the discussions with the incubator managers and from the questionnaires (Appendix H) it became apparent that community support does not play a role in incubator operations. Unfortunately, it was not possible to derive from the survey exactly why there is no real support.

8.2.5.4 Management

One particular aspect of incubation that is mentioned time after time is that an absolutely critical factor for success is the incubator manager. However, it seems that incubator developers, in South Africa, either ignore or just do not consider this factor as important. South African incubator managers have either no experience in related fields, and/or no training in small business development, and/or no training in incubator management. Where incubator managers do have experience in related fields, such as business management, marketing, etc., they tend to be generalists, with considerable experience in a wide variety of fields. Except for the SBDC Hive managers, none of the managers had specific training in incubator management.

The incubator boards are generally involved in a wide variety of activities, which can be seen as a good sign. However, where there is very little involvement from the JCI boards, in the management of the JCIs, there was an indication from some of the incubator managers that the TDI boards tend to focus more on the management of the incubator than on any of their other activities. This type of involvement in management activities is not recommended³⁹. Instead, the board's highest priorities should be future planning, a

focus on providing advice to incubator tenants, networking and external relations, with almost no involvement in the management of the incubator.

As Table 10 shows, both JCI and TDI view 'value added to product' and 'projected growth potential of the new firm' as the most important selection criteria to evaluate possible new tenants. The difference in priority between JCI and TDI is in line with their different objectives and with international experience. What is interesting to note, is that even though TDIs are more dependent on rental income, they still give the tenant's ability to pay a lower priority than JCIs. However, with so few incubators and so small difference in priority, this result might be insignificant.

TABLE 10: SELECTION CRITERIA FOR JUDGING THE SUITABILITY OF NEW TENANTS - RANKED ACCORDING TO IMPORTANCE

Job Creation Incubators	Technology Development Incubators
1. Value added to product.	1. Projected growth potential of the firm.
2. Projected growth potential of the firm. Compatibility of the business with other tenants.	2. Unique/superior product/technology. Value added to product.
3. A complete business plan. Ability to pay for rent or other services provided. Unique/superior product/technology	3. Market competitiveness.
4. Market competitiveness.	4. Ability to pay for rent or other services provided.
5. Managerial competence of founders.	5. Managerial competence of founders Compatibility of the business with other tenants.
6.	6. A complete business plan.

The survey also indicated that all the incubators are evaluated periodically. Financial self-sustainability is the most important criterion used for evaluating TDIs. It is, however, understandable, because they do not depend as much on government grants as JCIs. JCIs, on the other hand, are together with financial self-sustainability also evaluated on

the number of jobs created. Both JCIIs and TDIs are evaluated on other criteria as well, although, to a lesser degree.

8.2.5.5 Services provided to tenants

From the survey it was possible to determine the availability of certain services to the incubator tenants. However, because the availability of the services depends on the incubator manager's judgement, and does not include the tenant's perspective, further research might alter the results of this particular survey. Nevertheless, the survey provides a reasonable indication of what extent services are available to incubator tenants in their respective incubators (Table 11).

8.2.6 Conclusions

Table 8, Table 9 and Figure 10, positively confirm that the main difference between JCIIs and TDIs lies in the respective priority that each gives to the 'technology' involved at firm level. One can easily be fooled and interpret this priority as the 'effort' put into administering technology transfer; the 'amount' of technology being transferred; or even the 'level' of the technology involved, and then differentiate between JCIIs and TDIs on one of these grounds. However, discussions with incubator managers revealed that both JCIIs and TDIs try to develop technology transfer relationships, and that the degree of technology transfer rather depends on the specific relationship, and not on the incubator as such.

TABLE 11: AVAILABILITY OF SERVICES

Services Provided to tenants	SBDC Hives	TfD Incubator	CSIR TDI	Stellenbosch Incubator
Accounting and Bookkeeping	To some extent	Fairly / Adequately	Completely available	Not available
Consulting services	Fairly / Adequately	Completely available	Completely available	To some extent
Employment assistance	To some extent	Fairly / Adequately	Completely available	Not available
Equipment rental	Completely available	Fairly / Adequately	Not available	To some extent
Fax	Fairly / Adequately	Completely available	Not available	Completely available
Financial management	Fairly / Adequately	Fairly / Adequately	Completely available	Not available
Information provision	Completely available	Fairly / Adequately	Fairly / Adequately	Completely available
Lab equipment access	Not available	Fairly / Adequately	Fairly / Adequately	To some extent
Legal assistance	Fairly / Adequately	To some extent	Fairly / Adequately	Not available
Management assistance	Fairly / Adequately	Fairly / Adequately	Completely available	To some extent
Marketing advice	Fairly / Adequately	Fairly / Adequately	Fairly / Adequately	Not available
Marketing of the incubator	To some extent	Fairly / Adequately	Fairly / Adequately	Fairly / Adequately
Office furniture	Not available	Completely available	Completely available	Not available
Photocopying	Fairly / Adequately	Completely available	Fairly / Adequately	Completely available
R&D / Product development	Fairly / Adequately	Fairly / Adequately	Fairly / Adequately	Not available
Receptionist	To some extent	Completely available	Fairly / Adequately	Completely available
Start-up counselling	Fairly / Adequately	Fairly / Adequately	Completely available	To some extent
Typing	Fairly / Adequately	Completely available	Fairly / Adequately	Fairly / Adequately
Word processing	To some extent	Completely available	Fairly / Adequately	Fairly / Adequately

JCIs and TDIs should, on the other hand, also not be separated on the basis of ‘high-technology’ or ‘low-technology’ tenants. The problem lies in defining ‘low-technology’ and ‘high-technology’, and if we define it, how to decide which firms are ‘low-technology’ orientated firms and which firms are ‘high-technology’ orientated firms. Instead, JCIs and TDIs can much more easily be differentiated on the basis of how technology is being implemented in the business. As with many ‘soft’ definitions, there is also a grey area between the two extremes, but in this case it is in line with reality where there are firms that can be either in a JCI or in a TDI. Nevertheless, at the one extreme are JCIs, which focus on firms that use technology to provide a service or manufacture a product, and therefore provide value adding only on a product level. At the other end there are TDIs that focus on firms that develop technology, and therefore provide value adding on a process, service, product, and firm level. Development refers to “the translation of research findings or other knowledge into a plan or design for new, modified or improved products/processes/services whether intended for sale or use. It includes the conceptual formulation, design and testing of product/process/service alternatives; the construction of prototypes; and the operation of initial, scaled-down systems or pilot plants. It does not include routine or periodic alterations to existing products, production lines, manufacturing processes, services, and other on-going operations even if these alterations may represent improvements”⁸⁸. Even though TDIs can sometimes have tenants that are not involved in development work, the majority of the firms should consistently be involved in technology development.

A TDI must not be confused with an innovation centre. An innovation centre focuses on the development of a technology, with the possibility that a business might be born out of the development effortⁱ. A TDI focuses on business assistance for businesses that are involved in technological development. As can be seen in the previous comparisons (viz.

ⁱ Some incubators are referred to as ‘innovation centres’; however, for the purpose of this document, an innovation centre is defined as a centre with a main objective of ‘technology development’ and not business assistance.

objectives, facilities, funding, management and services provided) between JCIIs and TDIIs, although there are many similarities, there are also many differences between the two and therefore their operational strategies differ quite extensively.

With more than 45 JCIIs operating in South Africa and with new JCIIs being developed on demand, the SBDC can be commended on their effort in assisting SMMEs. The hives are true to their objective in assisting job creation, and are also designed and operated on this basis. The operational policies and experience gained by the SBDC are also very similar to other international development efforts, indicating that South Africa may be on par with most other countries in the development of JCIIs. However, with only two operating TDIIs and only a few in the development stage, South Africa is certainly far behind in assisting technology-orientated businesses.

In addition to the lack of TDIIs, the discussions with the respective local incubator managers revealed that there is also a general lack of co-ordination among the concerned parties. This lack of co-ordination does not only create a duplication of efforts, but also prevents the incubators from forming a firm alliance with a common goal. Instead, the different development efforts have to compete against each other for resources and are thus slowing down the development process. The lack of co-operation between the local SBDC and the existing incubators can be seen as one example of this competition. Universities, on the other hand, are reluctant to participate in the development of business incubators, because economic development does not coincide with their mission of education.

From Table 11 one can clearly see that a strong relationship between an incubator and another organisation (i.e. between an incubator and the SBDC and/or research institute and/or university), contain additional advantages for the incubator. The SBDC Hives and the CSIR Incubators have almost twice the number of services available to their tenants in comparison with the Stellenbosch Innovation Centre. A good relationship between an incubator and an organisation is therefore highly recommended, even if it is only for the

sheer number of additional services that can be obtained for the incubator tenants. It must, however, be remembered that, even if the services are available, it is no guarantee that the incubator tenants will use them. Furthermore, the availability of the services are not indicative of the quality of the services provided. Nevertheless, a good incubator manager should be able to encourage the entrepreneurs to use the services to their advantage.

All the incubators are providing a wide variety of necessary services, yet it seems that the Stellenbosch Innovation Centre is not focusing enough on management assistance. This lack of focus has serious implications, especially, because poor management is most often rated as the major cause of new venture failures and because management assistance is such an integral part of business incubation.

Even though the Cape Technikon's development project is not a business incubator, it is still important that one take a closer look at the principle behind the project. In essence, the aim to create an environment in which groups of students can initiate, develop and establish their own independent chemical business units, is that of a business incubator. However, if you evaluate the 'work groups' against the four cornerstones of business incubation, a few critical components are missing. *Firstly*, the lack of a distinctive physical facility, which in general separates incubators from other development programmes. *Secondly*, the lack of at least one person with the necessary experience and qualifications, whose main focus is to provide the necessary business assistance to the respective business units. This is especially important in an educational environment, where technical assistance is readily available, and where business experience is generally lacking. Finally, with shared services, financial assistance and business assistance provided, emphasis should be placed on the financial self-sustainability, of not only the business units, but of the 'incubator' as well.

Both the LBSCs and the MACs differ quite extensively from business incubation programmes, and can therefore not be considered as incubators. The main differences between the centres and incubators are:

- ◇ the centres do not provide any affordable operating space;
- ◇ the centres can, therefore, not offer the advantages of co-location;
- ◇ no general administrative services are provided, e.g. fax, copier, receptionist, etc.;
- ◇ the centres do not obtain any financial income from rent and are therefore more dependent on additional financial support;
- ◇ the entrepreneurs must first approach the centre for help, because they have no incubator manager that can approach the businesses; and
- ◇ it is more difficult to measure the success/output of the centres.

Although incubators, LBSCs and MACs each have their own unique function in business development, they also complement each other and it would be an interesting prospect if two or more of the approaches could be combined.

8.3 UNIVERSITY-RELATED INCUBATORS FOCUSING ON HIGH-TECHNOLOGY BUSINESSES IN THE UNITED STATES OF AMERICA

The main objective of this part of the study was to obtain additional information on TDIs. With more than 500 incubators in the USA and limited time available, the number of incubators were narrowed down to three leading business incubators. The incubators had to be at least five years old, had to focus on firms that are involved in technological development, and needed to have a general reputation for being leaders in the field of business incubation. These constraints were essential to ensure that the most applicable and up-to-date information could be gathered on TDIs. Rensselaer Polytechnic Institute Incubation Centre, Edison Technology Incubator and the Austin Technology Incubator were chosen, after a careful process of elimination. The three incubators do not

only represent three very successful incubation programmes, but also three very unique TDIs. The three incubators are different in every aspect, except for the fact that they operate as business incubators and all have a strong relationship with a university.

The information was gathered through semi-structured personal interviews with the respective incubator personnel. Additional information was also gathered from several articles and brochures obtained at the incubators. In addition to the three TDIs, the University of New Orleans Technology Enterprise Centre and the New Orleans Business & Industrial District Enterprise Centre were also visited. The New Orleans Business & Industrial District Enterprise Centre represents a JCI, while the University of New Orleans Technology Enterprise Centre represents an incubator that forms a combination between a JCI and a TDI. The visit to the incubators also afforded the opportunity to attend the 10th National Conference on Business Incubation, held in New Orleans on 22-25 May, 1996.

8.3.1 Rensselaer Polytechnic Institute Incubator

Rensselaer Polytechnic Institute (RPI), a private university, started the incubator in 1980, in Troy, New York. An important feature of the RPI incubator programme is that its development has been entirely evolutionary. The incubator was initially set up in the basement of a classroom building while a permanent facility, an empty classroom building, was being renovated.

The RPI incubator encourages technically oriented people to start a business with the aid and resources of a *technical* university. The incubator programme is not focused on a single technology or specific industries. On the contrary, the objective of the incubator is to attract a broad diversity of ventures, reflective of the varied technological strengths of the university. The three main sources of entrepreneurs for the RPI incubator are the university, technology orientated companies and extant technology companies with the need for inexpensive space and technical staff. Rensselaer provides entrepreneurial firms with inexpensive space for operations as well as access to campus facilities.

The incubator programme is a department of the institute that reports through the Rensselaer Technology Park to the office of the president. Transactions are on a cash basis, although RPI has accepted stock in a company as payment for rent. In a related development, the New York State legislature has established the New York Centre for Industrial Innovation at RPI. The centre has both public and private sector support. As a research facility, the centre provides an additional resource that may assist the incubator's development.

One of the unique aspects of the RPI incubator is the Venture Affiliates. Rensselaer broke new ground in late 1988 by founding the Centre for Entrepreneurship of new Technological Ventures. The Centre for Entrepreneurship acts as a bridge between Rensselaer's School of Management and the Incubator Programme, and by extension of the Tech Park and the Capitol Region. In recognition of this growing infrastructure for new and young technological ventures, Rensselaer established the Venture Affiliates of RPI (VARPI) in March 1989. Designed to provide participating companies with a formal link to RPI and access to the resources of this expanding infrastructure, VARPI now has about 50 participating companies.

Rensselaer's goal is to build an Entrepreneurship Triad in the Capital Region composed of Technical Entrepreneurs, Business Entrepreneurs and Capital Entrepreneurs. They believe that a dynamic regional association of technological ventures will increase the probability of attracting the attention and participation of leading venture capitalists and business entrepreneurs nationally and internationally.

8.3.2 The Edison Technology Incubator

The Ohio Department of Development established the Thomas Edison Programme to strengthen and diversify Ohio's economy through the promotion of technological innovation. The State funded Edison Programme was the main driving force behind the establishment of no less than six incubators, and invested approximately US\$ 5 million in technology incubators to assist new technology/manufacturing-driven enterprises. The

Edison Programme has made a major contribution towards the success of the established incubators and still remains one of the largest funding sources available to the incubators. The Edison Programme also supports the following:

- Edison Materials Technology Centre
- Edison Welding Institute
- Institute of Advanced Manufacturing
- Edison Polymer Innovation Corporation
- Edison Biotechnology Centre
- Edison Industrial Centre
- Cleveland Advanced Manufacturing Programme

All the incubators in the Edison Programmes are linked to the Edison Technology Centres, so that the tenants have access to expert technical assistance. Each incubator is also teamed with its local Small Business Development Centre, local universities and other programmes that aid the development of small businesses.

Enterprise Development, Inc. (EDI) was established in 1983 to stimulate entrepreneurial activity and the creation and growth of early stage businesses. EDI provides individualised business counselling and offers a complete entrepreneurial curriculum in co-operation with the Weatherhead School of Management at Case Western Reserve University (CWRU). EDI also conducts targeted research in the areas of local economic concerns and pursues activities that support entrepreneurial growth. EDI is an independent, not-for-profit subsidiary of CWRU, a renowned research university with nationally recognised programmes in engineering and business. Sources of funds include EDI revenues, the Thomas Edison Programme, EDI sponsors, Weatherhead School of Management, CWRU, Cleveland Tomorrow, The Cleveland Foundation and the George Gund Foundation.

Enterprise Development is home to the Edison Technology Incubator in Cleveland, one of the six Edison Incubators located throughout the state of Ohio designed to ease the difficulties of launching a new technology-based enterprise. The well-funded EDI programme ensures that ongoing management assistance is available, at no extra charge, on an 'as-needed' basis. The incubator provides a full range of services, counselling, and direction to its tenant companies to help them achieve growth, stability, and commercial success. Graduate students from the Weatherhead School of Management and CWRU are also available to perform business-related projects for incubator tenants. The free or very low cost services, except for rent (still below-market), provide the incubator tenants with a major competitive advantage and contribute to the success of the incubator.

8.3.3 Austin Technology Incubator

In June 1989, the University of Texas at Austin established the Austin Technology Incubator (ATI) through its IC² Institute. During the first few months of 1994, ATI won a major national award, in only its fifth year of operation. During this period, ATI had jumped from a 4,000 square-foot to a 60,000 square-foot facility and nurtured more than 44 technology-based companies. These companies have in turn created more than 640 high-value jobs and generated revenues in excess of \$44 million. With such a remarkable achievement, ATI is viewed by many as one of the most successful incubation projects and is often referred to as the Austin model in recent literature ⁸⁹.

According to Ms. Laura Kilcrease, ATI founding director and Innovation Creativity and Capital (IC²) Institute assistant director, "community support and alliances" made the difference. ATI has received considerable support from the Greater Austin Chamber of Commerce, the City of Austin, Travis County, the Texas Department of Commerce, the Austin business community, the IC² Institute and the University of Texas at Austin.

Probably one of the most unique relationships, and one of the major driving forces behind ATI's success, is the relationship between ATI and the IC² Institute. The Institute has a long-standing international reputation as a catalyst for stimulating private and public-sector alliances. These alliances are directed towards local, regional, and national

economic development and revitalisation. The IC² Institute is a unique, non-traditional centre for research and educational excellence. As such, it strives to be a catalyst for transforming The University of Texas at Austin, and higher education in general, so as to positively and perceptually contribute to society through the enterprise system. This positive impact on society is achieved by focusing on the enterprise system — that is, the mechanisms and processes for creating and distributing economic wealth. It achieves this mission in many mutually supportive ways⁹⁰:

- By defining and conducting an integrated and interdisciplinary programme of research and education on the enterprise system, e.g. on The Japan Industry and Management of Technology Programme and the East Tennessee's 21st Century Jobs Initiative.
- By studying and employing unique and improved research and learning methods for investigating the enterprise system, e.g. The Centre for Commercialisation and Enterprise (C²E) Internship Programme, the ATI, Distance Learning, and The International Innovation and Management of Technology Training Programme.
- By developing a synthesis of research, education, and practice that mutually reinforce and enhance each other. The Austin Technology Incubator and IC²'s international network of technology commercialisation centres have international recognition as experimental laboratories — unique environments in which to study, measure, and enhance understanding of the enterprise system world-wide.
- By disseminating knowledge through systematic programmes, e.g. working papers, published books, and sponsored conferences, workshops, and seminars.
- By engaging The University of Texas and other progressive universities in dialogue and initiatives directed at maximally contributing to society's economic, social, and cultural well being.

The ATI office and tenant companies recently moved to the Microelectronics and Computer Technology Corporation (MCC) building to accommodate the expanding incubator. In addition to providing sufficient space for expansion, the facilities provide tenants with benefits such as a full-service cafeteria, 24-hour security, and the advantage

of very modern and professional building appearance. ATI is also one of the few incubators that have successfully limited their companies to three years in the incubator before graduating them.

8.3.4 The University of New Orleans Technology Enterprise Centre

The Innovation Centre is located in the University of New Orleans Technology Enterprise Centre and is part of the Downtown Development District and the Medical Centre Complex. The building was donated and most of the building has been renovated through an additional grant from the city of New Orleans. The Innovation Centre is organised and operated to recruit, promote and assist the development of small technology-based and medically oriented business activities in the city of New Orleans. The basic premise is that, through a partnership between the academic community, government and the private sector, new or emerging companies can master the techniques necessary to grow into viable sustaining members of the community.

The Innovation Centre offers its member tenants a variety of administrative support services including reception, conference rooms, phone service, copier and fax service, computer support, security and building maintenance.

The Innovation Centre is a good example of an incubator that works in conjunction with the local SBDC that is located on the 6th floor in the same building. The SBDC is, unlike that in South Africa, operated by the University of New Orleans. The SBDC works with member companies and the public at large to develop programmes to support the business needs of the community by:

- Determining specific business support needs
- Assisting member companies with business needs (Business Planning, Marketing)
- Providing access to educational and training seminars

- Assisting in the utilisation of student resources
- Access to library resources
- Computer learning and resources

8.3.5 Conclusions

The experience obtained from the visit to the three university-related business incubators and the 10th National Conference on Business Incubation, verified the success of business incubation as a concept to stimulate entrepreneurship and to increase the survival rate of small, medium and micro enterprises during those first few critical years. It was also evident from the presentations by the vast number of international speakers at the conference, together with the information obtained from the South African survey, that South Africa is currently especially lacking in the development of technology-based businesses.

Business incubators have not yet proven themselves as a technology transfer mechanism. Nevertheless, they do play a very supportive role in technology transfer and the linkages between the TDIs and research institutes and/or universities appear to be very effective. This linkage appears to be exceptionally effective for the Austin Technology Incubator. However, it seems that it is the IC² Institute that is the major driving force behind ATI's success. The Edison Programme, on the other hand, is a good example of incubators which are linked to technology development centres, local SBDCs, local universities and other programmes that aid in the development of small businesses, to form a comprehensive development effort. However, this type of programme is very capital intensive and could only be achieved with continued assistance from the state government.

Except for Rensselaer Polytechnic Institute Incubator, the other business incubator facilities in the USA represented a first-world country with well-funded support programmes. Rensselaer Polytechnic Institute Incubator, on the other hand, was more in line with what South Africa should try to establish. Rather than spending millions on purpose-built business incubator buildings, developers should rather try to utilise existing

facilities and spend more money on assisting technology and growth orientated businesses.

8.4 RECOMMENDATIONS

Incubators can be seen as a proven concept that is an essential part of a national strategy for developing technology-orientated businesses. However, business incubators are not necessarily successful, and attention needs to be aimed at avoiding some of the potential pitfalls. As the oldest of the operating TDIs, the Stellenbosch Innovation Centre was only established in September 1990. It is also the only incubator, not operated by the SBDC, that is more than five years old. TDIs are therefore still a very new concept in South Africa, and with no real role models of TDIs that can be followed, it is crucial that the first few TDIs be viewed as a success. Special care should therefore be taken on government level to ensure the success of the first few business incubators. The failure of the first few incubators can easily become the basis of negative connotations that may result in a total failure. The first few business incubators will therefore need the best conditions to create a suitable environment for business incubation, e.g. strong university and SBDC relations and sufficient financial support for the first few years. These conditions can only be created with co-operation between government, educational institutions, research institutions and the business community.

From the South African survey it became clear that most of the parties would like to assist in this development effort. However, the lack of co-ordination should be of grave concern to anyone developing a business incubator. In most cases the people involved in the development only knew about the SBDC's hives and maybe one or two other incubators. Furthermore, the people involved in the development have absolutely no experience in the development of incubators, even though there are a variety of courses available that are specifically designed for incubator developers and managers. These courses may not be designed for local conditions, but if they are combined with the experience gained by the Stellenbosch Innovation Centre and by the SBDC, which is

remarkably similar to other international experiencesⁱⁱ, it may prove to be invaluable in reducing the learning curve. Instead, a 'learn as we go' approach is most often adopted, slowing down the development process as well as risking the 'success' of the incubation approach.

Even though most of the successful incubators' development has been entirely evolutionary in an environment that also differs from South Africa's, it does not mean that we have to follow that same development process. Incubator developers and managers must identify the similarities and apply the lessons learned internationally to accelerate the development process and increase the chances for success. It is therefore also recommended that the first few incubator developers and managers be sponsored to attend international courses in incubator development and management. If this experience can be combined with the experience gained by the SBDC and that of the Stellenbosch Innovation Centre, it may prove to play a crucial role in establishing successful TDIs in South Africa.

The lack of support from the community should also be of grave concern, especially because the community can be such a tremendous resource to the incubator and its tenants. It is therefore recommended that future research looks into this issue, especially to determine what the communities' viewpoints are, what is being done to increase their support, and what can be done to improve the current status. This huge negative barrier first needs to be broken down to speed up incubator development. Government must therefore adopt a policy that will stimulate co-operation between the various parties to ensure the successful development of business incubators.

ⁱⁱ The similarities can be seen if the recommendations made by the SBDC (Appendix F) are compared to the recommendations made by Rice and Matthews, as well as numerous other Authors.

In the development of entrepreneurship, the 'work group' created by the Cape Technikon, can play a very important role if implemented on a national basis. This 'work group incubator', however, should rather be operated like a business, and preferably not as an educational department. It is therefore recommended that the 'work group approach', be slightly modified into that of a Pre-Competition Technology Incubator, similar to the approach that is being developed at the University of Pretoria. This modification will assist the work groups (or business units), by giving them a greater sense of identity, and will enable the Chemical Engineering Department to integrate and promote their activities within as well as outside the Technikon. If this type of business orientation is not desirable, it is recommended that this development project should change its focus slightly, focusing less on business development and more on technological development. Groups of students will then focus mainly on technological development, nevertheless, keeping a business perspective. This concept is similar to the concept of an innovation centre. When the technology is developed far enough and it is found that it is commercially viable, the identified students can form a business unit and move from the innovation centre to a business incubator that then focuses more on the development of the business aspects. The advantage of this concept is that it might be easier to develop an innovation centre within the existing structure of an educational institution. The various groups can then proceed with their development work within any department, and as soon as the business unit is formed, it moves out to the incubator. This incubator can then be part of the Technikon or not, e.g.: students might move from the innovation centre to the Capricorn Foundation's incubator.

Business incubators can provide South Africa with an effective and efficient business development system that has been proven by other countries. However, business incubators are not a short-term solution and sufficient time should be granted before results can be expected.

9. CONCLUSIONS AND RECOMMENDATIONS: INCUBATION AS A POLICY INSTRUMENT

From Chapter 2 it is clear that SMMEs are playing an ever increasing role in absorbing labour, penetrating new markets and expanding economies in creative ways. SMMEs are therefore now generally seen as an effective means of creating most of the new jobs which countries will need in the future. However, it is also evident that the success rate of new ventures, particularly those that are technology intensive, is often disconcertingly low. Since SMMEs are particularly important drivers of the economy, governments must take positive steps to increase the creation and survival rate of SMMEs. Fortunately, several SMME development programmes have been developed to do just that. However, with limited capital available to assist SMMEs, structures need to be developed to ensure that the optimum assistance is provided to firms with the highest growth potential, but at a minimum cost to government. The challenge, therefore, is to identify the ventures with great promise, provide the assistance they need, and to help them achieve their potential, but at a minimum cost.

In order to determine what development strategy is needed for local business development, one has to look at the basic principles of new venture creation and development. However, in retrospect to the research in Chapter 2, it is noticeable that the systematic research into the creation and characteristics of successful ventures is a new and inexact science, and the research in economics and strategic management has barely begun to focus on new venture development and performance. Entrepreneurship also typically occurs in a real-world environment that lacks certainty, predictability, stability, and smoothness. Therefore, given the complexity of new venture creation and the real-world environment, it is nearly impossible to determine where and how new venture creation should be stimulated and assisted to achieve the best end results. Nevertheless, Gnyawali and Fogel developed a framework (Chapter 2) that group the environmental conditions for SMME development into the following five dimensions: government policies and procedures, socio-economic conditions, entrepreneurial and business skills,

financial support to businesses, and non-financial support to businesses³⁰. This framework has important implications for policy makers. *Firstly*, it provides some of the most important conditions for new venture development and therefore points indirectly to the type of assistance that should be provided to SMMEs. *Secondly*, it provides a basis for policy makers, against which they can evaluate existing and new development programmes. *Thirdly*, it shows, together with Gartner's multi-dimensional framework, that development programmes should not only focus on one specific facet, but that they should rather work together to create a more comprehensive assistance programme with a common goal: successful new venture creation. *Finally*, it also shows that development programmes on their own are not enough. Government, educational institutions and families, in short the whole nation, should work together to create a more favourable environment for new venture creation.

From the available literature we also know that, although some of the new venture failures are unavoidable due to external factors, many of these failures could have been prevented. A business development programme must therefore not only focus on the different aspects of new venture creation mentioned in Gnyawali and Fogel's framework, but should also assist new ventures in reducing the problems experienced during those first few critical years. Business incubation fills this special niche, of nurturing selected early stage ventures through focused assistance within a supportive environment that is designed to reduce the number of problems experienced by new ventures. The uniqueness of the incubation approach is probably most apparent in the two unique functions that are not provided in other types of management assistance. *Firstly*, the combination of on-site management and tenant interaction provides direct assistance when and where needed. *Secondly*, business incubators provide an environment that encourages entrepreneurs to improve their management skills and practices through an ongoing process. Nevertheless, it is the comprehensiveness and the flexibility of the incubation process in addressing the problems that new ventures encounter, that makes business incubators such a success. Business incubators provide a framework for focusing and binding the critical elements of the entrepreneurial process (viz.: entrepreneurship, business know-how, technology and

capital) in a congenial supportive environment that is designed to provide a combination of business assistance, financial assistance, flexible space, and shared services (the four cornerstones of an incubator) to increase the survival and growth rates of small businesses. There are also additional benefits incubator tenants can expect from the incubation process, viz.: community interaction, increased credibility and shortening of the development process. A business incubation programme therefore combines several aspects of new venture development. However, it should complement other policy instruments in the tool-kit of small enterprise support modalities.

Despite criticisms such as evaluation bias by researchers, the available research (Chapter 7) confirms business incubators' potential for local economic development: nurturing home-grown businesses, creating new employment opportunities, increasing the survival rate of new enterprises, increasing the opportunities for clustering, and creating the possibility for technology transfer and commercialisation, by maintaining strong relations with universities and other research institutes. There is, however, not sufficient proof to indicate that incubators increase the new venture creation rate or the success of technology transfer relationships. Incubators alone, therefore, have limited potential in stimulating new venture creation and innovation. On the other hand, the greatest need, as indicated by entrepreneurs, were for management and financial assistance and not for technology transfer.

The business incubator has therefore become a significant micro-economic tool to foster the growth of new ventures. Business incubation programmes also have the additional advantage that they only need limited support from regional or national government agencies, since support is usually only needed to establish and maintain the facility's early operations, until the incubator can be managed as a business entity in itself. The investment to start an incubator can, nevertheless, often be quite substantial, especially if a new facility is purposefully built or an existing facility requires substantial funding for renovation. However, the initial investment in this type of development programme is small compared to the continued financing (subsidising) costs of maintaining similar

development programmes that may be operating indefinitely. The business incubator can even reach break-even point in about three to four years under the right conditions; however, it would take considerable time to recover the initial investment.

9.1 RECOMMENDATIONS

Incubators can be vital contributors to economic development. However, to ensure success, they need local support, good management - and sound planning. It is therefore up to the policy makers and incubator developers in South Africa to make sure that the incubator fulfils most of the factors (Chapter 7) needed for successful incubation. Many governments across the world have initiated programmes to support the creation of incubators, and many more are on the way. However, although some commonalities in incubation programmes do exist, each incubation programme must be able to respond to local community needs, resources, and opportunities. Given the unique local conditions, the policy implications offered are broad and should be taken as guideposts rather than prescriptions by South African policy makers and incubator developers.

Incubators have helped to focus the attention of government officials on the fundamentally different nature of enterprise development compared to conventional industrial attraction and recruitment. "Incubators are more than 'bricks and mortar'; they involve the close co-operation of public and private organisations and the sharing of entrepreneurial risks. Such an environment is characterised by mutual understanding and adjustment, not control" ⁵³. Additionally, incubators can also focus the attention of government officials and local community leaders on business development, legitimising the role of small firms in the local economy, leading lenders and investors to consider these firms and encouraging local real estate developers to provide smaller office and industrial spaces.

Probably the most important point policy makers and incubator developers in SA need to keep in mind is that a business incubator has to be designed as a small business development facility, within the context of long-term policy and legislation, to support

national SMME development as the engine of future growth. It may take up to ten years before the programme's impact in terms of new product development and job creation becomes known. Incubator developers must therefore be willing to be patient in their expectations for positive economic development outcomes.

Bears and Paterson recommend that government agencies that deal with oversight of economic development projects need to train or retrain their personnel, so that they have some appreciation of entrepreneurial economic development strategies and what it takes to build a business⁹¹. Top staff and regional directors in SA should be required to attend workshops or training sessions on entrepreneurship, business incubation, and the requisites of successful business incubators.

Allen points out that the kind of oversight that creates the greatest chances for success is a management philosophy that allows experimental, trial-and-error learning to occur rather than rigid adherence to standard operating procedures and policy pronouncements⁵³. "This is not to suggest that legislative and funding bodies should not have policy guidelines; rather, the guidelines should be flexible, thereby allowing multiple paths in the pursuit of attainable economic development outcomes"⁵³.

Bishop and Lalkaka concluded that "incubators function best when implemented in concert with other economic policy interventions"¹. This link between incubation programmes and other development programmes, surfaced time after time in research as well as in case studies on 'successful' university related incubators in the US. It is therefore highly recommended that policy makers in SA adopt policies that support each other and that create linkages between the various development programmes.

Lalkaka also found that often, even when financial assistance is available, that the motivated individuals are still missing in developing countries⁴. These individuals often lack the skills needed to identify an opportunity and mobilise all support to develop and market a product. The main task for policy makers in this type of situation is to ensure

entrepreneurship development through continuous training at all levels. Education can therefore play a very important role in the development of entrepreneurs for incubators, and should be initiated as early as possible.

The private sector in developing countries, in general, seems to be indifferent to incubators¹. Policy makers and incubator developers in SA should therefore develop mechanisms to encourage the private sector to participate, because countries that have successfully involved the private sector, have demonstrated that private sector corporate involvement is a powerful contributor to the success of incubators, with many benefits to both the incubator and its tenants¹.

Incubator developers should not only encourage co-operation between incubators and other institutions, but also between various incubators. In countries where both resources and time for developing successful programmes are limited, co-operative arrangements, on national and international levels, can be especially beneficial in the exchange of experiences by learning both from the mistakes and the successes of others.

Even though most of the incubators in South Africa were linked in some way to an established and well-known institution or organisation, the relationship often lacked the necessary devotion. To ensure that the right image and credibility is as quickly as possibly established, these institutions and organisations must provide their full support. Most importantly this means active support from the South African Government and its agencies as well as small business organisations and development agencies. The incubators should not be in a position, where they need to gain the support from the respective institutions. Instead, these institutions should rather be the driving force behind the incubators, until business incubators have established themselves in South Africa as a reputable business development strategy. Additionally, the awareness of the potential benefits of business incubation must continuously be raised and publicised. The objective is to establish a virtuous circle, viz. to promote a situation where business incubators have a reputation for helping create successful businesses, with the result that entrepreneurs

want to be connected with them, so that business incubators get the ideal flow and community support which enables them to improve the quality of their services and consequently the quality of their product, viz. more successful businesses⁴⁴. Establishing more voices of support for the concept is vital, particularly in encouraging the private sector to do more and getting the message across to potential client businesses.

From the South African case study it also became evident that there is a need for networking between incubators. The objectives are to ensure that incubators can learn from others' successes and failures, thereby helping to improve performance and avoiding best practices being reinvented, and to help alleviate the isolation that exists for many of those involved in incubator projects, particularly in the planning and start-up stages. The establishing of a single independent body, i.e. the South African Business Incubation Association, is therefore highly recommended. The association needs to cover all the provinces in South Africa and all types of incubator, and can assist in promoting co-operation, rather than competition. Another function of the association should be to monitor the South African Business Incubation Industry, providing each incubator with a benchmark against which they can evaluate themselves.

It is also important for each region to have a clear strategy for economic development within which should be a regional technology and innovation plan and a clear role for the promotion and development of incubators. Each strategy should be consistent with other and wider initiatives and identify those sectors or areas of specific expertise to be targeted for development. This will ensure greater awareness and consistency of approach in terms of incubation.

Bishop and Lalkaka provided the following guidelines for policy makers and incubator developers when targeting incubation support to fulfil certain objectives, viz.¹:

- ◇ When national aspirations call for an export-led strategy requiring value added and knowledge-based products, the technology business incubator is the instrument of choice.
- ◇ Where strong university and state-sponsored research systems exist, technology incubators are also recommended, maximising the expertise of faculty as well as commercialising research that might otherwise go unexploited.
- ◇ When the national strategy calls for quality products requiring collaborative ventures for domestic and foreign markets, an international incubator should be considered.
- ◇ Where the main development concerns are to enhance quality and competitiveness, a national productivity centre could well become the implementing agency for a business incubator.
- ◇ In countries where small business development centres are poorly utilised, converting such structures into incubator-like arrangements is a cost-saving strategy.
- ◇ Where a 'technology culture' is to be developed, an innovation centre can be the catalyst.

9.2 RECOMMENDATIONS FOR FUTURE RESEARCH

This study will hopefully serve as a basis for future research, not only in the field of business incubation, but in the development of new ventures in SA. Future research can especially make a huge contribution towards new venture development if greater emphasis is placed on the local business environment and its entrepreneurs. It is further recommended that the following points be considered for future research, viz.:

- ◇ The needs of local entrepreneurs.
- ◇ The problems local entrepreneurs experience.
- ◇ Reasons for local SMME failures.
- ◇ The effectiveness of the present local development programmes.
- ◇ Cluster development of local firms in incubation programmes.
- ◇ Ways to improve the co-operation of local development programmes for a more effective and holistic development effort.

Some of these areas have been addressed in previous research. However, because new venture creation is such a dynamic process, especially with the local business environment continually changing at an ever increasing pace, it is important that the research is continually or periodically updated. This updated research will hopefully encourage local business developers and policy makers to adjust or develop new mechanisms and policies that will strive for the most effective and applicable assistance to SMMEs.

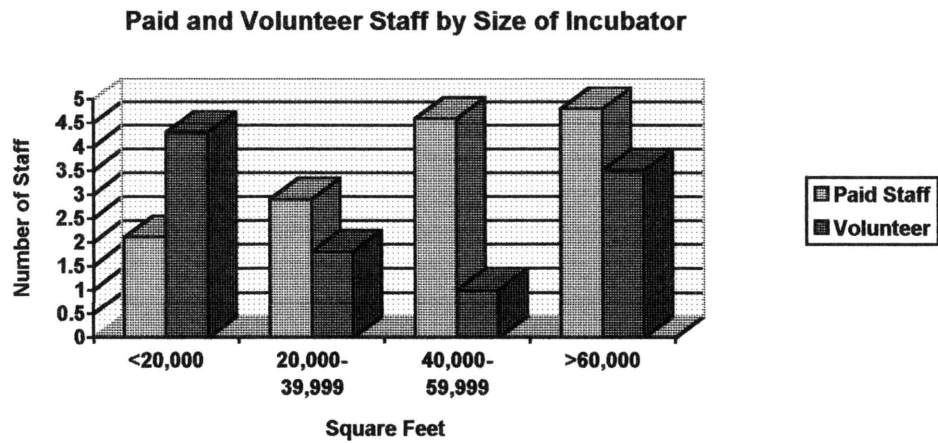
APPENDICES

APPENDIX A: RANKING OF SERVICES BY MANAGERS AND TENANTS

In an effort to determine if the services offered by incubators coincide with those considered important by the entrepreneurial tenants, Spitzer and Ford asked incubator tenants to rank 18 services normally associated with business incubators in order of importance ⁴³. This table summarises their findings, and is a clear indication of the importance that both tenants and incubator managers assign to favourable rental rates and terms.

SERVICES	Managers Median/Mode/N	Tenants Median/Mode/N
Office and manufacturing space at below-market rental rates	1/1/60	1/1/119
Short term, flexible leases	3/2/56	3/2/95
Modular office space	4/1/13	5/3/37
Shared secretarial services	4/3/43	5/2/74
Shared telephone answering service	4/4/44	3/3/89
Shared receptionist	5/5/41	4/3/79
Shared common areas	5/3/55	4/3/105
On-site consulting services	3/1/52	3/1/65
Access to network with external local business community	6/7/52	4/1/69
Access to external consulting services	5/8/47	5/5/52
Reduced rates on consulting services	8/9/29	5/2/39
Access to internal network, including other incubator tenants	6/6/46	5/2/74
Access to network with regional, national or international business community	6/3/16	4/2/21
Access to low cost, on-site laboratory facilities	10/10/10	4/3/15
Access to low cost, on-site storage, warehousing, and material handling facilities	5/1/11	5/8/30
Access to incubator-provided financing services	6/1/10	2/2/32
Access to incubator-provided markets	15/2/5	5/1/14
Access to incubator-provided supply sources	8/8/4	9/3/10

APPENDIX B: THE AVERAGE PAID AND VOLUNTEER STAFF BY SIZE OF US INCUBATORS ⁴⁷



APPENDIX C: DESIRABLE TRAITS OR ATTRIBUTES OF AN INCUBATOR MANAGER ¹.

- ◇ **Maturity:** providing direction and commanding respect, as well as possessing significant contacts in business, academia, and Government that can be used for the benefit of the incubator and its tenants/graduates;
- ◇ **Progressive:** accepting new business ideas and providing a driving enthusiasm;
- ◇ **Government experience:** understanding the political process, and the policies of government in support of SMME development;
- ◇ **Private sector experience:** providing an understanding of the dynamics of the market, and of the requirements for beginning and operating successful business;
- ◇ **Academic experience:** understanding issues related to advanced technology, and a knowledge of how to work with the faculty/administration at local universities and research institutes;
- ◇ **Corporate planning experience:** including development and analysis of business strategies, tactics and plans, and with an emphasis on finance and marketing;
- ◇ **Computer literacy:** with a knowledge of basic business software packages and office information systems;
- ◇ **Communication skills:** both in the interpersonal, and publicity senses.

APPENDIX D: PROBLEMS EXPERIENCED BY INCUBATORS ⁹²

Governance/Organisation & Management

- ◇ Lack of a “Champion” or core development team.
- ◇ No clear definition of the sponsors’ roles, responsibilities and aspirations for the project.
- ◇ Unclear understanding of personnel responsibilities.
- ◇ Under-estimation of complexity of running an incubator project.
- ◇ No integration of project into regional economic development plan.
- ◇ Cumbersome and sometimes overlapping board structures.
- ◇ Lack of knowledge of similar projects on a national level.
- ◇ Reluctance to use outsider advisors, NIH (Not invented here syndrome).

Market

- ◇ Inadequate budget to support ongoing, systematic marketing campaign.
- ◇ Presentation of idea of “Cheap rent” instead of quality business and technical support services as key drawing card.
- ◇ Confusing the concept of advertising with that of marketing.
- ◇ Failure to understand tenant companies’ needs.
- ◇ Insufficient analysis of local market conditions.
- ◇ Managers unfamiliar with real estate sales.
- ◇ Ineffective use of local “referral agents” (e.g. accountants, bankers and lawyers).
- ◇ Failure to enfranchise the local real estate companies.

Programme

- ◇ Inadequate budget for support programmes and lack of delivery on promised services (i.e. free typing or bookkeeping).
- ◇ Hiring of business support personnel with no entrepreneurial or start-up business experience.
- ◇ Undue reliance on “pro bono services” by service professionals.

- ◇ Unkept promises of financial support for individual companies.

Real Estate

- ◇ Substandard property in bad location.
- ◇ Under-estimation of fixed costs to run building.
- ◇ Site has severe environmental remediation problems.
- ◇ Building size insufficient to reach critical mass of tenants.
- ◇ Architectural redesign not geared to tenant start-up companies.
- ◇ Inappropriate mix of uses by tenant type.
- ◇ Unworkable traffic flows of interior spaces.
- ◇ Net leasable space too small a percentage of total space.
- ◇ Property subject to historical or landmark restrictions.

Finance

- ◇ Lack of diversified and ongoing approach to raising capital.
- ◇ No reality-based financial projections.
- ◇ Unsuccessful monitoring of cash flow.
- ◇ Lack of foresight regarding financial contingencies.
- ◇ Disagreement around project's need to break even.
- ◇ No provision for working capital funds for start-up or entrepreneurial tenants.
- ◇ Unrealistic assumptions regarding tenant absorption rates.

**APPENDIX E: TEMPORARY REMOVAL OF RESTRICTIONS ON
ECONOMIC ACTIVITIES ACT**

No. 7 Of 1986

To empower the State President to suspend temporarily laws or conditions, limitations or obligations thereunder or to grant temporary exemption from the provisions thereof, if in his opinion circumstances exist under which the application of or compliance with those laws, conditions, limitations or obligations unduly impedes economic development or competition in the economic field, or the creation of job opportunities; and to provide for incidental matters.

APPENDIX F: RECOMMENDATIONS MADE BY THE SBDC ON THE FUTURE DEVELOPMENT OF HIVES.

Location of future hives

The SBDC made the following recommendations to what should be considered with the establishment of future hives (in order of importance):

- I. The hive should be well located with regard to ease of access for suppliers of raw materials, sub-contracted items and customers.
- II. The requirements of the development of a hive should be carefully considered.
- III. The hive should have maximum exposure/visibility.
- IV. The hive should as far as possible be in a stable, secure area.
- V. If possible the hive should be on a “passing traffic” route.
- VI. Public transport availability for employees is considered desirable, but not essential.
- VII. Infrastructure should be available and the zoning of the property, if not correct, should not be problematical.

Design and construction of hives

The SBDC made the following recommendations to what should be considered with the establishment of future hives (in order of importance):

- I. Wherever possible, the hive should have a single floor level.
- II. The internal height of the building should be as low as possible, to keep the costs down and to increase the efficiency of the partitions.
- III. The space available should be optimised, and wherever possible the space used should exceed 70 percent of the total space available.
- IV. The facility should allow for maximum flexibility as to the number of entrances to the building. In general external entrances to individual hives is of great importance.
- V. The ease of traffic flow around the hive and the availability of parking for tenants and their visitors, as well as the provision of loading facilities is important.

Management of hives

The following recommendations were made to how the hives should be managed:

- I. Wherever possible, depending on the number of tenants and the size of the facility, each hive should have a full time manager with the talents to be able to be “all things to all tenants”.
- II. The number of additional staff should also be dependant on the number of tenants and the size of the facility.
- III. The hive manager should be carefully selected and trained to enable him to carry out his difficult functions.
- IV. The branch, within which area the hive is located, must provide support in administration and public relations.
- V. The hive must be able to offer a “one stop” service.
- VI. There must be interaction among hives.
- VII. A method must be devised to enable the hive management to be measured on results - the measurements must not only be based on financial results but also on factors such as: improved productivity, sub-contracting, etc.

Support services in hives

The hives are the formative business training ground of the emerging entrepreneur, and it is therefore essential that all the various SBDC support services be available and offered at the hives. It is also recommended by the SBDC that:

- I. The hive management be fully informed on the various financial packages available from the Corporation for the small and medium entrepreneur.
- II. Business advisors be allocated to hives to assist with the writing of loans in the hives.
- III. Sub-contracting be promoted in the hives.
- IV. Skilled mentors be appointed to assist the tenants with production, etc.
- V. Hive management promote the business courses offered by the training Institute.
- VI. Fully staffed information offices be established at as many hives as possible.

Recommendations were also made on the following topics and can be obtained from the SBDC: benchmarking the hives, sub-contracting in the hives, marketing of the hives and the tenants.

APPENDIX G: CONTACT INFORMATION

Cape Technikon

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Associate Director

Cape Technikon

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Capricorn Foundation

Dr. Faizel Mulla

Executive Co-ordinator

Capricorn Foundation

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Donald Jennings

Incubator Manager

CSIR - Pretoria

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CSIR Technology Development Incubator

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CSIR

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Stellenbosch Innovation Centre

Mr. Johan Malan

Innovation Centre Manager

Tel: (021) 4603151

APPENDIX H: QUESTIONNAIRE USED FOR SOUTH AFRICAN SURVEY
DETAILS OF RESPONDENT

1. Name of respondent		
2. Position in incubator		
3. Address		
		Code :
4. Telephone number	Area code :	
5. Fax number		
6. E-mail number		

ORIGIN OF INCUBATOR

1. When was the incubator established?	Month	Year
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2. Name of incubator / programme	
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3. Was a feasibility study done at the beginning?	Yes	No
--	-----	----

4. Objectives /goals /mission of incubator	Not at all	To a great extent
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	1	2	3	4	5
4.1 Economic development	1	2	3	4	5
4.2 Job creation	1	2	3	4	5
4.3 Community development	1	2	3	4	5
4.4 Industry development	1	2	3	4	5
4.5 Rural development	1	2	3	4	5
4.6 Neighbourhood development	1	2	3	4	5
4.7 Technology transfer	1	2	3	4	5
4.8 Small business assistance	1	2	3	4	5
4.9 Other (Please specify)	1	2	3	4	5

INCUBATOR DESIGN
1. Location of incubator

City centre	Industrial area
Suburb	Rural

1.1 Redevelopment sites	Yes	No
1.2 Large, vacant commercial sites	Yes	No
1.3 Military base / Defence industry conversion	Yes	No
1.4 Commercial office build-outs	Yes	No
1.5 Space vacated by down-sizing corporations	Yes	No
1.6 Other (please specify)		

INFRASTRUCTURE

Are the following facilities and services available to companies in the incubator?

2.1 Industrial area	Yes	No
2.2 Paved roads	Yes	No
2.3 Important high ways (near incubator)	Yes	No
2.4 Electricity	Yes	No
2.5 Waste disposal	Yes	No
2.6 International airport	Yes	No
2.7 Security	Yes	No
2.8 Loading dock	Yes	No
2.9 Free maintenance to building	Yes	No

3. Ability to expand / grow
Not at all
To a great extent

3.1 Incubator building	1	2	3	4	5
3.2 Companies inside incubator	1	2	3	4	5

4. Incubator building size

	m ²
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5. Space configuration	Open plan	Closed offices
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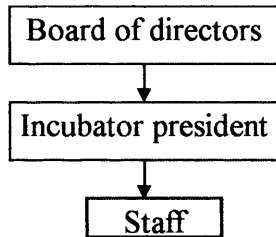
6. Common areas	1 Tea/Lunch room	2 Conference facilities
	3 Lab	4 Reception

7. Number of paid full-time staff employed by the incubator to assist companies

8. Acquisition terms of incubator building	1 Renting
	2 Buying
	3 Donation

GOVERNANCE OF INCUBATOR

1. Incubator structure :
(By way of illustration)



OPERATIONAL POLICIES OF INCUBATOR
1. Selection criteria required for new applicants
Not at all
To a great extent

	1	2	3	4	5
1.1 The completion of the application package	1	2	3	4	5
1.2 A complete business plan	1	2	3	4	5
1.3 Compatibility of the business with other tenants	1	2	3	4	5
1.4 Ability to pay for rent or services provided	1	2	3	4	5
1.5 Projected growth potential of the firm	1	2	3	4	5
1.6 Unique / Superior product	1	2	3	4	5
1.7 Marketing / managerial competence of founders	1	2	3	4	5
1.8 Value added to product	1	2	3	4	5
1.9 Market competitiveness	1	2	3	4	5
1.10 Other	1	2	3	4	5

2. Total number of companies supported in life span of incubator
Total number of companies that graduated in life span
Average graduation period of companies
Number of companies that failed during incubation period

3. What other time limits exists for support provided to the companies?

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4. Is the incubator evaluated periodically to determine the
Yes
No
successfulness?

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5. Success criterion of above evaluation
Not at all
To a great extent

	1	2	3	4	5
5.1 Number of graduating companies	1	2	3	4	5
5.2 Financial self-sustainability	1	2	3	4	5
5.3 Job creation	1	2	3	4	5
5.4 Fulfilment of incubator objectives	1	2	3	4	5

	Not at all		To a great extent		
	1	2	3	4	5
6. Does community support play a role?					
If so, in what way?					

7. **Clustering** is concerned with growth processes that arise from sectoral and geographical concentration of small firms. These firms may either be in direct competition with each other or linked in a vertical chain, e.g. a manufacturer linked with distributor linked with user. Such clustering opens up efficiency gains which individual small firms can rarely attain.

	Not at all		To a great extent		
	1	2	3	4	5
Is clustering supported in your incubator?					
If so, in what environment?	Businesses are part of cluster inside organisation		Businesses are part of external cluster		

FUNDING

1. Does the incubator aim to be self-sustainable?	Yes	No
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2. What sources of income exist for the incubator? Not at all To a great extent

	1	2	3	4	5
2.1 Government grants					
2.2 Private financial support					
2.3 Public financial support (donations)					
2.4 Local community support					
2.5 Rent received from tenants					
2.6 Equity received from successful companies					
2.7 Non-profit / University					
2.8 Other (please specify)					

3. Rent asked from companies for office space	Free	Below	Market	Above
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4. What financial support is provided to tenant companies? **Not at all** **To a great extent**

4.1 Operating funds	1	2	3	4	5
4.2 Seed capital	1	2	3	4	5
4.3 Expansion capital	1	2	3	4	5
4.4 Other (please specify)	1	2	3	4	5

5. Lease term flexibility to companies? **Not at all** **To a great extent**

1	2	3	4	5
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TARGET GROUPS FOR DEVELOPMENT

1. Are any specific market, industry or target groups addressed by the incubator? **Not at all** **To a great extent**

1.1 High technology companies	1	2	3	4	5
1.2 Low technology companies	1	2	3	4	5
1.3 Manufacturing companies	1	2	3	4	5
1.4 Service companies	1	2	3	4	5
1.5 Consulting companies	1	2	3	4	5
1.6 Retail and wholesale companies	1	2	3	4	5
1.7 Research and development	1	2	3	4	5
1.8 Black-owned or -controlled enterprises	1	2	3	4	5
1.9 Woman entrepreneurs	1	2	3	4	5
1.10 Youth self-employment	1	2	3	4	5
1.11 Small farmers	1	2	3	4	5
1.12 Small business exports	1	2	3	4	5
1.13 Tourism	1	2	3	4	5

TECHNOLOGY SOURCING AND TRANSFER
1. Technology transfer mechanisms
Not at all
To a great extent

1.1 University linkages	1	2	3	4	5
1.2 National research centre linkages	1	2	3	4	5
1.3 Industry linkages	1	2	3	4	5
1.4 Science councils	1	2	3	4	5
1.5 Other	1	2	3	4	5
(please specify)					

2. Are there any international linkages?

(Please specify)

Yes	No

3. How effective are these linkages / technology transfer mechanisms?
Not at all
To a great extent

1	2	3	4	5
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BUSINESS SERVICES PROVIDED
1. What services are provided to the companies?
Not at all
To a great extent

1.1 Information provision	1	2	3	4	5
1.2 Start-up counselling	1	2	3	4	5
1.3 Accounting / Bookkeeping / Tax	1	2	3	4	5
1.4 Marketing advice	1	2	3	4	5
1.5 Equipment rental	1	2	3	4	5
1.6 Fax	1	2	3	4	5
1.7 Photocopying	1	2	3	4	5
1.8 Receptionist	1	2	3	4	5
1.9 Typing	1	2	3	4	5
1.10 Word processing	1	2	3	4	5
1.11 Consulting services	1	2	3	4	5

APPENDICES

1.12 Legal assistance	1	2	3	4	5
1.13 Human resources	1	2	3	4	5
1.14 Management assistance	1	2	3	4	5
1.15 Advertising / Marketing of incubator	1	2	3	4	5
1.16 Office furniture	1	2	3	4	5
1.17 Employment assistance	1	2	3	4	5
1.18 R&D / product development	1	2	3	4	5
1.19 Lab equipment access	1	2	3	4	5
1.20 Financial management	1	2	3	4	5
1.21 Other (please specify)	1	2	3	4	5

2. Are any services provided to other SMMEs outside the organisation?

Yes	No
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Remarks

Any remarks or recommendation about the questionnaire or study would be appreciated, especially if you could provide us with addresses or telephone numbers of other relevant business development programmes (incubators) .

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