

UNESCO

UNISPAR

PROGRAMME

University-Industry
Science and Technology Partnership

*UNISPAR SERIES OF TOOLKITS ON
INNOVATION*

**Manual on
Technology
Business
Incubators**

Rustam Lalkaka

United Nations Educational, Scientific & Cultural Organization
Paris, 2000

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Preface

In today's increasingly knowledge-based and globalised societies, technological change and innovation have a pivotal role to play and are of strategic importance in reducing the widening gap between "haves" and "have-nots". This function of technological innovation in the development paradigm is of particular relevance to UNESCO, the "knowledge organization" of the United Nations system.

Whether "hi-tech", "low-tech" or a combination of both, innovative and well-adapted technology offers solutions that promote economic, social and human development. As the 1999 UNESCO-ICSU World Conference on Science underlined, innovation is especially important for developing countries and those in economic transition. There, the contribution of university research in the economic and social spheres can offer real leverage for development and should be enhanced. This process of university-industry cooperation is the aim of the UNESCO UNISPAR Programme.

UNISPAR has developed a series of "Toolkits" of information, learning and teaching materials. This series of Toolkits introduces and explores the topics of Innovation, Technology Business Incubators and Advisory Centres, Globalisation and Changing Work Organisation in Engineering and Technology, the Management of Maintenance and Gender Indicators for Engineering, Science and Technology.

I hope this UNISPAR Toolkit series on "Innovation for Development" will prove to be a useful tool. I invite potential partners and sponsors from government, inter-governmental organisations, NGOs and industry to co-operate with UNESCO in the development of workshops and follow-through activities making use of the materials published in this series.

Koïchiro Matsuura

Director General of UNESCO

Foreword

Technological change, including the commercialisation of R&D, innovation and diffusion of new and improved technology, is the main agent of industrial, economic and social development. Cooperation between universities, R&D institutions, industry and the private sector is vital in the innovation process. This is especially important with increasing globalisation, as emphasised at the UNESCO-ICSU World Conference on Science held in Budapest in 1999.

The overall goal of the UNESCO UNISPAR Programme is to promote university-industry partnership in engineering, science and technology. A current priority is the production of information, learning and teaching materials in an initial series of "Toolkits" focussing on "innovation for development". This series of UNISPAR Toolkits focuses on Innovation, Technology Business Incubators (the present Toolkit), Globalisation and Changing Work Organisation in Engineering and Technology, Technology Advisory Centres, Technology and the Management of Maintenance and Gender Indicators for Engineering, Science and Technology.

An increasing number of businesses develop from a technology base, and the successful application of technology, as hardware and software knowledge skills, is of crucial importance in business development. The main function of a "technology business incubator" is to support technology-based innovators in business establishment and development.

The UNISPAR Programme has published this Toolkit to address the need to raise awareness and provide information, learning-teaching material to share knowledge and experience on technology business incubators. The Toolkit is intended for people in the public and private sectors, tertiary and continuing education with an interest in the support and development of technology business incubators around the world, particularly in developing countries. Partners are invited to use and help develop the Toolkit.

Rustam Lalkaka deserves particular praise for his distinguished work with technology business incubators, and the production of this Toolkit.

Tony Marjoram

UNESCO UNISPAR Programme

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Introduction

This manual forms part of the UNESCO University-Industry Science Partnerships (UNISPAR) program to help develop and strengthen innovative university-business linkages for technology commercialization, enterprise creation and knowledge-based employment. Interest in business incubation has been growing rapidly since the last decade and many organizations are considering whether this type of service will assist in employment generation and regional economic development.

Small business development services and managed work spaces (such as incubators) are evolving as the rapid changes in computing and communications technologies as well as international trade regimes present new opportunities and pose enormous challenges for new venture creation. Technology Business Incubators (TBIs) have to be seen as one support mechanism which can complement other tools in the processes of linking universities to the business sector, creating enterprises in knowledge-based goods, and promoting economic development.

Purpose of manual

This manual is intended to guide planners, educators, sponsors and management teams in exploring this option and establishing a successful TBI program, where warranted, especially under the difficult conditions in industrializing countries. While a body of research on business incubation in general is growing, there is little yet that is specific to technology incubation, linked to technical universities, and in the developing country environment. Lessons have been learned, and planners can benefit by the experience of others and the mistakes they have made.

It presents good practices on a range of issues, to be adapted by the organizers with flexibility, to suit their own requirements, conditions and context. No manual can cover all eventualities or be a substitute for the experience of good managers who have a basic understanding of the art and craft of day-to-day operations, are continuously enhancing their skills by staying abreast of the literature, and participating actively in incubator associations and conferences.

The manual draws upon the experiences gained by the UN Fund for Science and Technology at UNDP, which initiated business incubation in developing nations starting in 1987, as well as by Business & Technology Development Strategies LLC, which has been involved in the establishment and management support of similar programs in some 25 countries.

Content

The manual contents cover a progression of TBI development in five parts:

One - Incubation Concepts places small and medium-scale enterprises and their support services in the overall framework (chapter 1), and outlines the characteristics, objectives, types and challenges of technology incubation systems (chapter 2).

Two - Planning covers the preparations, the feasibility analyses and business plans, the selection of location and design of facilities (chapters 3), followed by the financial analyses required and expected benefits (chapter 4).

Three - Implementing follows by defining the actions to start the establishment of the TBI and the organizational issues (chapter 5) and gives practical guidance on selecting tenant companies (chapter 6).

Four - Operating proposes measures for serving tenant companies through training, counseling and networking (chapter 7), as well as good management practices towards greater self-sustainability and a framework for assessing the performance (chapter 8).

Five - Learning from others presents a case study of TBIs in Brazil which points to some features for enhancing operations (chapter 9). The success factors and lessons learned are brought together in chapter 10.

A bibliography and annexes are included.

While incubation concepts appear simple, they are difficult to apply where entrepreneurship has been repressed and business infrastructure is inadequate. The text relates to incubation in general and to technology start-ups in particular. There is no fixed 'model' because the TBI has to be planned to suit local conditions, and as conditions differ, the systems vary widely.

Using the manual

This guidebook could be used as a practical reference to be consulted from time to time for guidance on the establishment and day to day operations of TBI programs. It may also serve as a training work-book. The text includes examples of how principles described have been applied in different contexts. At the end of each chapter a box summarizes the actions to be taken.

As the incubator program matures, its planners and managers will undoubtedly modify and add to the materials covered here based on their own experiences and local needs, be they university officials, private developers, community leaders or the small businesses themselves. They must all face the competitive environment with flexibility, new skills and structures.

Acknowledgements

The manual draws on work done by Business & Technology Development Strategies LLC, New York, in many countries together with colleagues Jack Bishop, Dinyar Lalkaka, Carl Tiedemann, Pier Abetti, Atul Wad, Daniel Shaffer, Richard Meyer and Frank Guinta.

The insights of the national experts in the industrializing countries with whom we have worked on incubation programs are gratefully acknowledged. Sincere thanks are due to Patricia Mascarehenas (Brazil), Adolfo Naranjo (Colombia), Yuan Huan, Zhang Chaoying and Luo Hui (China), Hussein El-Gammal, Hilmi Gabr, Ahmed Darwish, and Said Ghany (Egypt), SP Ranade (India), Harry Haryanto and Handoko (Indonesia), Sandra Glasgow (Jamaica), Zong-Tae Bae (Republic of Korea), Salleh Ismail and Annuar Saffar (Malaysia), Guillermo Fernandez de la Garcia and Laila Arechavala (Mexico), Krysztof Zasiadly (Poland), Simina Dragomirescu (Romania), Natalia Golaenko (Russia), Steven Park and Nich van Niekerk (South Africa), Omar Oz (Turkey), Eduardo Tarrago (Uruguay), and Khatam Khakimov (Uzbekistan).

Special mention should be made of Nessim Shallon, Henry Jackelen, Edmund Cain, Keith Hillyer, Khalid Malik and Johann Baumler of UNDP; Richard Kennedy, Zeyneb Taluy and Fabrizio Condorelli of UNIDO; Lorraine Ruffing of UNCTAD; Hassan Charif and Antoine Mansur of UN ESCWA, who helped in pioneering the incubator programs. Tony Marjoram conceived and guided this series of manuals at UNESCO-UNISPAR, Paris.

The review and comments on the draft manual by Jack Bishop, Lawrence Albertson, Dinyar Lalkaka and Daniel Shaffer are greatly appreciated.

Finally, I would like to record with gratitude the contributions of Rustam Jr and Cyrus Lalkaka who, at age 8 and 5 years respectively, built their own 'incubator' under their grandfather's desk, and of my wife, Phiroza Lalkaka, who abetted them (and aided me enormously).

Abbreviations and terms

BDS	Business Development Services
BTDS	Business & Technology Development Strategies LLC
BIC	Business Innovation Center
EBN	European Business Innovation Center Network
ED	Entrepreneurship Development
IP	Intellectual Property
NBIA	National Business Incubation Association
NGO	Non-Governmental Organization
OECD	Organization for Economic Cooperation and Development
SME	Small and Medium Enterprises
TBI	Technology Business Incubator
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNESCWA	United Nations Economic & Social Commission for West Asia
UNIDO	United Nations Industrial Development Organization
UNISPAR	University Industry Partnerships

In the manual, the term ‘member’ or ‘tenant’ is used for ventures in the incubator; ‘graduates’ are those who leave when they have out grown the space and services that the incubator offers; ‘terminating companies’ leave because they may fail to achieve their purpose, or merge with others, or have to exit for other reasons. ‘Affiliates’ are companies who work in their own premises and are served by the incubator on out-reach basis. ‘Anchor tenants’ are established organizations admitted to provide credibility and mentoring, while paying higher rents and not being required to leave the incubator.

As regards the term ‘incubator’, for some it implies that the members within are somewhat premature, incompetent, and therefore needing special care. Also, it is difficult to translate into some languages and ‘smells of chickens or hospitals’. Better nomenclature may be innovation center or enterprise center, although these too have special connotations. However, the name “incubator” has caught on in many developing countries, and is used in this manual. The Technology Business Incubator (TBI) denotes a facility providing nurturing services to entrepreneurial groups in technology-related ventures, to help them develop viable businesses.

Some form of technology enters practically all businesses today; for our purpose a technology or knowledge venture is one based on innovations being developed in state, university or corporate research laboratories, or

incrementally at the shop-floor, or importantly, in the creative minds of people in all walks of life.

Currency used is US\$ unless otherwise indicated.

Overview

Nurturing technology ventures under conditions of global change

This manual has the purpose of providing practical guidance on starting and running Technology Business Incubators (TBI). These are special purpose facilities in which selected start-up companies in knowledge-based products and services are nurtured till they can develop their products for entry in to markets.

Small businesses create the bulk of new jobs in all countries but they have high failure rates in the early years. The imperatives today are to provide targeted support to start and grow new ventures and create employment, in the face of globalization, rapid technological change and more open markets. For these reasons, the number of business incubators has expanded rapidly to about 2,000 world-wide, and growth is now faster in the developing and restructuring countries.

Depending on the local conditions and goals of the sponsors, incubators are designed to promote regional development, industrial sub-contracting, empowerment of hitherto disadvantaged communities, technological innovation and other objectives. The majority deal with mixed businesses while some – the TBIs – are focused on technology, broadly defined.

The main incubation characteristics are careful selection of entrepreneurial firms and focused counseling, training and networking on management, marketing, information and affordable workspace, together with access to outside service providers and finance, in one integrated package. This support comes from a small trained management team, under the overall guidance of a local Board of Directors. Another characteristic is that successful tenant-companies (and those not likely to succeed) should leave the incubator when they are successful and their needs of out-grow the incubator's capacity.

As technology businesses encounter severe problems in pursuing their innovations and mobilizing the needed technical, financial, personnel and other resources, the TBI facilities and services have to be tailored to their special needs. Supportive state policies and good technical infrastructure are the prime responsibilities of governments. While the bulk of initial finance is from the entrepreneur, family and friends, the subsequent debt and equity capital has to come from a financial system geared to these requirements.

Affiliation of the TBI to a knowledge-base such as a technical university or a research institute facilitates access to expertise and equipment. However, the cultures of academia and business are quite different, and both have to adjust to each other's aspirations and work patterns. The involvement of the private businesses as mentors and the linkage to a technology park can be very helpful.

A carefully designed and operated TBI has the potential of significant benefits for the entrepreneur in improving the chances of success, the university in enhancing its linkage to business and providing learning and income opportunities for faculty and students, the business sector in outsourcing supplies and investing in innovations, and for the state and community in terms of jobs, incomes, taxes and exports as well as the nation's transformation towards a knowledge society.

The key initial step is the preparation of a feasibility analysis and business plan, by a local team, supplemented if needed by external experience. The manual helps guide the preparatory process, comprising the identification of sponsors and objectives, the selection of location, the design of construction (or renovation) of the TBI building, and developing consensus among all stakeholders.

A critical component is the financial analysis, which estimates the investment and working capital to be mobilized and indicates the prospect of self-sustainability. In both industrial and developing countries, the initial finance is usually provided by city, state or federal government agencies; the prospective, however, is to raise incubator income through space rentals, services and other sources in order to cover expenses when the operations have stabilized, in say 5 years.

Based on experience in some 20 countries, the manual presents good operating practices for incubators, to be adapted to the local culture and context. A case study of two technology incubators in Brazil illustrates the organization structure, client base, services and strong state support needed. It also indicates a system for assessing the effectiveness, impact and sustainability of TBIs.

The pre-requisites for an incubation program and the determinants for success in its establishment are summarized below.

A. Pre-requisite factors

- 1. Focus the energy and resources of the TBI on developing the enterprises within it, utilizing networks of state, university and community support. New jobs and economic growth are created by the resident companies, not by the workspace itself. In some countries the tendency is to spend much effort on preparing perfect plans rather than on developing the***

human resources and providing real services for enhancing firm-level performance. Further, small enterprises and the affiliates outside can be enabled to learn from each other.

- 2. Manage the TBI as a business-like and demand-led enterprise, which progressively recovers significant proportions of its operating costs. The managers of services for entrepreneurs have to be entrepreneurial themselves. They must network with local professionals in creative ways and mentor the client-businesses. As in the industrial countries, government involvement is necessary to create the business infrastructure and provide initial funding. But corporate sponsors, regional and city agencies, universities and associations have to get involved, to help improve performance and move towards sustainability.*
- 3. The incubation services and structures offered must be based on local context and must be compatible with existing support programs. The development cooperation landscape is littered with remnants of programs which had limited outcomes and were not sustainable, as they did not build on the traditional knowledge and needs of the target tenants and the full involvement by the local sponsors.*
- 4. An outward looking service is forced by the competition to become more dynamic, more efficient. The skills and structures for domestic and international marketing are generally the most critical. Liberalizing markets require continuous innovation, and this happens best in an environment which encourages risk-taking.*

TBIs in many industrializing countries are reaching a level of maturity and can now benefit from linkages between incubator associations and tenants within and among countries. International organizations such as the UN system, donor agencies and development banks have catalytic roles to play.

B. Good practices for adaptation

- 1. Commit to the core principles of business incubation as the first step. In order to avoid misunderstandings and conflicts, core concepts must be clearly explained to all stakeholders and commitments obtained from carefully selected sponsors at the outset. Linkage to a technical university has clear advantages, but the problems arising from differences in cultures between academia and business must be resolved*
- 2. Prepare a feasibility study and then the business plan if warranted, to honestly assess all key issues and to decide whether the incubator is going to be effective and sustainable. In many countries, such analysis is incomplete (or information is biased, in order to “sell” the project and obtain funds). With consensus in – and ownership by – the community, the incubator programme has good chances of becoming financially sustainable. This also requires careful scrutiny of facilities and costs;*

the proper delegation and accountability of authority to managers; major efforts to mobilize state, donor and private sector support and possibly 'anchor tenants' (who can pay higher rents and also mentor the early-stage firms).

- 3. Recruit, train and properly remunerate the TBI management team, so that it is fully responsible (and accountable) for providing practical help to enable the companies grow. The incubator staff must be local, with understanding of the specific needs of the companies and the regional support network, and possess business skills. It should be continuously trained in good incubation practices and properly remunerated..*
- 4. Choose a location and building that will enable the incubator to generate sufficient revenues and support business incubation. The building should be of high quality, conveniently located and well equipped (telephone exchange, computers, copiers, faxes, satellite communications) in order to attract creative companies. Mistakes in selecting the most suited location and design of facilities tailored to the requirements of technology companies are expensive, and permanent. A marketing campaign is needed to promote the incubator-as-service-provider.*
- 5. Select companies that have the potential to grow and create jobs. The incubator manager must resist political pressure to recruit companies that do not meet agreed criteria. Business plans and the commitment, management, marketing competencies of the entrepreneurs should be rigorously evaluated. A business/technical advisory group can advise the manager to make sound selections, then to be endorsed by the Board.*
- 6. Customize the delivery of services and address development needs of each company. The tenants have varied needs and high expectations, particularly in the area of advice on markets and finance. The management team can be developed to provide some services in-house, supplemented by access to networks of mentors and professionals in the community. This is especially important under conditions of global change and the galloping pace of technological progress.*
- 7. Continuously evaluate and improve as the incubator progresses and needs change. Careful monitoring of progress should be done monthly by the incubator management and board, so that deviations from plan are promptly identified and corrected. For the purposes of assessing performance, quantifiable measures have to be set, the data collected continuously, and frank reviews undertaken.*

With the manual as guide, incubator planners and managers have the challenging tasks ahead of developing the support environment for

'technopreneurs', as we may call them, to transform their innovations in to successful ventures.

ONE – INCUBATION CONCEPTS

*There is nothing more difficult to take in hand,
more perilous to conduct, or more uncertain in its success,
than to take the lead in the introduction of a new order of things*

Nicolo Machiavelli

1. Venture creation in global context

The place of business incubation has to be examined in the overall framework of small enterprise creation mechanisms and support services under conditions of change. A salient feature of globalization is the extension of the international division of labor to specialization in different products of the production chain across regions. Corporations now operate through functionally integrated and geographically dispersed activities; out-sourcing of services and components enables them to optimize competitive advantage by mobilizing different production factors wherever available. This in turn offers expanding opportunities for modern, small enterprises which can anticipate – and organize – for change. It also is a challenge for planners and educators to restructure the learning systems to better equip their graduates to respond to the challenges of the new marketplace.

1.1 Nurturing business enterprises

In both industrial and developing countries – with the exception of the former socialist countries – micro, small and medium scale enterprises (those employing up to say 500 persons) have generally constituted the overwhelming bulk of total firms by number, contributing around one-third to one-half of gross national product and total employment. Entrepreneurial small companies with growth-oriented management can adapt faster to change, create new products and bring them to market swiftly, trim overheads, and supply the large corporations with low-cost, high-value services and goods.

Promoting growth-potential enterprises

Industrial country governments have intervened legislatively to provide better access by small enterprises to finance, technical and business services, fiscal incentives and markets. But in many countries of the developing world the small firms have generally lacked the capabilities to grow and compete due to a variety of internal and external constraints. Most emerging countries are characterized by a poor technical infrastructure, together with large agricultural and rural populations. Government-sponsored support mechanisms for the non-farm sector have generally lacked the needed flexibility, motivated personnel and political leadership. In most instances, national small enterprise development strategies do not exist, state policies are unfriendly and regulations are burdensome.

Further, international technical assistance projects and development loans have often been unsuccessful in leaving behind sustainable activities. Universities, research organizations, large corporations and their associations in these countries, have hitherto played no significant supporting role.

In the former socialist countries, the emphasis was on giant combines, to the neglect of small businesses. For instance, formerly in East Germany the employment in firms with under 500 employees was only 12 percent of total and in West Germany over 70 percent – with vastly different national wealth creation rates. Indeed, this neglect of self-owned small enterprise based on market signals may be considered a contributing factor in the sudden collapse of the command economies. Now changes are taking place rapidly, not only in central and eastern Europe but in China and central and south-east Asia as well. Even so, Russia is still lagging (1998) with the percentage of workers in firms with fewer than 100 employees still only 12 percent, compared to 61 percent in Poland, 67 percent in Hungary, and 74 percent in Italy (The New York Times, July 20, 1999).

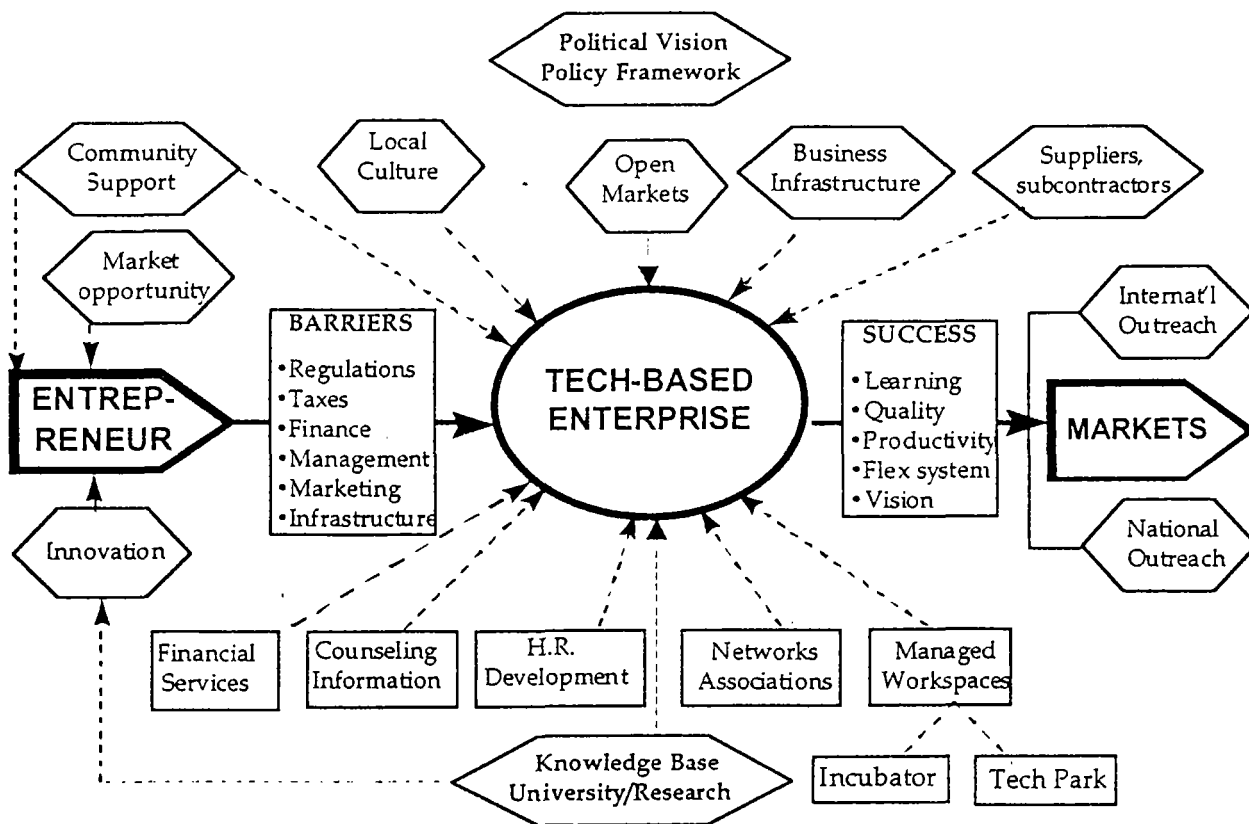
Given the need to reduce government expenditure budgets, privatize the state-owned enterprises, and generate the one billion new jobs needed by year 2005, the creation of modern, entrepreneurial enterprises can play a crucial role. At the same time, the micro and small enterprises, many in the informal sector, have a major role in utilizing local materials and skills to produce affordable products for community and regional markets. Their performance can be improved and the returns to labor augmented. The large, the small and the micro-businesses can develop side by side, in a symbiotic manner. All are needed, in their own special contexts.

The role of entrepreneurs

The business incubation process is primarily concerned with nurturing start-up and early-stage ventures; these begin with 2 or 3 persons but have a strong growth potential – companies which would become large in future but happen today to be small. On the Internet entrepreneurs making fortunes in Silicon Valley, Scott McNealy, chief executive of Sun Microsystems, writes: “As for the start-ups, the ones that will make it will be those that create goods and services that people want and are actually adding value to people’s lives. In other word, those that make a profit. ...If you don’t create value, you have a virtual company with virtual profits. A virtual competitor can easily blow you out of the water just as easily as you created your virtual value.” (The New York Times, July 5, 1999).

The starting force, then, is the entrepreneur, operating in a national and international environment, moving to overcome obstacles and create a successful knowledge-based business, Figure 1

Figure 1: Enterprise support system



As the agent of change and progress, the entrepreneur identifies a market opportunity and matches this with social or technical innovations in the form of products or services, then proceeds to prepare a strategic plan, mobilize resources and drive the business concept to realization.

The popular conception is that entrepreneurs are born, not made. Present experience indicates that entrepreneurial skills can in fact be identified and developed. The entrepreneur is typically an innovator who formulates new solutions to existing problems and stimulates others to participate in the venture. These aptitudes develop over time, often starting in childhood, as the person faces new challenges and learns from failure.

Principal sources of entrepreneurs for knowledge-based ventures are often the university and government research laboratories, the large industrial and military establishments, and professional service firms. Stimulants to become an entrepreneur include the need to be independent, create value, contribute to society, earn recognition, to become rich or, quite often, to not be unemployed.

It is noteworthy that the large U.S. Fortune 500 companies have lost five million jobs since 1980, but overall over 34 million jobs have been created. Small businesses (with under 500 employees) employ 53 percent of the private workforce, account for 47 percent of sales and 51 percent of private GDP. Interestingly, in 1996 small businesses created 1.6 million new jobs. Of these, the fastest growing firms (constituting 15 percent of total) accounted for 94 percent of net new job creation, and less than one-third of these firms are in high technology. (Global Entrepreneurship Monitor, 1999).

Why do entrepreneurship and innovation matter? According to the UK Government, "Entrepreneurship and innovation are central to the creative process and to promoting growth, increasing productivity and increasing jobs. Entrepreneurs sense opportunities and take risks in the face of uncertainty to open new markets, design products and develop innovative processes". (Our Competitive Future: Building the Knowledge Driven Economy, UK white paper, 1998)

The galloping pace of technical change

Breakthroughs in biotechnology, medicine, computing and space are taking place at a rapid pace. While the 19th century ushered in the telephone, electricity and automobile, this century has brought us near-costless and ubiquitous information flows, and complex organisms decoded and cloned. Our knowledge of inner and outer space is changing our understanding of the universe and our place in it. Computing and communications have the potential to help developing countries leap-frog in some fields; but it is also widening the gap between the knowledge-haves and have-nots, between countries and within them.

A dozen Newly Industrializing Countries now have the technical infrastructure and capacity for major innovation; and for many others, the advanced technologies – adapted, applied, and absorbed – can improve their lives. Some countries, however, need to strengthen their technical

infrastructure, education systems and scientific capabilities in order to leap-frog in to the new Internet and bio-sciences environment.

Signs of the Internets popularity are everywhere. In the U.S. traffic on the Internet is doubling every 100 days. Business to business commerce is expected to grow from \$8 billion (1997) to \$ 300 billion in five years.

How long will it take for the Internet and the Web to become big forces in the developing world? According to Dr Michael Dertouzos, director of the Laboratory for Computer Science at the Massachusetts Institute of Technology, "Bill (Gates of Microsoft) sees this expanding world of networking as an opportunity for poor people to sell their wares, get educated, participate in the world marketplace and pull themselves up from poverty. I see the exact same thing with a time scale of 15 years – and only if we help" (The New York Times July 6, 1999). That is, it would take half a generation, but it could be much faster. One may also ask: How long did it take personal computers and the World Wide Web to become ubiquitous in the U.S.? For PCs 16 years and for the World Wide Web only 4 years ("World in Figures," 1998, The Economist).

In the rush of 'technopreneurs' in the U.S. to start an Internet venture and make a fortune through a public stock offering, many do not make it. For instance, out of 1,000 proposals seen by a venture capitalist, typically 10 may be funded; of these, 2 will be stock market successes, 3 sold at modest profits, and the rest fail.

Many TBIs the world over have large numbers of software and media companies, which are being facilitated by incubation. But this only touches the fringe of the venture creation phenomenon, and surely the vast majority of ventures are started without the intervention of incubators.

1.2 Key constraints in emerging economies

The tasks to be handled by a business enterprise and its needs become more sophisticated as it moves forward from concept to commercialization. Some key constraints encountered in developing countries are as follows:

Entrepreneurship: An entrepreneurial culture lies dormant in many societies. Here, a distinction may be drawn between the successful proprietor of a small family business and the innovator-entrepreneur who can bring together various resources to develop an enterprise of significant scale. Such businesses can best be grown in a culture which supports risk taking and attendant failure.

Indeed, a characteristic of a market economy is allowing failures to happen, rather than sustaining them artificially as in other systems. The market economy encourages the team work necessary to expand, and is focused firmly on the potential inherent in the future. To the extent that the

secrecy and distrust of closed systems and the lack of concern with quality and competitiveness exist, the blooming of entrepreneurial talent will be constrained.

It is not surprising that developing country nationals, who learn to overcome bureaucratic obstacles at home, flourish as immigrant entrepreneurs abroad when cultural constraints are removed. It is also worth noting that in the US, the stronghold of immigrant entrepreneurs, 80 percent of all millionaires are first generation. At a given time, three million people are starting their own businesses, more than are becoming married and more than are having children!

Financing: A critical constraint is access to medium-term investment and short-term working capital. The costs of money are often very high, with interest rates of more than 50 per cent. The traditional banking system is usually unwilling or ill-equipped to incur the costs and risks of credit to small businesses with no collateral, or unable to appraise the complex business plans of a technological venture. Risk finance through angel networks or venture capitalists is practically unavailable.

Bureaucracy: There are often pervasive regulatory and legal hurdles, interpreted by an entrenched bureaucratic system, which result in many extra months and much unnecessary expenditure. Problems are compounded by high tax rates, restrictive import/export regimes, currency exchange restrictions, environmental regulations and corruption.

Property rights and related legislation are poorly defined in some countries. So, while buildings are vacant, it is extremely difficult to get possession for starting businesses due to the uncertain legal basis for ownership of land and buildings.

Technology enterprise promotion strategy: State interventions to control SMEs are plentiful, but there are seldom explicit national policies to promote them, or adequate policy instruments to provide effective support, incentives and markets. Small enterprises with their limited financial and human resources often cannot access the management skills, trade information and technologies appropriate to their needs.

Enterprise management and marketing: Businesses of any scale require a variety of skills to compete effectively in today's fast-changing, more open markets. Competition may come from subsidized state companies and from international multinational corporations. In such environments, managers themselves have to adopt decentralized, 'guerrilla' tactics.

Such managerial skills begin with the ability to identify feasible projects and access information, prepare fundable business plans, acquire the appropriate technologies, and continues through the range of functions from marketing and finance to production.

Business infrastructure and support services: The absence of a strong service sector of professionals (accountants, attorneys and consultants) and basic telecommunications facilities hamper business growth. While many entrepreneurs do start by using only their own capabilities, others can be facilitated by services offering counseling, training, information, and marketing.

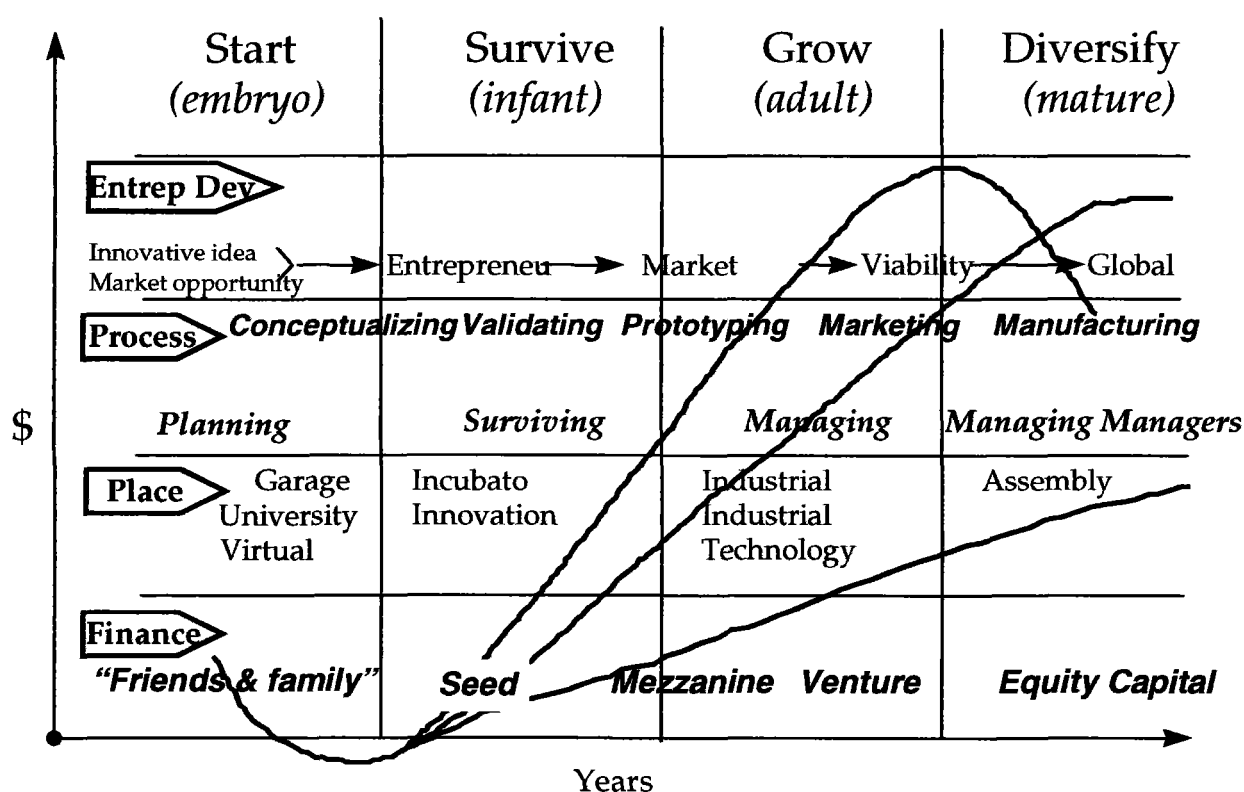
Other constraints to entrepreneurial success include the lack of market data, imperfect capital markets, poor accounting and rudimentary distribution systems.

Stages of business development

The mix of services needed changes as the entrepreneur plans and starts a business, struggles to succeed, begins to manufacture and market products, and then follows a trajectory of growth (or of decline). The process and place of business may change together with the financing sources. A tiny proportion of these ventures should grow exponentially, the bulk would experience lesser growth, and many will fail,

Figure 2.

Figure 2: Venture creation and growth



Service information -----
 needs entrepreneurship training -----
 research, costing, prototyping, -----
 market analyses, process/equipment selection -----
 business management, marketing, IPR -----
 quality, production engineering, factory

planning

special training, financial management.
 interactions with foreign buyers

As the product development cycle moves from concept to full-scale production, the level of skills needed and the capital requirements increase significantly. The focus of the enterprise shifts from planning and surviving to managing, and then to managing managers. As it makes the transition from the "first crisis of leadership" to the "second of autonomy", the chief executive officer has to change from the role of promoter to entrepreneurial manager and to enlist the needed skills.

The incubators contribution takes place by reducing the gestation time and costs at the cusp, before the business transits from negative to positive cash flow.

If the venture progresses from start-up through its early stages to growth and maturity, its staff and sales also rise. When, and if, it crosses the

threshold of say 20 employees and commensurate annual turnover, it is becoming a 'modern' medium-sized undertaking. Its chances of surviving the crisis of exponential expansion (top curve) are better if growth is evolutionary (middle curve). And some 'lifestyle businesses' may prefer to grow more slowly or not at all (lower curve).

Following a biological analogy, a venture progresses from an idea (conception) to early-stage (embryo), a physical product (child), the learning and testing (adolescent) and entry to market (adult). Continuing, the business will disappear unless it is reinvigorated with fresh ideas and a new product line.

1.3 Business development services

The rapid progress in computing and communications, together with more liberal trade regimes, are forcing large companies to become leaner through enhanced productivity, outsourcing and mergers while requiring small companies to mimic the large through strategic alliances and electronic commerce.

But the new technologies do not necessarily make the tasks of small business survival and success any easier. Indeed, the causes of failure (poor planning, under-capitalization, inadequate management and marketing skills, inattention to quality and service, low firm-level productivity) are being accentuated. For governments and donor agencies, the continuing challenge is to develop innovative, cost-effective support systems to help small firms become technically efficient and competitive. There is yet no consensus on 'best practices', and some debate on the proportion of net state subsidy that may be justified for business development services (BDS) support to small enterprises.

Changing approaches to supporting small businesses

In countries transiting from the legacy of a command to a more open market economy, the process of structural reform is less than ten years old and is quite painful. New forms of support for self-owned venture creation are helping to leverage more supportive policies, while reducing gestation periods and costs.

Culture provides a strong bias towards some types of business practices (such as industrial clustering) and support services (such as vouchers). The earlier dominance of government-established small enterprise support centers is giving way to public-private partnerships such as Enterprise Africa and SEBRAE in Brazil, and to the fuller involvement of banks as with the Small Industry Development Bank in India.

BDS mechanisms in industrializing countries are under pressure to become financially self-supporting as governments (and donors) have diminishing

resources. In the better-endowed OECD countries, SMEs do receive significant state support. For instance, in the U.S., the Small Business Development Centers and the Small Business Innovation Research program are government funded.

There is less debate today on defining micro, small and large firms by investment levels or the number of employees, with the realization that the survivalist, the bold and the bountiful all have roles and must work in synergy. The informal businesses now have enthusiastic support from micro-credit agencies for creating livelihoods while the mega-corporations have the resources and access to find their own salvation. This leaves the small enterprises in the “hollow middle”. The service providers need to target the modern small enterprises which have the entrepreneurial energy to grow in sales at rates of 20 - 40 percent a year.

Recent experience confirms that: services should be market-led and business-like; donors and governments should increasingly support the development of the market for services (not the service providers) and should empower the customers to choose the preferred, accredited provider; and the BDS system selected should be proactively evaluated and monitored based on agreed measures and methodologies.

Business incubation has evolved from the experiences of earlier small business support systems, attempting to link affordable work space to focused counseling, training, information as well as to external networks, university capabilities and finance.

ACTION POINTS

The creation of knowledge-based enterprises gives the opportunity for some industrializing countries to participate in globalization; for many, however, who do not yet have the structures and skills for competitive performance, there are enormous challenges in overcoming the obstacles to starting and growing a business. Towards meeting these challenges:

- Governments, business and civil society need to establish effective small business development services which are business-like, start with the needs of small ventures and are designed for effectiveness, impact, outreach to large numbers, and progressive self-sustainability,
- Technological entrepreneurship and innovation do not just happen. They have to be nurtured through major investments in technical education and research, supportive policies and legislation, and good business infrastructure.
- The corporate sector has the primary responsibilities for the careful acquisition, adaptation, improvement and development of technologies for products, services and processes appropriate to local context and culture,
- Public-private partnerships, with strong linkages to academia, are an appropriate means of achieving competitive advantage, raising quality, lowering costs and reaching outward to international markets.

Countries now called 'developing', but which once in earlier times were at the forefront of technological innovation, have to radically re-think their strategic plans, develop the skills needed and build new structures, if they are to survive and thrive under conditions of globalization.

2. Technology business incubation

Among the new approaches being used to foster modern enterprises (which are almost always in the private sector), the business incubation modality is now giving encouraging results. Evolved from the earlier business services, it now provides a platform for the convergence of development support. In 1999 over 2,000 incubators are in operation world-wide, mainly in the United States and Europe, with about 500 incubators now in the developing and former socialist countries.

2.1 Essential design characteristics

In relatively advanced industrializing countries the focus should shift progressively towards developing commercial applications of products and services in frontier fields such as biotechnology, information technology, advanced materials and robotics. The technopreneur anywhere has the challenge of moving a concept through the prototype and production phase to meet market needs at a price consistent with the value created and with the ability of customers to pay. Equally important, the market itself has to be developed and sustained. It is not enough to be first with a better product if one does not have the skills to educate and reach potential buyers.

Technology-based enterprises

Definitions of high technology industry or enterprise have been based on R & D expenditures of say 5 percent + of annual sales or a high proportion of Ph.Ds in the work force. But these are not very relevant today when innovations spring from creative minds and college drop-outs become multi-millionaires. A friendlier, more-encompassing term is the knowledge society, based on ethical values and the welfare of humanity. When relating specifically to a product or process, a technology based enterprise is considered an appropriate usage.

Technology-based enterprises have unique characteristics that require special attention:

- Being knowledge intensive, they need linkages to technical universities and research complexes, and access to faculty, graduate students, scientific facilities, technical information and the creative ambiance,***
- They can benefit by technology transfer arrangements on equitable terms,***

- **Proprietary know-how imposes discipline requiring legislation and compliance,**
- **The variety of biotechnology, computer software and microelectronics applications is accelerating rapidly; this calls for agile, risk-taking actions,**
- **Linkages are essential to networks of specialized service providers, lawyers, researchers, technology consultants and financial restructuring specialists;**
- **Finance requirements are high and may involve higher risk levels,**
- **A culture that encourages risk-taking certainly helps sustain scientific research efforts whose outcomes are not predictable,**
- **Tech-ventures need to draw upon experienced professionals and a skilled work force,**
- **Encouragement from the city, state and national governments is required in the form of simpler regulations, fiscal incentives and technical infrastructure,**
- **Development costs and time can be reduced by well-prepared inter-country collaborations and strategic alliances, and**
- **Technology projects may have widespread social and economic implications as well as environmental impacts, negative as well as potentially positive.**

The technology business incubator (TBI)

The TBI, a variant of the business incubator, has the purpose of enterprise creation focused on technology based ventures, broadly defined. Essentially, the TBI is an environment with a small management staff that provides the physical space, shared facilities, counseling, training and information specific to selected technology ventures, with access to university research, finance and technical support services in one integrated and affordable package. Such caring and sharing have been shown to facilitate business start-ups by reducing initial costs and delays, and to diminish the chances of failure at a fledgling enterprise. Some 25 percent of all U.S. incubators have a technology focus and another 9 percent are targeted to a specific sector such as software.

Incubators in general present seeming contradictions:

The incubator has elements of public good and private gain,

Tenants within a facility may compete and also benefit by cooperation,

When they become successful and comfortable, they are required to leave,

Initial state support is essential but state intervention is to be avoided.

Main features of the TBI include the careful selection of prospective entrepreneur- tenants; assistance in preparing business plans and accessing seed capital; training in small business management skills; and after a reasonable incubation period, the 'graduation' of successful businesses from the incubator, making space available for new tenants. While in industrial countries the graduating company is not usually serviced by the incubator, in developing countries a system of continuing assistance may be needed.

An important requirement is that the business incubator should itself be run as a business, with the perspective of becoming self-supporting when operations are fully established. Initial support, however, is almost always provided by state and city authorities, for instance, in the form of a low-rent (or no-rent) building and some operating expenses. There are, however, a number of privately-financed, for-profit incubators.

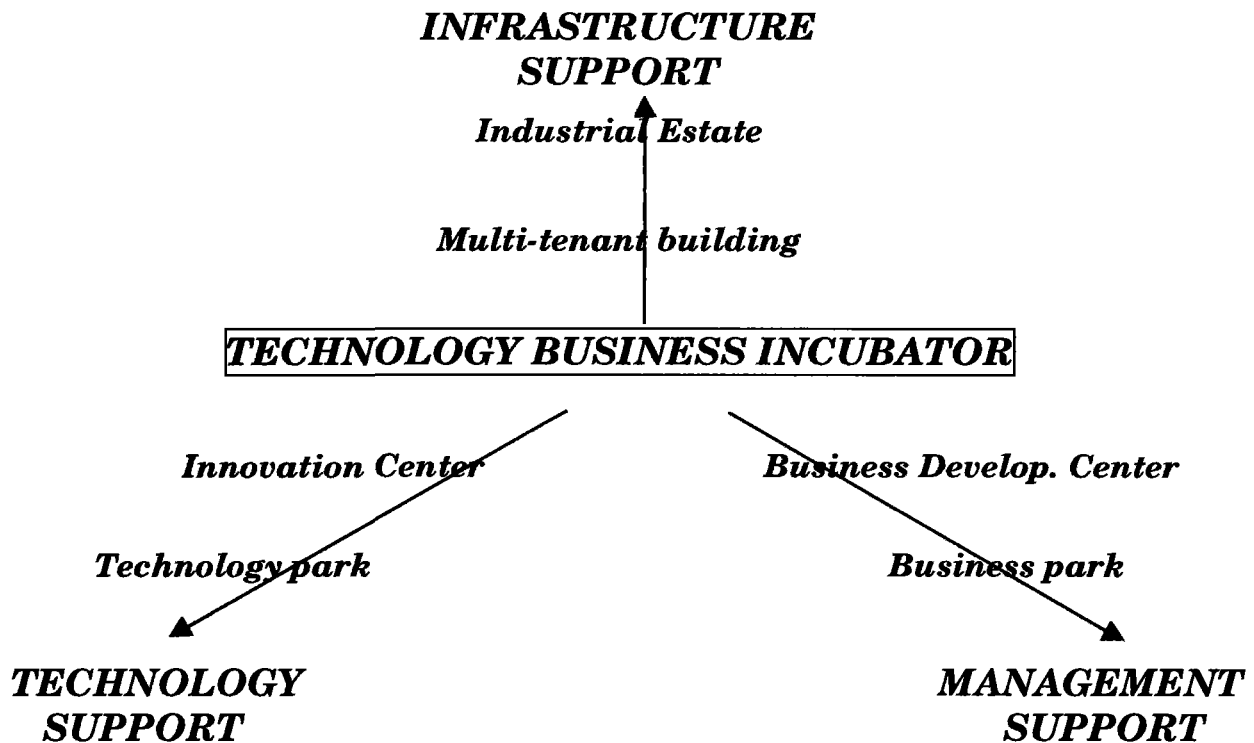
The TBI is usually linked to a technical university, research laboratory or technology park. It is service oriented and depends upon the use of equipment, libraries and facilities from the university/laboratory linkage, as well as professional services from an informal network of community supporters.

Export processing zones, industrial estates and technology parks are longer-term, large-scale real estate developments which first started in the 1970s. Then, in the early 1980s, the business incubator concept was developed as a micro-environment for nurturing early-stage businesses. It is possible and desirable to place the TBI adjacent to an existing technology or industrial park in order that the incubator tenants can benefit by synergies with other park members and by the credibility of the park. Further, graduating tenants can move to a bigger space in the park.

As seen in

Figure 4, there is an outward progression of work spaces along the three axes of infrastructure, management and technology support. When development along all axes matures and the circle is complete, you could have a 'technopolis', 'science city', or a new-age transnational S & T community.

Figure 3: The constellation of innovation/enterprise support



TBI characteristics

The distinguishing characteristics of the incubator can be summarized as follows:

- **a managed work space providing shared facilities, focused advisory services, and interaction among tenants, available frequently on short-notice and with the requirement for neither demonstrated financial resources nor a long-term commitment;**
- **small management teams with core competencies to provide early diagnosis and treatment or referral through a wide network of professionals and friends in the local community;**
- **careful selection of start-up groups as incubator tenants, and their nurturing and growth. The selection and focused help, of course, account for a better survival rate (two or three times greater for incubated businesses compared to those outside the incubator);**
- **flexible exit policies usually requires that the business 'graduates' when the scale of operations, staff and sales have expanded to a point when the space and service requirements go beyond the incubator's capacity, usually after 2 to 3 years, or even longer for tech-companies, or when the business does not portend success;**

- ***the business incubator itself should run as a business, with the perspective of becoming self-supporting when operations are well established.***
 - ***initial support is provided by the government, universities or other sponsors, in the form of a low (or no) rent vacant building and operating subsidies, until rents and fees from tenants grow to match operating expenses. In fact, however, many continue on net subsidy, and the support provider sees this as an investment in the social infrastructure while also deriving some tax, foreign investment, culture change and other benefits;***
- ***in addition, outreach assistance is provided to affiliate businesses in their own premises; but, if the TBI has no tenants within its walls to benefit by interaction and focused attention, then it is like a small business development center and lacks the defining features of an incubator.***

Typically, in US incubators 60 percent are tenants, 34 percent affiliates, and 7 percent anchor tenants (NBIA Tenth Anniversary Survey).

Incubator benefits

For the affiliated university, the TBI offers opportunities to build firms led by local faculty, scientists and engineers while enabling society to reap the rewards from investment in local universities and research institutes. The incubator also provides employment opportunities – part-time and full-time – for university students and graduates.

For the start-up venture, the incubator offers the promise of creating a new business at higher survival rate, with reduced duration and costs.

For the community, these businesses stimulate economic activity, with collateral growth of suppliers and customers. Significant tertiary effects come from the incubator playing a catalytic role in developing entrepreneurial skills, modifying the culture of university - research - industry relations, and influencing national policies toward small businesses.

For the state, the TBI is a demonstration of its commitment to promote employment, technology commercialization, regional development and exports, while securing returns as corporate and personal taxes which are typically many times the net subsidy. In addition to the say 20 surviving businesses with over 200 workers within the incubator, the real benefit to the state and community comes from the companies that leave and grow (some at rates of 20-30 percent per year). While employment creation is usually a desired objective, the TBI essentially creates enterprises, some of which may grow exponentially to create jobs and wealth, and some will fail.

2.2 Incubator sponsors, objectives and types

The incubation system is remarkably flexible and serves a variety of purposes and stakeholders. Depending on the predilections of the leading sponsors, it can be designed to meet specific objectives, based on needs and conditions, Figure 6.

Figure 6: Business incubator sponsors and purposes

Objectives

<i>Productive Investment</i>	<i>Self Employment</i>	<i>Industrial Sub-contracting</i>	<i>R&D Utilization</i>	<i>Regional Development</i>
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Sponsor:

<i>Private Enterprise</i>	<i>University Research</i>	<i>National Government</i>	<i>Local Government</i>
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University Research

Technology Park

Small

Entrepreneurs → *Business Incubator* → *Successful Business*

Industrial Park

Rural Community

Type:

<i>Modified Classic</i>	<i>Incubator without Walls</i>	<i>Expatriate Nationals</i>	<i>Rural Incubator</i>	<i>International & Export</i>
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Coverage:

<i>Start-ups Early-stage</i>	<i>Expansion / Diversification</i>	<i>Research / Services</i>	<i>Consulting Distributing</i>
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Incubator objectives

The primary purposes of an incubation center are to help new businesses succeed and thereby create wealth and employment opportunities. Incubators also help their tenants overcome the bottlenecks and regulatory hurdles to rapid business formation by facilitating the start-up process and through access to a community support network. The social purposes are to foster an entrepreneurial culture and increase the participation of indigenous entrepreneurs in the national economy, including youth, women and other special groups.

Specific objectives, depending upon the incubator's focus, may include:

Technological innovation through interaction with universities and research complexes, for initiating innovative products and services to domestic and export markets (as in Turkey and Brazil).

Regional development by decentralizing economic activity away from urban concentrations, mobilizing local resources and enabling informal businesses to move into the formal sector. Rural incubators, many focused on agri-business, are of special interest in developing countries (as in Indonesia).

Industrial sub-contracting by linking up with industrial estates, facilitating the downsizing/privatization of conglomerates, providing specialist components to them and opportunities for "spin-offs".

International out-reach by helping foreign companies to quickly enter the domestic market with local partners, or use the incubator as a base to export to third country markets (as in China).

Targeted development of special groups such as artists, or culinary specialists, agri-businesses, expatriate nationals (as in China) or new immigrants (in Israel),

Empowerment of women (as in Samarkand/Uzbekistan and Volkhov/Russia), or of disadvantaged communities (as in South Africa and Palestine Territories.).

Spatial configurations

To achieve the above objectives, a variety of incubator arrangements are being used and, of course, they need not be called "incubators". Most prevalent is the full-service incubator providing a broad range of assistance to start-up business within its premises while utilizing the hardware facilities and other resources in neighboring community. Virtual incubator helps nurture start-up businesses in existing laboratories or work spaces, until such time as they can move to a proper incubator.

The open incubator has no physical residential requirements, and serves firms 'in situ' on out-reach basis. In developing countries, culture and conditions require a high proportion of rural and town businesses to be home-based. As noted, most incubators today serve both tenants within their walls as well as affiliates outside, to assist a much larger clientele. At times, a start can be made as an open incubator to assess the market and culture, then move to a renovated building, and then construct a custom-built facility.

Local conditions may call for a hub or central incubator with satellites. One management group serving multiple sites has the advantages of utilizing the experience to save costs and time, serving larger numbers of clients with complementary service staff. This configuration, however, requires a strong core management team.

Internal incubator may be promoted by a large conglomerate which wants to spin-off new ventures, or is down-sizing, or wants to give teams full flexibility to develop a new product, or to create intrapreneurial suppliers who will work in symbiosis with it.

Incubator types

The different incubation modes include:

TBIs with Research/University Linkages: While in the U.S. only one-third of incubators have a technology focus, in many developing countries the university-linked technology-business incubator is predominant. In China, Mexico, Czech Republic, Indonesia, and Turkey incubators have university affiliations and technology commercialization objectives. This may be due as much to recent public perceptions of the image of technology, as to the disappointment at traditional means of transforming research to marketable products. Such linkages provide a means for university faculty, researchers and graduate students to become entrepreneurs, utilizing technical capabilities to meet needs/opportunities.

Single-sector TBIs, such as biotechnology or software. Often a good course is to start with mixed tenants, until the orientation of local entrepreneurs is discernible. India has made good progress in computer software, with dynamism by private business and international partners. It has also had focused state support including Software Technology Parks with characteristics of technology incubators, Box 1.

Some such sectoral incubators are being called industrial clusters. A cluster typically is an agglomeration of firms which come together in a town or district due to locational advantages, cooperate and compete, specializing flexibly in some component of the supply chain. Later, a city or other agencies may come in to strengthen some cooperative functions.

State or Regional Development: Such an incubator would seem appropriate in many developing country situations, particular if it can focus on local resources, such as agribusiness, light engineering, and special artisanal skills primarily for regional markets and with potential for going even further afield. In practice, it has often been difficult to find good institutional bases or the entrepreneurial framework for rural development incubators.

Public / Private Partnerships: Given the technical infrastructure of an urban environment or an industrial estate, large enterprises can be linked to the development of small businesses as vendors for components and services. Generally, the private sector will participate in the incubation process only after the state has financed the establishment and initial operations. There are notable exceptions, such as the Federation of Industry Sao Paulo (FIESP) which has mobilized its own resources to run a dozen incubators.

Box 1: Software technology parks in India

India is moving to catch up with its neighbors in the field of science parks, focusing on information technology for export and domestic markets. Currently India's software industry employs over 150,000 people and produce sales of over US\$ 2.5 billion (1996), a 10-fold increase in a decade. Exports exceed \$ 2 billion and are growing at 45 percent a year, mostly to the U.S. and mainly as end-user application products and services. The Y2K conversion work has generated considerable additional income in 1997-1999. Yet, this output is minuscule in the context of the current world software market of \$400 billion. Current constraints in India are skilled personnel and finance. This sector alone needs over \$ 500 million of risk money and several US venture capital companies have expressed interest.

A significant initiative of the Department of Electronics is the Software Technology Parks of India (STPI) to help strengthen the "India - Software Advantage". For out-sourcing software, these advantages include:

- **Large, English-speaking personnel pool, with technical and management skills;**
- **State-of-the-art technologies and equipment, significantly lower development costs;**
- **Quality assurance levels, ISO 9000 certification and copyright protection;**
- **High speed datacom links and time advantage for 24-hour development.**

STPI is an autonomous society for promoting the establishment of software centers by private, public or 100 percent owned foreign agencies. Through "single-point contact" for all regulatory functions, the sponsor can get duty-free imports of equipment, custom-bonded warehouses for materials, income-tax exemptions for five years, full repatriation of know-how fees and royalties, and other facilities, in order to develop and export software (domestic sale need only be 25 percent of software exported). STPI has set up Parks at Bangalore, Pune, Bhubaneshwar, Hyderabad, Noida/Delhi, Gandhinagar and Trivandrum, while some state governments have their own schemes. In addition, Export Processing Zones are established at seven port cities, essentially for software exports. At these places, reliable high speed data communication infrastructure has been created for executing off-shore projects, remote computing, software development and maintenance.

Another program is S&T Entrepreneurship Parks (STEPs), located at a dozen technical universities, which assist graduating students with workshops to become self-employed.

Private for profit incubators have yet to emerge in developing countries although there are some elsewhere (about 10 percent of total in the US). The potential exists to create innovative partnerships that match large enterprise needs for new growth opportunities with the needs of small

enterprises for customers and financing. An example is the Lexington Business Center in Elkhart, Indiana, USA.

International Business Incubators: Such a facility focuses on international collaborations, both financial and technological, to facilitate the entry of small foreign businesses, including returned expatriates, into local markets. A complementary program may support the export of local manufactures. A major International Business Incubator Program is being developed in China, Box 4.

Services

The rationale of incubation is to provide services and facilities which add value to selected firms at affordable costs, in order to help them survive and grow. The services generally offered include:

- **affordable space, on flexible leases**
- **shared facilities such as receptionist, conference room, office equipment**
- **business planning, accounting and legal advisory services**
- **training in small business management and marketing**
- **out-reach counseling/training for businesses outside**
- **access to university faculty, facilities, students. And its university**
- **trade/technology information services**
- **linkages to international/national support groups**
- **facilitation in securing seed capital.**

Some of the above services are included in the rent paid for space. Electricity, telecommunications and use of university facilities may be charged on a cost-recovery basis, while counseling, training and special services may require payment of fees.

Developing and offering business profiles

The entrepreneur-group should normally come to the incubator with its own innovation to be developed into a business. In some situations where entrepreneurial energies have been long repressed, as in Arab states which have depended on oil revenues and expatriate workers, or some of the CIS countries, there is interest in the incubator itself identifying and offering “model” business opportunities. A person contemplating the start of a business can then draw from such a bank of project profiles, possibly at the end of a training program.

The concept of some authority telling a person what product (s)he should produce smacks of a command economy, with its unfortunate consequences. But there is persistent interest in such a ‘business ideas bank’, and it could serve a purpose when the products/projects are properly identified through market surveys, implemented with involvement of the potential

entrepreneur, and supported with continuing technical services. Clearly, the business profile (with basic information on product, process, inputs, investment and operating costs) is not a substitute for a proper business plan to be prepared by the entrepreneurs themselves based on actual market conditions.

Such an approach seems to work well for low-cost, rural, business development in India and South Africa, based on local needs, raw materials and skills. A variant of “franchising-type” operations could also be envisaged, where franchisors of well-developed local products and services, provide these to local franchisees, in such activities as construction materials, agri-businesses, and repair shops.

2.3 Linkages to universities and technology parks

Role of the university

The TBI could be university-related but not university administered or controlled. The outlook of university administrators is often technical, bureaucratic or political, seldom entrepreneurial. When the university is willing to provide a vacant space for the incubator and cover some of its costs, it is not easy for the incubator board and manager to fend off attempts at interference in operations. The professors may see the incubator tenants as sources of consulting income and business experience as well as opportunities for graduate students to write dissertations and earn some money. The incubator tenants may not be fully aware of the faculty’s strengths or potential for technology transfer.

The major disconnects between the cultures of academia and of enterprises are:

Time-cycles: Most professors and students are driven by the academic schedule and by longer cycles such as student graduation or getting tenure or sabbaticals. By contrast, entrepreneurs need to respond to the cycles of the markets being targeted.

Urgency: At the university, schedules may relate to preparing final exams, whereas for business this means meeting payroll and delivering products to meet dead lines.

Institutional accounting vs enterprise accounting: For university administrators the incentive is to spend what is in their budget, or lose it. Success for those who do not need to generate income to cover expenses is a bigger budget allocation and more staff. Administrator's seek to protect university reputations, not take risks.

Lack of experience among faculty of working with small companies, differences between the culture of researchers to publish and of business executives to be secretive, difficulty in accepting advice, and discomfort in

public roles. Faculties also tend to be highly autonomous, narrowly focused, publications-driven and to operate in a bureaucratic framework.

For these reasons, spin-offs from faculty research to incubator company are quite rare in developing countries. There is also the reluctance to sully one's academic reputation by delving in commercial activity, rather than getting recognition for publishing learned papers.

This is changing with the emergence of the 'entrepreneurial university' and its move towards the 'learning enterprise', offering the future prospect of a knowledge development continuum. Further, we have the emergence of the private corporate universities, which could combine the best of both worlds.

Advantages to the TBI of linkage with a reputed technical university include the prestige that this institution brings as well as the ferment of creative young minds and the rigor of academic analysis. The incubator can benefit by synergies through use of computer systems, libraries and data bases, the special scientific equipment and laboratories, the expertise of faculty, the internships and part-time employment by senior students.

In turn, the university benefits by the practical demonstrations of technology transfer as well by using the TBI as a 'living laboratory' for students and faculty. The challenge is to mobilize the reputation (and resources) of the university while maintaining the autonomy (and mission) of incubator management. When the ethical and conflict-of-interest guidelines are clearly drawn, the interactions between faculty and business can be fruitful.

The university with a strong research activity can help catalyze technology venture creation in the region by generating competent personnel, as the example of Stanford University adjacent to Silicon Valley demonstrates, Box 2.

Box 2: The Silicon Valley phenomenon

The clustering of related activities in a single sector is centuries old. In the U.S., for instance, the automotive industry grew around Detroit, entertainment around Hollywood and financial services in Wall Street. The Silicon Valley and Route 128 phenomena for growing high-tech ventures has attracted much attention abroad, and some of the advanced industrializing countries have sought, with very limited success, to replicate these.

The genesis of Silicon Valley may be dated to the 1940s, when Stanford University engineering professor Frederick Terman inculcated a pioneering spirit of in his classes. At Terman's instigation and with \$ 538 seed capital, Bill Hewlett and Dave Packard set up shop in their garage in Palo Alto to produce their first marketable product, an audio-oscillator. Sixty years later, the 50 mile strip from San Francisco-Berkeley to San Jose, California has grown to over 7,000 electronics and software companies with a market value of \$ 450 billion. Its 300,000 top scientists include some one-third born abroad. A dozen new firms (and many new millionaires) are created each week.

What makes this "innovation machine" at Silicon Valley really work? A prime factor is the prevailing culture of risk-taking, competitiveness, and the freedom to fail. There is the critical mass of professional services from lawyers and accountants, to the technical infrastructure of proto-typing new devices and out-sourcing components, and to venture capital (about \$ 2 billion a year of the US total \$ 6 billion in 1997). And there are the universities to provide a stream of engineers and scientists with innovations and ambition.

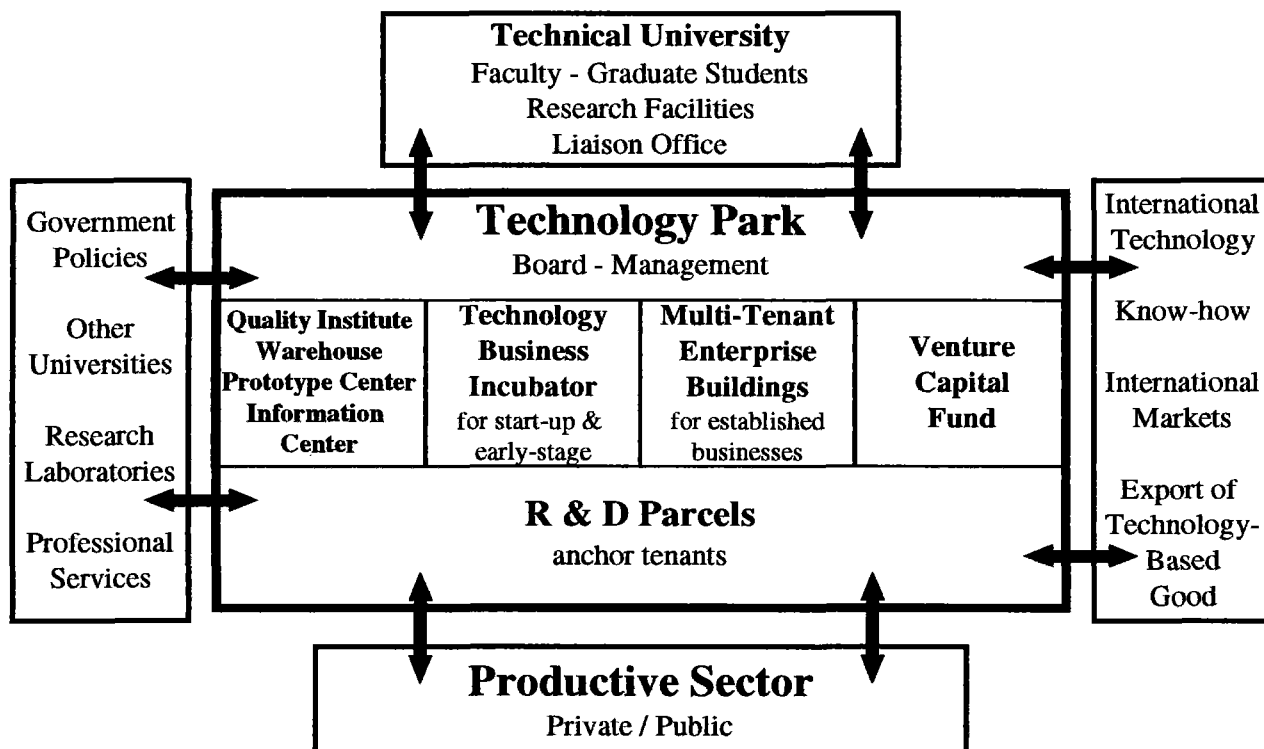
The University of California-Berkeley has started an incubator program in 1998 for use by students while still in business school. The rationale is that what is learned in class can be put to immediate use in starting a technology company. On the other hand, the Stanford University Graduate School of Business, believes that students should make a full-time 2-year commitment to study, before starting their own venture. NASA has started a technology incubator in Silicon Valley to help commercialize its research results, and so have others; the reason for their success is the ethos of the Valley.

Linkages to technology parks

The main characteristics of technology parks are outlined in

Box 3. Good examples of the TBI-techpark nexus is the Rensselaer incubator and park in Troy, New York (although physically separated), There is potential for synergy between an incubator and park, with some shared common facilities, the opportunity for graduating tenants to relocate in the park, and for an incubator to be the first "building block" of a future park. This synergy has to be purposefully planned, Figure 7.

Figure 7: Synergy Between Technology Parks & Business Incubator



There could be the prospect of competition between university research, publicly-funded research, and research by incubator companies for the same contract funds. The positive effect would be efficiency through competition with the negative of neglect of priority programs or cross-subsidization by more profitable ones.

Box 3: Features of Technology Parks

A technology park can be defined as an enhanced property-based development which has a high-quality, physical environment in a park-like setting, is located adjacent to or in a reasonable distance from a research institute or technical university, and emphasize activities promoting the growth of research, technology commercialization and knowledge-based enterprises. Depending on context and focus, it could be called a research park, science park, or science-based industrial park. It may vary in size from a few hectares on to the far end where the clustering of technology related activities becomes a city in itself, a technopolis.

The technology park has strong program components, that:

- take advantage of proximity to sources of significant intellectual capital, conducive surroundings and policy support. When a new park is being planned, an incubation facility can be integrated into the organizing concept, with special attention to the architectural features of buildings, traffic circulation, and other design elements.**
- support technology firms and state institutes in a large pre-zoned area with extensive infrastructure, in order to promote technology development and economic growth. For long-term success, the park must move beyond real estate to real innovation.**

Salient features are a long-term lease and/or purchase of land to build (often with significant limitations) or to rent pre-built space, with physical infrastructure and utility services provided by the park authority. The relationship with a university or research institute is a key feature. Role of government ranges from major direct role, where the state provides concessional land, financial incentives and anchor tenants, to a more laissez-faire role, providing mainly normal infrastructure under commercial terms.

A technopark represents a major investment of US\$ 20 million or more, over a time horizon of a decade and beyond from conception to maturity. Unfortunately, some of these developments have performed poorly, and several have taken many years to mature. It is therefore essential that a new facility is carefully planned from the outset, to address the strategic purposes, achieve expected benefits at projected costs, and meet the expectations of the potential partners and tenants. It is also important that initial expectations be set realistically, with output indicators to guide project development.

While varying in levels of performance and success, technology parks have grown steadily, to some 411 (1997), with 144 in the United States. The bulk of this growth took place in the 1980s. While this has slowed in industrial countries, there has been considerable activity in Asia, central Europe and Brazil.

Further, there is a trend towards the convergence of support mechanisms, inter-linked to a park and incubator. Good examples of convergence are in Singapore and Taiwan-China. The Hsinchu Science Based Industrial Park in its fourth expansion will cover 1,400 acres, and expects by year 2003 to have 300 companies with 80,000 employees and sales revenues of US\$ 50 billion. The Tainan Park, now under completion, takes park-neighborhood integration even further, and includes a technology business incubation system. Tainan could have even more impact than Hsinchu

Seamless integration of learning and venture creation may well locating incubator member companies within the university buildings, and both within a technology park. This kind of arrangement has been attempted at the Korea Advanced Institute of Science and Technology High Tech Venture Center incubator at Taejon.

Incubators to assist international interactions

While significant national revenues come from tourism in some developing countries, the export of technology-based manufactured products and services is an indicator of technology development. In most cases, small businesses do not export directly, and often lack the technology for raising productivity/quality and the information for export-oriented marketing. At the same time, small high-tech companies do not have the staff and other resources to enter complex foreign markets.

In order to meet these outward-looking objectives, new incubators should facilitate joint ventures and strategic partnerships while linking up to export promotion agencies. A recent development is the International Business Incubator, Box 4.

2.4 Technology incubator programs in selected countries

Developments on incubators in selected countries are summarized below. Most of these deal with technology-related products, while in Uzbekistan and Indonesia many incubators are focused on agri-businesses and industrial sub-contracting.

China: Starting in 1987 with assistance from the United Nations Development Programme, China now has about 100 incubators, the largest such program in the industrializing countries. Figures for 80 incubators (1998) indicate that on average, each incubator is 11,500 sq.m. gross area, has 54 tenants and 17 graduates. Some 14 million jobs have been created. Severe difficulties have been encountered, such as insufficient assistance to tenant companies, low levels of local technological development, inadequate finance for tenants, and weak incubator management. The tendency has been to expand the real estate with state finance, to the neglect of support services for tenants.

Incubators in China are generally non-profit, state-owned corporations, reporting to some combinations of the provincial/municipal Science and Technology Committees and local economic development zone. While the Ministry of Science and Technology's TORCH program provides policy guidelines, the management responsibility is left to the local agencies. Two-thirds of the entrepreneurs come from adjacent universities and technical institutes. The local government often offers free land to help reduce capital costs while flexibility in leasing part of the rentable space for commercial purposes helps raise operating revenues.

Box 4: International Business Incubators (IBI)

Essentially, the small technology business wanting to enter a large, complex market needs: reduction of perceived risk; local partner, preferably with a record of success and trust; market opportunities for maximum return at optimal investment; protection of all property, intellectual and other; and services for information and interpretation, travel and accommodation. Some of these requirements can be met by the IBI mode.

The Chinese program was designed (1997) by the TORCH Expert team and Business & Technology Development Strategies, New York, to offer competent support and modern facilities to international technology-based companies and Chinese scholars now overseas, in order to attract their technology and investment into local markets. Further, it is to provide support to local companies in their efforts to export their products, services and technology as well as to enhance their competitiveness abroad.

Eight existing technology incubators are being transformed into IBIs, namely, Beijing-Fengtai and Tianjin (in north China), Shanghai, Suzhou, Wuhan and Xi'an (east and center), Chengdu and Chongqing (south-west). Importantly, the organizational structures have to be transformed to a market system, the mind-sets of management teams significantly changed, and the marketing of the IBIs pursued aggressively abroad.

This process is now underway. Some tenants at the new IBIs have an international orientation, mainly overseas Chinese. Twinning arrangements are being negotiated. The potential of this innovation has yet to be fully realized.

IBI, Silicon Valley, California, has hosted 200 delegations in the last three years since inception, and assisted 29 companies from 17 countries on problems of marketing, tax, legal, immigration, etc. It occupies 1,600 sqm downtown and is supported by a variety of local and regional sponsors. IBI also assists countries to open offices in Silicon Valley.

Ben Craig Center at University of North Carolina, Charlotte, has worked with 40 companies in pursuing opportunities in the US and currently houses the subsidiaries of 5 foreign companies; its satellite incubator at Geilenkirchen, Germany, has helped 15 US-based companies explore European markets.

Other similar initiatives are to facilitate German companies in Shanghai/China and Atlanta/USA, and Israeli companies in Boston/USA.

Uzbekistan: As the Government of Uzbekistan increases the pace of transforming its 70-year command system in to a market economy, the incubator program is helping to overcome the hindrances encountered by privately owned businesses, including problems of cumbersome registration, high taxes, inadequate banking, materials procurement, and access to credit. With political support at the highest level and initial UN assistance, three pilot incubators were started at Tashkent and Samarkand in mid-

1995. Their total investment and operating cost over three years is around one million dollars and about 200 jobs have been created.

In 1996 the Republic Business Incubator Network was initiated and has been expanded to 23 incubators serving 365 tenant businesses and providing 3,000 jobs with a turn-over of about US\$ 5 million. In addition, a large number of businesses outside the incubators benefit from their services. The program is also being used effectively to leverage small-enterprise friendly policies. Uzbekistan provides a good example of strong state support and effective donor intervention.

South Africa has had for many years a network of facilities called “hives of industry”, established by the Small Business Development Corporation. A new development is the start of an incubator at Johannesburg by a large corporation – South African Breweries – to help provide alternative livelihoods to their laid off employees. A technology incubator at Technikon Natal, Durban will empower previously disadvantaged communities, by extending their technical education through hands-on experience to become employers, not just employees. State agencies – NTSIKA and KHULA – are establishing three pilot Local Industrial Parks comprising business incubators and multi-tenant buildings.

Malaysia: The large state investment of US\$ 80 million in the new Technology Park Malaysia near Kuala Lumpur has now been “corporatized”. The core facility at TPM is an innovation center (currently 13 entrepreneurs), an incubation center (32 tenants) and an enterprise house (18 companies needing good space without support services. A large proportion of members are in information technologies. TPM has a large prepared area with 13 R & D companies.

The integration of support facilities includes a robotics center, a prototyping center, quality control laboratory, recreational facilities and a small in-house venture capital fund. While the complex was under construction, TPM had started pre-incubating entrepreneurs in an interim incubator. Now, a dozen incubation variants are operating, mainly linked to universities.

Egypt: The Social Fund for Development of the Government of Arab Republic of Egypt has initiated a network of business incubators as a component of its extensive SME development and employment generation programs. A business incubator at Tala in the Nile Delta started operations in March 1998 with 8 tenants, including a software company, aluminum packaging, fiber glass and sheet metal products.

To prepare a master plan to establish 20 incubators by year 2000, BTDS surveyed 26 sites in 12 governorates. These include biotechnology and information technology incubators at Mubarak Science City, “open incubators” to serve small businesses in their own premises, and an

incubator for women entrepreneurs. The implementation is being undertaken by the Egyptian Incubator Association, an NGO set up for this purpose, under coordination by the SFD Incubator Unit.

Indonesia: starting with UNDP assistance in 1994, three pilot incubators were established in Java: at Puspipstek Technology Park, Serpong; a regional incubator at solo; and an industrial incubator at Surabaya. By osmosis of experiences, seven more began, many as "out-wall incubators" which also provided out-reach services to businesses in their own premises. Then, the government of Indonesia decided to establish a major national program with a dozen more incubators at universities in the out-lying islands. Now with reduced state support, the program is in jeopardy at a time when it is urgently needed.

Korea: There are 25 incubators in operation in Korea and another 25 being planned. While the Korea Advanced Institute of Science & Technology's High-tech Venture Center (HTVC) is sponsored by the Ministry of Science and Technology, most others are supported by the Ministry of Industry, Energy and Resources. HTVC at Taejon, Korea's science city, is run as a department of KAIST, managed by a part-time director and an advisory board of academics. KAIST also runs a Technology Innovation Center to provide opportunities of research with its staff), a Technology Business Incubator (with 22 start-up companies) and a VC company.

Turkey: The Small and Medium Industry Development Organization (KOSGEB) provides significant financial support to six university-linked Technology Development Centers as well as to their tenants. The Centers at Middle East Technical University, Ankara and Istanbul Technical University have successfully nurtured several high-tech companies. In addition incubators have been started at Ege University-Izmir, Marmara Research Center-Gebze and Gebze Technical Institute. Major technology parks are under construction at METU and MRC.

Brazil: As the case study in Chapter 10 indicates, the present 74 incubators are being strongly supported by federal, state and city governments, by universities and private business, and by ANPROTEC, the association.

Overall, many TBIs in the industrializing countries are suffering from sporadic state support, inadequate management capabilities, and the limited reservoir of entrepreneurial and technological projects. State funding continues to be significant in China, Uzbekistan, Turkey and Brazil.

The German experience

In moves to catch up and surpass the U.S., the European Union together with federal, state and city governments have actively promoted

technological innovation. There are now around 1,000 technology centers, incubators and research parks in Europe.

In Germany, based on its strong technical education and research infrastructure, TBIs have been an important instrument of regional development and technology commercialization. Starting in 1983, Germany now has over 200 'technology centers and business incubators'. These support some 6,500 ventures, research institutes and service companies, with a total of 42,000 employees. On average, each German incubator has 5,400 sqm of space, 25 companies and 200 employees. Some 2,000 companies have graduated from the incubation system.

After German unification in 1990, the centers in eastern Germany have grown rapidly to about 65, representing 4 incubators per one million population (as against 1 per million in the west). Early differences between them are now disappearing.

Of the technology incubators, roughly half are linked to universities and one-third to technology parks. The main concerns of the TBIs are providing good support and access to finance, and promoting academic spin-offs. The technology orientation of tenant firms has dropped from 90 percent to 70 percent, even lower. Their focus has hitherto been in information technologies (75 percent) and software (67 percent). Ownership is often in the form of a limited GmbH company, with participation by the host town, chamber of commerce or bank. The Association of Technology and Business Incubation Centers (ADT) is a strong group to promote inter-actions .

While continuing to expand, recent studies have questioned the effectiveness of the German incubators in promoting innovation and regional development.

The U.S. incubator program

TBI sponsorship and operations in the industrialized countries of Europe and North America show similarities but also many differences. The US program is the world's largest with 550 incubators, Table 1.

Table 1: US incubation industry, 1998

Incubator focus (n=396)	
<i>Mixed use</i>	43%
<i>Technology (general)</i>	25%
<i>Manufacturing</i>	10%
<i>Targeted (kitchen, software, etc)</i>	9%
<i>Services, empowerment, etc</i>	13%
Vital statistics, averages per incubator	
<i>Operating expenses/year - all incubators</i>	\$256,713
<i>Technology incubators</i>	\$320,701

Gross area	
Technology incubators (sq.ft.)	20,779
Mixed use	45,442
Manufacturing	62,000
Current tenants	20
Current employees	85
Employees at graduated tenants per incubator	251
Total staff (full-time equiv.)	2.8
<i>(of which in senior positions 30 % female)</i>	
Main services offered, % of respondents	
Help with business basics	95%
Marketing assistance	90%
Networking activities	89%
Links to educational institutions	89%
Strategic partner linkages	81%
Technology commercialization	79%

Source: 1999 State of the Business incubation Industry, NBIA

The National Business Incubation Association and its committees provide a variety training, publications, statistics, conferences and advocacy services. The 1998 survey of business incubation by NBIA indicates that current tenants and graduates at north American incubators have added some 19,000 viable companies and 245,000 jobs. The average incubator is around 40,000 sq ft, has 24 client companies, and has graduated 20 enterprises in about six years.

Outcomes of incubator programs

Without agreed metrics and definitions among countries and the inadequate attention paid by incubator managers to collecting (and sharing) information on their operations, it is difficult to assess the performances.

Since three-quarters of the incubators in developing countries are about five years old on average, it is difficult to make assessments of success. UNDP jointly with UNIDO and OAS undertook an initial review in seven countries (Brazil, Mexico, Nigeria, Turkey, Poland, Czech Republic, China). The countries differ markedly in policy orientation and technical infrastructure, and their incubators cover a wide range in size, characteristics and performance. The median in the incubators studied would be 8 graduates after 3 years, and 2-3 firms would have discontinued their business. Among the 78 incubators reporting employment figures for their client companies, a total of 26,000 jobs have been created, Table 2.

Table 2: Main Features of Incubators Studied (1996)

<u>Country</u>	<u>Sample Total</u>	<u>Building sq.m.</u>		<u>Tenant Firms</u>	<u>Tenant Employees</u>	<u>Investment US\$ 000</u>
		<u>Gross</u>	<u>Net</u>			
<i>All, median</i>	142	2,500	1,521	12	94	236
<i>Brazil</i>	16	1,225	600	10	43	-
<i>China</i>	32	6,100	3,036	22	318	78
<i>Czech R.</i>	17	-	2,230	16	105	175
<i>Mexico</i>	6	1,550	420	7	98	468
<i>Nigeria</i>	2	2,700	1,860	7	44	864
<i>Poland</i>	19	1,603	1,593	11	58	-
<i>Turkey</i>	4	2,086	974	19	82	441

Source: Business Incubators in Economic Development, R. Lalkaka and J. Bishop, UNDP/UNIDO/OAS, 1996

An assessment of impacts (Business Incubation Works, 1997. NBIA) showed that the average annual operating budget of a group of incubators was \$ 278,240. Average annual subsidies were estimated at \$ 86,254 on operations and \$ 25,000 on investment over 7 years. The employment created in this period was 702, giving a public subsidy cost of \$ 1,109 per good job. The tax revenues generated were reported at \$ 4.96 per \$ of public subsidy. These studies have had their critics.

In Germany, the average investments (2,000 to 4,000 DM per sqm of incubator space, mostly as state subsidy) and annual operating costs (between half and one-million DM) are high in relation to net subsidy. To the pertinent query: What proportion of ventures would in fact start without an incubator? The answers range from 20 percent to 3 percent. Only one-third of the German incubators cover their own costs, the rest being currently subsidized. This pattern is prevalent in many industrial and industrializing countries.

An EBN study in 11 European countries of 51 Business Innovation Centers which have been in operation for at least two years determined that they launched 2,726 companies with a failure rate of 11.2%. In five years, these incubators have created 16,000 jobs. Over the last decade, the EBN program has created 4,000 SMEs, with an average of 5.5 jobs per company.

Rigorous assessments of the performance of incubators and other BDS now under way indicate that the effectiveness and outcomes vary under different conditions and the levels of initial subsidy also vary for each type of support service (from less than half of costs to 100%+). Each has a role in its own context.

2.5 Limitations of incubators

For a variety of internal and external factors, incubator planning and operations in developing countries have problems which constitute risks in its successful operation. These include the following:

- **Feasibility process is often skipped, or not promptly implemented due to political constraints and lack of clarity on incubator strategy. There is inadequate involvement of business/community.**
- **Legal structure does not permit reasonable autonomy or facilitate building lease/purchase and for-profit activities.**
- **Start-up finance and working capital for incubator are inadequate, or under-estimated. Over-lapping SME support initiatives cause waste of resources.**
- **Location may be chosen for political considerations. Many empty building spaces seem to be available, but with poor layouts and difficult acquisition process. Renovation costs may be excessive, due in part to the ‘Taj Mahal’ ‘syndrome of opulent appearances.**
- **Entrepreneurship is poorly understood and nascent. There is resistance to leave the incubator. The cultural preference is for an “out-wall” incubator where persons work in their own premises.**
- **Manager is often state or university official with poor communication, networking and business skills, and low salary. The team requires intensive training, at home and abroad, with continuous access to books, journals, videos.**
- **Markets: Main constraints are access to markets, management skills, trade and technology information, and unfair competition from state enterprises.**
- **Seed capital for tenants: Many sources of finance are established, but cannot be readily accessed due to bureaucratic appraisal, high collateral and interest, and lack of information on sources.**
- **Legislative environment and tax structure are unfriendly (if not hostile) to small enterprise development. New decrees and incentive mechanisms are required, governing property, accounting standards, banking, taxation, stock market, foreign investment, bankruptcy, and resolution of disputes.**
- **International linkages are still weak. Special efforts are required to link up to NBIA/EBN/ICECE, who in turn need to take special measures to serve emerging country incubators, in self-interest.**

As business incubation is a recent phenomenon, many myths persist, as shown in Box 5

Box 5: Myths about Incubators

Myth #1: "The incubator is only a building with shared facilities"
It is a process, a means to nurture, to improve chances of success.

Myth #2: "Incubators make money"
Not in the short-term. But they must be run as businesses, for the longer term. And some do make money.

Myth #3: "Incubators rapidly create employment"
Incubators create enterprises, some of which grow rapidly to create jobs directly (and as many jobs indirectly).

Myth #4: "It is government's responsibility to finance incubators"
While governments should provide seed money, the private sector must come in, in enlightened self interest.

Myth #5: "Entrepreneurs come to the incubator with good project ideas"
Incubator managers must pro-actively search out good ideas, markets and entrepreneurs.

Myth #6: "Entrepreneurs are born, not made"
ED programs, from school onwards, can help identify entrepreneurs and enhance skills.

Myth #7: "Incubation is a simple concept, easy to implement"
Often difficult to adapt to local cultures, when infrastructure and entrepreneurial attitudes are still nascent.

Myth #8: "Incubators are a panacea for economic growth"
They are not. They are derived from other BDS mechanisms, and must be considered an additional instrument as part of a national SME strategy.

Myth #9: "Incubators are a "fad", which will soon disappear"
Not if they are carefully planned and operated. Currently, incubators are growing the world over at the rate of two every week.

Myth #10: "Incubators are for small companies"
Incubators are really for growing big companies which, at this time, are small start-ups.

Limitations

While incubators are demonstrating benefits, this modality is not without its limitations:

- **Incubators represent aspects of both public policy and private business, each with different goals. The measures of performance for the public sector may be jobs created, while the business sponsor looks for return on investment. Failure to develop agreed measures of performance and reconcile differences in expectations from the onset can result in problems.**

- ***While the incubator can stimulate entrepreneurial activity under defined conditions, its role in creating large numbers of jobs or promoting rural development has yet to be established. As the incubator provides focused, one-on-one help together with shared office facilities and space, its investment and operating costs tend to be higher than for more basic single-service BDS.***
- ***The incubator selects groups with high growth potential and greatly increases their chances of success. It is then considered unfair and elitist. But the process of selection in the longer term saves the prospective poor performer considerable costs and embarrassment and also saves the community some costs.***
- ***When a business fails, the tendency for the entrepreneur is to assign the blame to the incubator and its support programs. Further, the tenant may graduate from the incubator but still need advisory support and a new space to continue operations. These needs have to be foreseen, by linking the incubator to an industrial/technology park and by designing an outreach program.***
- ***Sooner or later the incubator management and sponsors may be required to support the relatives of persons of influence. Strong political and community support are essential, but the incubator cannot be allowed to become a “political football.”***
- ***The goal of incubation is the creation of successful, vibrant businesses. Some businesses will not survive and must be removed from the incubator to make space for potentially viable enterprises. A more difficult class of ventures neither succeeds nor fails. Without resolve on the part of management, the incubator can become a haven for financial cripples, or a home for hobbies.***
- ***The incubator is human resource incentive, requiring highly entrepreneurial managers and professional support networks which are difficult to find.***
- ***While for decades governments and international donors subsidized SME support mechanisms, today there are high expectations that every system be self-reliant. A balance has to be struck between entrepreneurship development as a social responsibility of governments and financial viability in the longer term.***
- ***In countries where financial resources are severely limited and need for employment generation is enormous, the cost per job created in the incubator in the short-term may be considered high. Special measures are needed to accelerate the graduation of enterprises and also help them expand rapidly through longer-term support. This reduces the cost per good job. In effect, the costs of business incubation are comparable to many other BDS systems, when fairly assessed using common yardsticks.***

Despite its shortcomings, a carefully designed and executed incubation strategy can be one effective instrument for economic development. To the

axiom, "Use many instruments, but none in excess', one could add Einstein's admonition, "Make it simple, but not simpler".

ACTION POINTS

Incubators are a mechanism to augment venture creation and reduce failure rates. The cause of the reduction is some combination of the selection process and the focused support. Incubators have a variety of sponsors, objectives and arrangements, of which the TBI is becoming dominant. To initiate a program with good chances of success:

- Seek strong partners, identify incubator purpose and type, leverage policy support
- Develop a linkage to a technical university, which provides access to faculty, graduate students, facilities, laboratories, and importantly, the reputation. But the vastly different cultures of academia and business must first be reconciled.
- Develop also the potential of synergy between technology incubator and technology park. They differ in scope and scale but have significant complementarities.
- Review the experiences of TBIs (and innovation centers) in North America and Europe, where infrastructure conditions are more favorable, and where the state support to innovation is strong.
- Explore the new incubation arrangements such as 'software technology parks' in India and 'international business incubators' in China.
- Note that incubators, like other forms of small business services, are not without their myths and limitations. When carefully planned and prudently managed, they can be effective.

The TBI modality faces specific challenges in implementation, especially in developing economies. The failure to observe "good practices" imperils incubator performance and curtails its contribution to national economic development.

It is worth noting that developing and restructuring countries are attempting to accomplish in two generations a technological transformation which took industrial countries two centuries, under more favorable conditions. While mistakes will be made, the trend is positive.

TWO – PLANNING

*Nothing will ever be attempted
if all possible objections must first be overcome
Samuel Johnson*

3. Planning the TBI

The preparatory process commences with a proper understanding of the incubation system, collecting information by accessing sources such as NBIA and EBN on the Internet, and talking to consultants and managers of incubators in the vicinity. The next essential step, at times missed, is the preparation of a feasibility study to examine viability in the given context.

Typically, the preparatory work comprising feasibility and business planning for a business incubator requires 6 to 9 months, and the implementation takes a further 6 to 9 months, that is, a total of say one year before the TBI can start operations. Where the concept is new, the implementation process can take longer; with strong leadership and assurance of funding, the process can be accelerated.

3.1 Preparatory process

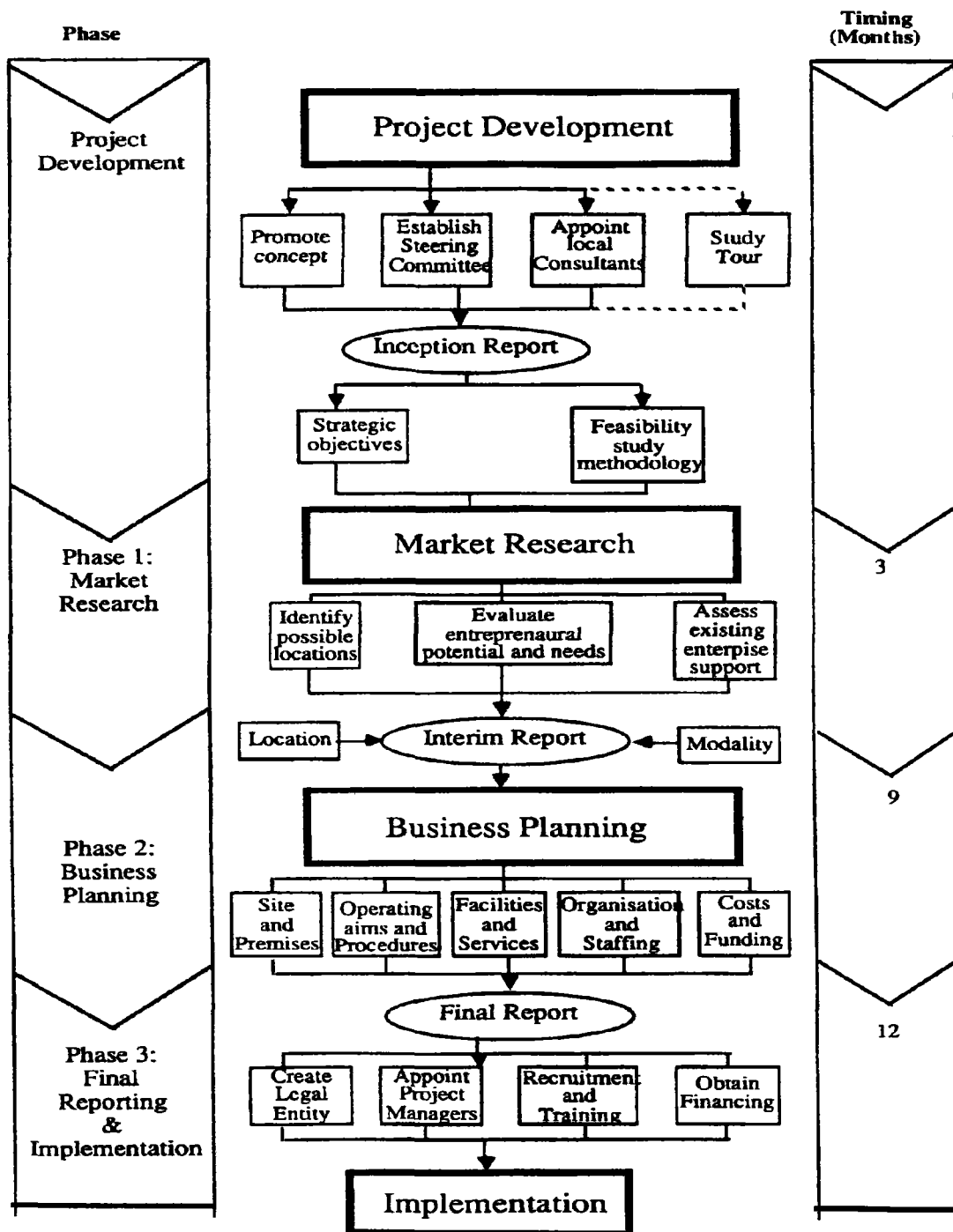
The overall planning process is outlined in Figure 8.

Step 1: From the start, responsibility has to be established to coordinate program development. An orientation seminar is useful to familiarize potential sponsors with the incubation concept, NOT to promote it. This process should present information objectively on characteristics and objectives, its problems and potentials, and the responsibilities and obligations of the key players (that is, government, universities, research institutes, state and private enterprises, banking systems, NGOs, local administrations). It should stress that government enabling policies and financial support are essential initially. Further, the large enterprises in the state and private sectors have a responsibility and longer-term benefits by helping create businesses.

Step 2: A small study-team of key selected sponsors could undertake a well-prepared reconnaissance tour, not a junket, to TBIs and related developments in industrial and industrializing countries. The opportunity

may be taken to attend an annual conference of one of the incubator associations (such as NBIA/USA, EBN/Europe, ANZABI/ Australia, ADT/Germany). At this point, decisions are needed on the mode of preparing the feasibility analysis, by a local group, supplemented by an experienced consulting company, as needed. Donor agencies may be approached for technical assistance, if needed.

Figure 8: Incubator preparation process



Step 3: The feasibility study then looks at the main parameters. Entrepreneur surveys are useful to broadly indicate the local profile, attitudes, strengths and needs, in order to determine the services and facilities for which the TBI is to be designed. Provisional incubator sites

and possible building options have to be assessed together with the estimated investment and working capital requirements. The strategy of the program and possible funding sources are explored.

Step 4: Consensus has to be developed among the key players on the viability of the program. This is followed, if warranted, by the business plan to determine management, market, and money needed, to identify the options regarding objectives, facilities and services design, and to analyze investment, and income / expense estimates, risk factors, working capital, marketing, implementation actions and other parameters.

Step 5: The critical assumptions have to be discussed and final decisions taken whether and how to proceed with the TBI implementation process. The possible university and other sponsors must to be finalized and their objectives in considering establishment of a technology-related incubator formulated in the form of a mission statement.

Step 6: Once the project is GO, legal incorporation has to be studied and executed and the funding pursued seriously. In most situations, the negotiations for financing of the TBI program can be the most time-consuming and frustrating. Yet, without assurance that funds will be available, the project cannot be pursued.

Step 7: The appropriate organization structure then is put in place and the Board of Directors formally appointed, with the necessary responsibilities and authority (see chapter 5). Concurrently, the Board needs to start recruitment of the incubator manager, a difficult task in developing countries. Once the legal and financial hurdles are overcome, the manager can be appointed, trained and made responsible for following-up on subsequent implementation activities.

Preparation of feasibility study and business plan

Clearly, incubator establishment is not a linear process, but an iterative system in which some actions move in parallel and reinforce each other. Moreover, the process is flexible (like the incubation concept itself) and no fixed formula applies in all situations. The local environment, the dynamics, and serendipity play their part.

Basic questions have to be addressed:

What is to be the basic type of the incubator? Should it start with a specific discipline?

Does the selected city have potentials for new businesses, a professional network and a 'champion'?

Is the building appropriate?

Can the TBI reinforce these potentials, provide services not readily available?

Are the financial resources likely to become available?

Can business-like sponsors, Board and management team be developed?

Can the TBI concept be adapted to the political, economic and social conditions?

An outline of a feasibility analysis and business plan for a TBI covering the main points is suggested in Box 6.

Box 6: Suggested outline of incubator business plan

Executive summary

1. Background and history:

Proposed project

2. Market for TBI services:

Market analyses for services & space, in demand & available

Profiles of tenants and affiliates

Competition - direct and indirect

3. TBI objectives, type and focus:

Identification of sponsors/stakeholders

University/business/banking linkages

Legal and implementation arrangements

4. Location and building surveys:

Recommended sites and building options

Build consensus on above before proceeding further!

5. Organization and management:

Board and committees, Management team

6. Facilities and services design:

Training, counseling, networking, finance

7. Operations:

Tenant selection/exit process/policies

Marketing strategy

8. Financials:

Major assumptions

Balance sheet and cash flow, sensitivity

Sources and use of funds

Benefits and risk assessments

9. Implementation, monitoring, evaluation:

Process and milestones

Annexes: Sponsors/management qualifications; Building layouts/ photographs;

Standard lease and service agreements; etc

The outline can be adapted for the real purposes to be achieved and the availability of resources for the study.

If there is no in-house capacity to prepare a feasibility study, a small steering group can be formed to pursue the process and prepare a Request for Proposal to invite bids on a competitive basis. The short list of consulting firms should have knowledge of country conditions and experience on the type of facilities. A requirement should be to utilize local consultants to optimal extent.

The expert time deployed on preparing a competent feasibility study/business plan depends on a variety of factors, such as the technical and political complexity, the support and information to be provided by the sponsors themselves, and the experience of the team. Typically for such work, expert inputs (excluding support, travel and other activities) could be broadly as follows, in work-days:

<u>Tasks</u>	<u>Chief investigator</u>	<u>Co-investigator</u>	<u>Total</u>
Preparatory tasks	10	15	25
Feasibility study	10	25	35
Business plan	<u>10</u>	<u>25</u>	<u>35</u>
Total	<u>30</u>	<u>65</u>	<u>95</u>

If a major incubator network is envisaged, it is desirable to start with a pilot project in order to test the adaptability of local institutions and practices to the innovative incubation concept; once the initial incubator is in place, additional facilities can be designed incorporating the lessons learned.

The incubator needs a "champion" to pursue the process, to mobilize political and business forces, and to overcome all obstacles until success is achieved. Furthermore, the local Board must provide supervision and provide assurance that the total financial resources will be made available to meet the needs of program implementation.

Assessing the demand for incubator services

Assessing small business needs is still more art than science. Entrepreneurs have a strong sense of self-esteem and tend to blame external obstacles for their problems rather than acknowledge their own shortcomings. In surveys in Egypt to plan pilot business incubators in the Nile delta, the lack of finance topped the list, as shown in Table 3. In practice, however, the real needs may be for counseling and training on management and marketing, production processes and quality. In some situations, it is possible to survey the profile of potential tenants and TBI services needed through interviews

with representative focus groups of 10-15 persons. A simple instrument for such a discussion is in Annex 1.

Table 3: Egyptian entrepreneur needs

<u>Services needed</u>	<u>Priority</u>	<u>May be</u>	<u>Not needed</u>
<i>Financing</i>	156	2	4
<i>Marketing help</i>	135	16	13
<i>Work space</i>	123	16	13
<i>Product design</i>	97	28	39
<i>Training</i>	90	48	26
<i>Production help</i>	87	50	27
<i>Prototype development</i>	87	49	28
<i>Business/tech information</i>	84	54	22
<i>Contacts with government</i>	62	81	21
<i>Contacts with business</i>	60	80	24

Source: Business & Technology Development Strategies LLC, 1995

Mission statement

An organization's mission statement is intended to state the fundamental reasons for its existence and outline the scope of its activities. It provides the overall directions for its growth. A good mission statement looks to the future and reflects the unique strengths of the group, Box 7.

Box 7: Mission statement-Lexington Business Center

In the case of an incubator program, the mission expresses the consensus among sponsors and stakeholders on its purposes (such as economic revitalization, employment creation or technology commercialization) as well as its main client groups. The mission statement, for example, of the for-profit incubator Lexington Business Center - Elkhart, Indiana reads as follows:

The Centre is dedicated to providing a diverse environment in which new and emerging companies can develop and grow, with the end result being profitable businesses, capital generation, economic diversity and a positive impact on the Elkhart Community.

It must be emphasized that a mission statement and strategic plan, while useful, do not give results; only people and process give results. The plan is a road map which shows the way; only a driver and vehicle will get you there.

3.2 Key players and legal incorporation

Governance is here defined as the system of key players which has the overall responsibilities for the functioning, monitoring and evaluation of

the operations, performance, impact and sustainability of the incubator program Each player has a special role and specific responsibilities. Problems arise when these roles (and the accountability, commitment and costs that go with them) are not properly defined at the outset, not properly understood, or not properly implemented. The responsibilities of key players are generally as follows:

Main sponsor: *To secure, coordinate and monitor the national and international finance and other inputs to support the establishment and operation of incubators.*

Board of directors: *To establish the supportive policy and regulatory environment for small enterprises to start and grow, provide overall guidance, and help link it to related national and international activities.*

Steering Committee *could be useful in the initial stages for active supervision of the implementation process. Once operations begin, an Advisory Committee of experts could assist the Board and manager on assessing candidate-firms for entry into the incubator, issues of exit, and on emergent technical problems.*

Incubator management: *The management team is critical to success. The selection, remuneration and development of good incubator managers is perhaps the most critical problem for TBIs in developing countries.*

Community and service providers: *To serve as the network of professional and community services to support the incubator and tenants, in mutual interest.*

Local intermediary bank: *To promptly appraise the loan applications of prospective tenants and, where warranted, provide credits based on flexible interpretation of procedures.*

Incubator tenants: *The entrepreneur-as-tenant is the central figure, the reason for the existence of the incubator. (S)he has to plan the business, mobilize capital and staff, aggressively seek markets and take measured risks.*

Affiliates: *Selected businesses who pay a nominal fee for preferred access to incubator services but prefer to work in their own premises.*

Anchor tenants: *These are a few established companies in the incubator, whose reputation gives credibility and whose experience provides mentoring to the start-up firms. Anchor tenants are required to pay higher rental rates and not required to exit the incubator.*

Common responsibilities: *While the above indicates the individual roles, the over-arching responsibilities of all the key players include: Special efforts to raise the incubator revenues (rentals and services) and optimize expenses, in order that the incubator achieves operational break-even in*

about five years. At the same time, the incubator must realize other benefits such as enhanced self-esteem in the community, closer linkages with educational institutions, growth of sales and jobs in the tenant businesses, and enhanced income and taxes for the state.

Attracting private sector support

Incubators should neither be viewed nor operated as government projects. The program has to mobilize private sector support in order that it can:

- **Be managed like entrepreneurial enterprises themselves.**
- **Become financially self sustaining within five years.**
- **Be progressively weaned away from initial dependence upon state support.**
- **Play an important role in entrepreneurial economic development strategies at the provincial level as well as nationwide.**

Corporate social responsibility calls for a strong mentoring role by private sector managers and promoting the sub-contacting of supplies from tenants.

Legal status

The choice of legal identity for the TBI is influenced by the unique characteristics of the incubation modality, the main sponsor's own mandate and by-laws as well as the regulatory and tax legislation. If possible, the incubator should be a separate legal entity, and not an adjunct or sub-unit of an existing government agency, university, or research laboratory. Their cultures and operating modes may be adverse to entrepreneurial behavior.

In this context, the legal structure of business incubators in other countries is of interest. For example, in Minas Gerais in Brazil, Fundação Biominas in Belo Horizonte, Minas Gerais, is a not-for-profit foundation with the objectives of promoting biotechnology in the state and establishing a technology business incubator. It has a strong board comprising private business, Ministries of Scientific Research and Education, the Belo Horizonte municipality, government research institute (CETEC) and financing agency (FINEP).

Israel, starting in 1991, has 28 technology incubators. The incubators are set up as limited companies or not-for-profit associations, under the overall auspices of the Office of the Chief Scientist, Ministry of Industry and Trade. See Box 10.

The technology incubators of Middle East Technical University and Istanbul Technical University, Turkey are set up as foundations by the respective Universities and supported financially by the Small and Medium Industry Development Organization of the Ministry of Industry.

In South Africa, South African Breweries' business incubator at Johannesburg, operates currently as a "department" of the corporation, under the Noah Program. Another Technology Business Incubator is being promoted by an empowerment group for previously disadvantaged communities, with strong backing by the Technikon Natal, Durban.

For Egypt, the Social Fund for Development by its legislation can not directly implement the incubator program, it has established an NGO, the Egyptian Incubator Association, to be the implementing agency for the program. Such an arrangement can work efficiently if there is full trust between the leaderships of the sponsor/ financier, the NGO and the local incubator boards.

In the United States, only 8% of all incubators (1991 NBIA survey) are private, for-profit companies and 16% are university-affiliated. The remaining three-quarters are public or public-private, not-for-profit entities. At Northwestern University, for example, the business incubator started as a department of the university and is now part of the for-profit Research Park. The Lexington Incubator in Elkhart, Indiana is a private, for-profit facility and has shown a positive return on investment within the second year from start up.

A separate entity for a new TBI would have the substantial advantages of providing an autonomous status and a business-like image, and securing the full participation of universities, municipalities and local institutions.

Harmonization of policies and exchange of information between a network of incubators could be done through an incubator which could link present and future incubators as well as serve as a technical support, information and training agency.

3.3 Location and building criteria

Prior to selecting the incubator site a number of basic decisions have to be addressed. The framework of the incubator feasibility plan should have been assembled and provisional sites listed, sponsors identified, objectives established, and projections made of the facilities and services needed.

Selecting the location

The definition of the incubators objectives should include a decision on the types of businesses to be targeted for occupancy (i.e. research, commercialization, manufacturing, services, etc.). Each discipline has different space and facility requirements. The geographical location of the incubator plays a major role in the success or failure of the project as well as of the companies housed there. Incubator sites should be selected that offer: a vibrant and supportive business community (both public & private), close proximity to universities, service providers, Industrial and Technology

Parks (for graduating companies to move to), and an adequate business infrastructure, Box 8. A check-list is in Annex 2.

The incubator project needs to be compatible with the neighborhood. For example, one would not want to locate a light manufacturing operation in a residential area, or by the same token locate a retail service operation in a rural agricultural area.

Recent experience in developing countries highlights the importance of the following location factors for siting incubators:

1. Support of local business community and service providers.

The premises should be close to a large business center to provide easy access to commercial activity, to service providers such as accountants, consultants, lawyers, and to a pool of entrepreneurial and management talent. In addition, the site must be readily accessible to the incubator tenants as well as their potential customers. The proximity to a vibrant entrepreneurial community provides role models and mentors. This can also potentially serve as a source of investment funds and a market for tenant companies' goods and services.

Box 8: Selecting the TBI location

1. Preliminary Screening Criteria

First, determine broad region preferred

Geographic location (region, state, city)

Linkages and proximity to university, research laboratory, business

Availability and area of possible sites

Availability of utilities and services

Options of renovate or build, lease or buy

Community support for incubator project

Availability of potential entrepreneurs as tenant companies

Availability of professional service providers

Space for graduating tenant

2. Specific Site Criteria

Then, narrow list down to 2 or 3 sites

Topographic considerations

Geographic features (flood risk, natural surroundings)

Transportation (access to public transportation)

Estimated costs of operations

Proximity to airport, rail, highway systems

Utilities (location, availability, costs)

Neighborhood (potential for expansion, security issues)

Legal (title/ownership, covenants/rights)

Security

NEGOTIATE—RECOMMEND—PURSUE

2. Proximity to centers of technical education, research and industry.

The presence of large industries, technical universities and research laboratories provides a pool of potential management talent as well as customers and suppliers. Universities and industries may contribute spin-off businesses to be developed in the incubator.

3. Support of local government and sponsors.

At the initial start-up stage, incubators need the political support of government agencies as well as financial and substantive involvement of local sponsors and the state. At a location where such support is likely to be available, the incubator has a better chance of sustainability.

4. Infrastructure of good transport and communications.

The availability of transport by bus and rail and of convenient electronic connectivity, telephone and fax facilities is necessary for tenants to have good access to market information. Reliable electricity supply with minimal voltage fluctuations and power outages, and availability of basic raw materials likely to be used by tenant firms are also important. Access to the world community for exports and personnel movements is a consideration.

5. Availability of affordable premises.

A facility with good layout possibilities in a pleasant environment conducive to creative work can be a major determinant of success. A vacant building or land for a new structure has to be secured from sponsors at low (or no) cost.

Evaluation of alternative sites could be done with a scoring system which includes the complete rejection of a site based on significant problems in any one area.

Selecting the TBI building

Renovating an existing vacant building may in some situations be both faster and less expensive. A 'distressed property' may offer a good deal and some funding sources may prefer this option. This requires a detailed engineering survey of the condition of structures, utilities and waste disposal systems. A space can be too large in which case it would increase investment and working capital. Or it can be too small and not able to generate enough income, affecting profitability.

New construction, while initially more expensive, may have lower maintenance and operating costs. For technology incubators, it is difficult to rehab an old building to meet special needs such as wet labs and electronic connectivity. An attractive modern space to attract creative people is highly desirable. However, the limitations of finance may require the compromise of beginning in renovated space.

The other major decision concerns leasing the facility (with lower up-front finance requirement) or purchase (with prospects of property appreciation, use as collateral for debt financing, and security of ownership)

Important considerations for the selection of existing buildings and for developing a new facility for the incubator include the following:

- 1. Floor space of about 2,000 sqm gross, capable of future expansion. Experience suggests that this is the optimum floor space necessary for the start of a new incubator with about 20 companies, otherwise rental incomes would be inadequate. It may be possible to begin with less area provided that prospect of more space is assured when needed.**
- 2. Prompt transfer of land or vacant building to incubator entity. In order to minimize delays in start-up, it is critical that legal title (or a clean lease, depending on the situation) to the premises (or land) can be passed promptly and without encumbrances to the incubator sponsors.**
- 3. Flexible layout. It should be possible to easily and quickly change the layout to adapt to changing tenant needs and to expand the TBI in future. In addition, the layout has a direct impact on internal traffic to promote interaction between tenants. To be avoided are many entrances, wide corridors, high ceilings (for office space), and high energy costs for**

heating and cooling. The need for warehouse, parking and laboratory facilities must be kept in mind.

- 4. Good general condition of building. A vacant building should require minimal capital investment for renovation, to ensure that resources dedicated to the TBI reach the tenants and are not dissipated on the facility itself.*
- 5. Good security. Interior layout should provide good security though a single entry point. A common office area should be adjacent to the entrance for easy access for both tenants and their customers. Interior spaces should provide access to central office area, while ensuring confidentiality and security for individual businesses. The premises should also be environmentally safe.*

A check-list for assessing the building and site is in Annex 2.

Facility layout

Layout of the workspaces and common areas within the facility are a critical factor in incubator success. It must combine functionality with legal and safety considerations, as well as be modern and attractive in order to present a good image and attract clients. General guidelines to develop a workable layout are in Rules of thumb for facility designs and financial considerations are:

- Gross space needs to be about 2,000 sqm. or larger to become self-sufficient.*
- Net rentable area should be on the order of 70 % of the gross area of the building or preferably more.*
- Tenant space should be designed in 10 to 150 sqm units, with provision for enlarging and dividing spaces on a modular basis,*
- Financial break-even point should be planned at say, 70 percent occupancy, and in no case greater than 85 percent.*
- Keep debt servicing as low as possible.*

Box 9.

The TBI is more than just a physical facility. The design and layout can play an important role in the success of the technology companies it houses. The facility needs to be appropriately sized and compatible with the firms in it. Studies have found that tenant interactions play a significant role in the success of the incubator program as well as that of the tenants. The physical layout can increase or decrease that interaction and synergy.

In designing a new building for a TBI with mixed technology tenants poses special problems and higher investments. The Ben Craig Center at the University of North Carolina, Charlotte, presents a good layout arrangement, Annex 3. The two-storey building with 5,000 sqm space cost \$

3.5 million and was constructed in 11 months. The basic premises are to provide the tech-based tenants with a creative environment, the opportunities of interacting with fellow-entrepreneurs, and the physical facilities/utilities to carry out their tasks.

Good design also calls for the ability to generate an income stream sufficient to support the facility and services. The scope of the project should be determined by "backing" into the financial pro forma. In other words, the projected income stream less the expenses and an amount for reserves should provide for the facility to at least break-even and contribute to administrative costs. Also, the amount of any debt will impact the project and has to be factored into the financial projections.

Rules of thumb for facility designs and financial considerations are:

- **Gross space needs to be about 2,000 sqm. or larger to become self-sufficient.**
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- **Financial break-even point should be planned at say, 70 percent occupancy, and in no case greater than 85 percent.**
- **Keep debt servicing as low as possible.**

Box 9: Guidelines for Incubator Layout Planning

- **Layout of common spaces directly affects the probability, frequency and quality of face-to-face interactions among tenants. A common work area with computers, copy machine, and mail area should be located near the reception;**
- **Reception area should be immediately inside the front door, easily accessible to tenants, and not too large. The main traffic pattern should pass reception and the General Manager's office;**
- **A courtyard with greenery is useful, to enable tenants to relax over a cup of tea and inter-act creatively;**
- **A space for display of Incubator Member products should accompany a list of businesses (with short description of each, including length of membership and goals while in the incubator) near the front entrance;**
- **The space should be divided into a variety of sizes of workspaces, from about 10 square meters (for a single office to begin a knowledge-based business) to say 1,000 square meters in a large facility. Normally, a single tenant should not occupy more than 10% of the total leasable space;**
- **Hallways should be sufficiently wide to allow movement of product to and from workspaces, and not too wide as to reduce rentable space. Each tenant space should have secure windows, to the extent possible;**
- **Ideally each workspace should have two doors to provide alternative exits in case of fire or other problem. Similarly, each floor must have two means of entrance and exit;**
- **Consideration must be given for joining separate workspaces (through provision of connecting doors within the facility) to deal with the needs of businesses to expand;**
- **Floor loads should be adequate in designated areas for heavy equipment. Buildings with slanted floor auditoriums reduce leasable space. Loading docks and storage spaces should be well located for ease of receipt/dispatch.**

The layout planning should permit construction and renovation to be completed within tight budgets and schedules. Importantly, the design and renovation should focus on lowering the investment and reducing the debt burden.

3.4 Facilities and services design

Emerging companies have the talent, ideas and even the capital to launch a new venture, but may lack, in various degrees, the business know-how to operate the business effectively. The incubator management has to be equipped to provide a package of technical assistance, education, information and access to external facilities and services. The cost of services should be affordable so that the tenant can use them when

required. Yet, the incubator also needs to strive to make a profit on its assistance packages.

The incubator may consider inviting a tenant to set up a Business Office to provide business assistance to other tenants as well as to other small businesses in the area.

Management should perform a support service analysis internally as well as in the local market. This can provide direction on the type of assistance to be offered with pricing competitive in the local market area. Typically services can be grouped into six categories: secretarial, administrative, consulting, facilities, marketing and value-adding, Table 4. Services provided are usually paid for as they are used, either cash at the time of service or monthly billing with no longer than 30 day terms. Some incubators increase the monthly rental rate and include a package of services.

Table 4: Typical TBI Services

Secretarial Services: Word Processing Photocopying Receptionist duties Clerical/Filing/Faxing Telephone answering	Administrative Services: Accounting/billing Equipment leasing Health /property insurance Janitorial services Courier/mail/ business address
Consulting Services: Management counseling Business plan preparation Financial management Legal/patents/IPR Access to finance Personnel issues Human resource development	Facilities Security Conference/exhibition space Training rooms/audio visual Computers Library and information Loading dock/warehouse Shared laboratory/equipment
Marketing Web page links, advertising Government procurement Open houses, trade shows Public relations International trade	Value Adding Services New product development Tech commercialization Credibility /"halo effect" Manufacturing competitiveness University /business networking

The services considered important to the incubator tenants in industrializing countries include: the space, credibility, counseling on business planning, marketing, accounting, management and access to

external networks Services offered in US in relation to incubator type are shown in Table 5. Technology incubators offer the largest variety of services.

**Table 5: Services offered by different incubator types, USA
(as % of total in group)**

<u>Services</u>	<u>Techno logy</u>	<u>Mixed use</u>	<u>Empow- erment</u>	<u>Light manuf.</u>	<u>Services</u>
<i>Space rental</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>	<i>100</i>
<i>Management advice</i>	<i>98</i>	<i>97</i>	<i>91</i>	<i>96</i>	<i>100</i>
<i>Business planning</i>	<i>87</i>	<i>82</i>	<i>92</i>	<i>83</i>	<i>94</i>
<i>Office services (reception, etc)</i>	<i>83</i>	<i>87</i>	<i>92</i>	<i>71</i>	<i>100</i>
<i>Access to financing</i>	<i>87</i>	<i>84</i>	<i>83</i>	<i>79</i>	<i>81</i>
<i>Marketing assistance</i>	<i>83</i>	<i>78</i>	<i>83</i>	<i>63</i>	<i>94</i>
<i>Financial accounts</i>	<i>70</i>	<i>63</i>	<i>83</i>	<i>58</i>	<i>63</i>
<i>Techn. consulting</i>	<i>87</i>	<i>40</i>	<i>25</i>	<i>25</i>	<i>25</i>
<i>Legal/ patents/ IP</i>	<i>72</i>	<i>38</i>	<i>42</i>	<i>13</i>	<i>25</i>
<i>Other</i>	<i>20</i>	<i>15</i>	<i>33</i>	<i>17</i>	<i>25</i>

Source: NBIA, 10th Anniversary Survey 1985-1995

Design of facilities and services

Recent work in Asia, Latin America, and the transition economies indicates that, in concept, business incubation is useful in these rapidly growing economies. The north American and west European experience has, however, to be significantly modified to meet the more difficult conditions and special needs, while still retaining the unique incubation characteristics.

In the difficult environment, the design of TBI facilities and services need adaptation to take into account the following:

Overall flexibility

- Design flexibility in facilities and operations, to allow for uncertainty and change, for available infrastructure and prevailing conditions;*

Entrepreneurs

- To help identify the services that will be needed by new entrepreneurial businesses, detailed market testing is required. But in the absence of past experience, the outcomes are more difficult to predict.*

Admission and exit criteria

- Fairly strict entrance criteria are needed to avoid poor initial choices or nepotism, at the same time recognizing that potential entrepreneurs may*

not have formal business plans nor means to support initial operations, see Annexes 4 and 6.

- *Exit criteria have to be flexible, depending on judgements regarding the potential for success. Further, the entrepreneur may have no space to go to after exit and may still need different forms of support.*

Facilities and services

- *It may be necessary to start as a "virtual incubator" in a university or laboratory when finance is scarce, then move into a renovated building providing affordable rental space and interaction; and later build a new facility.*
- *Technology transfer to the market place has been weak in most industrializing countries. Special efforts are needed to firmly link technology incubators to technical universities, and to critically prospect the research portfolios to identify opportunities for commercialization.*
- *The primary focus has to be on entrepreneurship training and counseling including business planning and small enterprise management skills. As noted, a training group and business center may be in the incubator as tenants and service providers.*
- *A key task is to help in accessing the seed capital and then the long-term risk finance. Venture capital is now developing in industrializing countries, to channel domestic and international investments together with management support into carefully selected entrepreneurial enterprises.*
- *In countries where the business culture stresses family ties, there is reluctance to trust others. The job of the incubator manager is to promote confidence and mobilize networks of support from the whole community.*

Ownership

- *Incubators will need strong government support in the initial years, and this may require some state representatives on managing boards. At the same time, private associations of entrepreneurs and commercial chambers should be brought in as partners from the start.*
- *A national association could play an overall role in promoting the incubator concept and mobilizing wide support.*

Twinning

An incubator in an economy in transition can benefit by "twinning" to an incubator in Europe or North America. Turkish language affinity could be an advantage for an incubator in Uzbekistan linked to one in Turkey. An incubator in Ukraine benefits by the "secondment" of MBA students from the

US. Incubators in Egypt could be “twinned” to those in the US and to others in countries such as Malaysia and Indonesia.

In the preparatory process, there will be disappointments and delays. Remember, in Einstein’s words, ‘At a time of crisis, imagination is more important than knowledge.’

ACTION POINTS

A consultant advising on starting an incubator (or a new business) is often told: Don’t tell me *what* to do, tell me *how* to do it. The first question really should be: *Whether* to start at all?. For success in the preparatory process:

- From the outset, mobilize the politicians, government officials, directors of technical universities and research institutes. Some may not be of much help, but just one can be of hindrance. Build consensus at every stage.
- The first steps are to clearly understand the incubation process, the potentials without the hype; then, undertake an honest feasibility analysis and business plan, based on a survey of potential entrepreneur needs and realistic assumptions on cash flow.
- The TBI should be so legally constituted that it has reasonable autonomy and the image of a business-like facility to attract private business support. Success will depend on getting government funding while avoiding government interference.
- Select the location with good infrastructure and decide whether the finance likely to be available will permit construction of a new building, or require renovation of vacant space. In either case, the layout should be functional, flexible and friendly.
- Don’t raise high expectations and be committed to the long-term perspective. Be flexible, entrepreneurial, opportunistic and expect the unexpected.

After the basic understanding of the process, the business plan can help address the know-how or show-how or know-who concerns . The real learning take place when you yourself take the plunge!

4. Financial Analysis

The financial analysis is the critical part of the business plan. Incubator sponsors, particularly in industrializing countries do not have abundant resources and the investment and operating costs need to be carefully planned and prioritized.

4.1 Incubator investment costs

The incubator program needs funding for three main purposes:

(1) Capital resources are required for land and construction (or vacant space and its renovation), office equipment and furnishing, technical services for planning and training, and other preparatory costs. Renovation may not be a preferred option for special TBI requirements such as wet labs or electronic connectivity.

Recent experience indicates that the capital investment to establish a business incubator in a developing country in an existing space would be around US\$ 500,000 (as of 1999), or less depending on the extent of renovations, equipment and furniture required and other local factors, Table 6.

**Table 6: Indicative capital cost
Based on renovating vacant building (2,000 sqm)**

A. Building renovation	US \$
Construction work	175,000
Electrical/mechanical work	75,000
Architectural/engineering design	30,000
Contingencies	20,000
Sub-total	\$300,000
B. Office Equipment	
Computers, copiers, telephone exchange, furniture	\$70,000
C. Other costs	
TBI planning/training services	60,000
Manager and secretary salaries, 3 months	20,000
Miscellaneous	50,000
Sub-total	\$130,000
Total	\$ 500,000

Assumes land and vacant space provided without cost.

In addition, working capital of say \$50-100,000 will be needed. New construction could cost around \$ 1 million for the building alone. If this level of funding is not in sight, compromises may be inevitable for an early start.

(2) Operating funds are needed to pay a declining proportion of staff, building utilities and related costs for the initial say, 5 years; then, revenues from tenant rents, services and other income-raising methods could cover operating costs. If some of the initial costs are met by donors and sponsors, the actual investment and working capital requirement may be less. Many incubators the world over are provided some such form of support even after the initial years.

In addition, seed money is essential for incubator tenants to cover initial working capital and investment requirements. Such finance may be available on commercial terms from development banks and special SME support facilities, or as equity by growth capital funds. The incubator itself could help manage a “revolving fund” of say US \$100,000 and, if conditions warrant, take equity positions in their tenant-firms in future.

While the incubator’s funding structure varies with the sponsor's orientation, so do the sources of investment. Non-profit incubators may receive funding from local municipality, community groups or foundations. Universities can assist through the provision of building, in-kind support of faculty, staff and student expertise. Joint sector sponsors utilize a combination of the above tools. Experience in both developed and developing countries confirms that federal, provincial and municipal, agencies provide much of the financial support in the initial years.

4.2 Financial projections

Financial projections in the business plan, together with underlying projections of tenant and management activities, provide the basis for setting prices for individual items and activities, and for final decisions on how to structure and implement the TBI. As William Rouse points out, “The business plan is not to predict with certainty. It is to put you in the path of serendipity”.

Assumptions regarding revenues

A series of assumptions form the foundation for the financial analysis and review. These must be tested and modified as appropriate in the development of the operating plan. The Board and management must be creative, since the incubator cannot provide the necessary range of services from the rent income alone.

For the purpose of illustrating the estimation process, the financial projection assumptions for a business plan are discussed below. Some items may be excluded in actual projections. Actual costs at specific locations may of course be different and must be assessed for each case.

(1) Rent

Rent cannot be priced much below market without a corresponding subsidy from sponsors. Some TBIs in both developing and developed countries are operated by universities as a part of their normal activities, underwriting the costs of buildings and salaries of professional staff. Regardless of the sponsorship, the cost of acquisition and operation of the incubator facility forms the basis for the calculation of the rents to be charged to the tenants. Direct costs (such as rent or mortgage and maintenance) are incurred based on the gross space under management, while rental income can be derived only from the rentable space, frequently 60 - 70% of the gross space. Allowances for vacancies (say 15%) as tenants move out and in further increase the margin required for sustainability.

The other determinant of the rental rates is the going price for comparable industrial or office space in the area. Surveys of rental rates in the neighborhood are essential. For the services associated with the incubator, this rate forms the floor and higher rates are justifiable. A compromise is to set the rental rate for a new tenant at or below the local market rate, and to increase the rents annually during the tenancy in the incubator.

Accordingly for this illustration, the assumed rent (for office-like space) is set at \$ 5 per square meter per month in the first year, increasing to \$ 7 with graduation in around the third year. For special laboratory facilities leasehold improvements may be needed, and rent negotiated. As rents are dominant in income, this tariff has to be assessed with care.

(2) Services to Members

The specific nature of the services depends on what is available in the community as well as the needs of the members and affiliates:

Physical Services, including appropriate markups on telephone costs, if billed centrally, in addition to copier, fax and other office services. Some operations provide bookkeeping and payroll services which can generate income and serve a real need.

Training Services, including short courses offered in conjunction with the local university.

Development Services, including general counseling for the businesses. The specific services offered, the prices charged, and usage should be reviewed on a quarterly basis, to ensue that only relevant services are offered and that pricing is reasonable.

Income is to be generated by associated services, from a modest markup on utilities through charges for fax and copies to a range of services and training courses. Many incubators find such revenue to be a small component of their operation (say 10% - 20% of rental income) while some may bundle all services into the rent. The rationale for such inclusion is simplified bookkeeping for the incubator and predictable costs for the tenant. However, a "bundled" service package removes market signals to the incubator about the quality and usefulness of the services provided.

Other incubators seek higher revenues through aggressive development of services as a source. Management will formulate specific schedules for services and fees to be charged for the office operations (e.g. copier and fax) at, or near, market rates. The incubator should not use its special position to undercut, even unintentionally, local entrepreneurs (e.g. photo duplication shops, travel agencies, and secretarial services). The ideal situation finds the incubator staff initiating services, then spinning off the successful services to spread the entrepreneurial success pattern.

For preliminary estimates of service revenues, an option may be to take say 10 up to 50 percent of the annual management team salaries as an approximation of the value of professional services rendered to companies, the value rising as the quality of the services is recognized by tenants.

(3) Outreach services to affiliates

An important market is Affiliate Members (businesses who are not resident in the Incubator complex). While potentially large, intensive promotion is required to develop this outreach portion.

For estimation purposes, services income from affiliates could be up to half the income for services to tenants

(4) Provision for Bad Debts

While some incubators choose not to recognize potential losses from nonpayment of bills by Members, building a reserve account for such losses is prudent and consistent with the development of conservative, attainable financial projections.

The provision of about 5 percent of total Rental and Service Income is not unreasonable, depending on local experience.

(5) Royalties and equity dividends

Since the impact of an incubator is greatest in the early years when member incomes are modest and their cash flow is critical, one means of realizing the economic return is through either equity participation in member businesses or royalty.

An equity position appears attractive, but contains many subtle and onerous effects, including the difficulty in cashing out the equity position,

the potential conflict of interest when the incubator is landlord, consultant and shareholder, and the inhibitory effect on significant equity funding by yet another minority shareholder.

A modest royalty has the advantage of providing the incubator with an additional revenue stream that can be used to enhance the service offerings. A royalty of around 3% of gross revenues is a starting (and often ending) point for the licensing of technology from a university in the US. Such royalty and equity arrangements may be deferred by the Board until the TBI has achieved a standing in the community.

(6) Other services

An alternative is development of a fee schedule for specific tasks which go beyond the normal services of an incubator because of their specialized nature. For instance, such services and associated fees could include:

<i>Service</i>	<i>Possible Fee</i>
<i>Technology brokering, sourcing, negotiating</i>	<i>negotiated</i>
<i>Strategy development and business plan</i>	<i>US\$ 5,000 - 25,000</i>
<i>Financing and loan facilitation service</i>	<i>3 - 5% of financing</i>
<i>Development and execution of sales program</i>	<i>10% of sales</i>
<i>Procurement assistance*</i>	<i>5-10% of purchases</i>

** Development of specifications, qualification of vendors, solicitations for requirements, and negotiation of cost and terms, as done by BIOMINAS incubator in Belo Horizonte, Brazil.*

In practice, the Board may decide to implement one or more of the services above to support the businesses and enhance the viability of the incubator.

(7) Patrons' Club contributions

A Club of local business, private and public, can be brought together to support the incubator, through subscriptions (in the range of say \$ 200 to \$ 1,000 annually per business entity depending on its turnover) as well as sharing business acumen by one-on-one advise to the companies. Club members are given privileged access to innovations developed by the entrepreneurs, subcontracting of services and components and opportunities for equity investments in companies. The corporate sponsors should gain value in excess of their contribution.

Assumptions regarding expenses

Staff salaries are the major item, often constituting one-half and more of expenses. Utilities and telephon/fax/copier are estimated at prevailing rates and mostly recovered, with a mark-up, as revenue. Travel, promotion, staff training have to be provided for. Other expenses include maintenance, janitorial, insurance, part of which may be covered by a university sponsor.

The major expense is in debt service, and it is therefore essential to keep loans to a minimum and at the best terms.

It may be advisable to make contributions to a depreciation fund, at acceptable rates for building, furniture and equipment.

Pro forma statement of income and expenses

In making projections, the first estimates have to be revised again and again to arrive at values that meet project objectives and are within budget constraints. As Lord Rutherford said, "We haven't got the money, so we've got to think". For instance, the projection may need to be re-worked in order to reduce deficits, with modifications such as the following:

- 1. Increase rental rates and increase net rentable space.**
- 2. Add Patrons Club to involve private business. in mutual interest.**
- 3. Take equity or royalties in tenant companies for deferred income.**
- 5. Other cost-cutting and revenue raising measures.**
- 6. Securing grants for building.**
- 7. Lower borrowing and better credit terms**

A typical pattern of revenues and expenses for a TBI Base Case is illustrated in Table 7. This assumes a renovated building at no rent from sponsor, net rentable space 1,500 sqm. No provision has been made for bad debts or for depreciation.

Table 7: Indicative TBI operational budget, US \$

	Year 1	Year 2	Year 3	Year 4	Year 5
Revenues					
Rents	60,000	93,000	126,000	144,000	162,000
Services	9,000	20,000	48,000	54,000	72,000
Elect./fonelcopie r	12,000	16,000	18,000	20,000	22,000
Patrons Club	2,000	4,000	6,000	8,000	12,000
Equity in tenants	-	-	-	5,000	15,000
Total income	83,000	133,000	198,000	231,000	283,000
Expenses					
Salaries	60,000	80,000	85,000	90,000	95,000
Electricity/phon e	10,000	12,000	14,000	15,000	17,000
Maintenan./rep air	6,000	7,000	8,000	8,000	9,000
Travell/promotio n	9,000	8,000	8,000	8,000	9,000
Janitorial, etc	4,000	8,000	10,000	10,000	10,000

<i>Miscellaneous</i>	<i>5,000</i>	<i>6,000</i>	<i>7,000</i>	<i>9,000</i>	<i>11,000</i>
<i>Debt service</i>	<i>40,000</i>	<i>40,000</i>	<i>40,000</i>	<i>40,000</i>	<i>40,000</i>
<i>Total expenses</i>	<i>134,000</i>	<i>161,000</i>	<i>172,000</i>	<i>180,000</i>	<i>191,000</i>
<i>Surplus/(Deficit)</i>	<i>(51,000)</i>	<i>(28,000)</i>	<i>26,000</i>	<i>51,000</i>	<i>92,000</i>
<i>Cumulative</i>	<i>(51,000)</i>	<i>(79,000)</i>	<i>(53,000)</i>	<i>2,000</i>	<i>90,000</i>

On the basis of the assumptions made, the TBI shows a small surplus in the third year and a cumulative surplus in the fifth. The major expense is in debt service. The projection is meant as a guide to illustrate the estimation process, and in each case estimates must be made during preparation of the business plan.

Sensitivity Analyses

This requires a series of modifications to the Base Case Income-Expense projections, under alternative scenarios, to indicate their effect on postponing the year in which positive cash-flows would occur: What if:

- Rental rate had to be reduced by 10 %?*
- Bad debt provision is made?*
- Income from services were deleted/ bundled with rent?*
- Economic conditions forced the TBI to operate with 30 % vacancy?*
- And what if, all the above conditions were combined?*

4.3 Sources of funds for incubator

In some countries, federal, state and city governments have economic development, special legislation, and incubator financing programs. Multi/bilateral donors can be approached for preparatory work. The university or municipality could provide the land and/or vacant space, and cover some costs such as insurance, security and janitorial service. The significant financial support to both incubators and their tenants by the state is shown by the example of Israel, Box 10.

Box 10: Support to TBI program in Israel

The Israeli incubator program, under the auspices of the Office of the Chief Scientist, Ministry (OCS) of Industry and Trade, provides up to \$180,000 a year as a grant on presentation of a budget. The selected project/company is supported by state grants of up to \$150,000 a year for two years, to enable them to develop their scientific work and find strategic partners for future investments. The scientist must personally raise 15% of the equipment and materials costs. If he succeeds in forming a joint-venture, he can keep 50 percent of the equity, and must allocate 20 percent to the incubator, 20 percent to the investors, and 10 percent to key personnel. He must also pay a 2-3 percent royalty on sales to the OCS until the state subsidy has been reimbursed.

Over the last eight years, about US\$ 150 million has been invested on the national TBI program. Currently the 28 incubators house about 200 companies which employ about 1,000 professionals. The 476 graduates to date have raised \$ 200 million in private financing and employ 1,315 persons. Some 42% of graduating companies have closed down.

The interesting features of the Israeli program are the significant state subsidies in order to promote technology-led economic development, commercialize scientific concepts through emigrant groups, and attract private foreign investment. The success of the program is due to the concentration of skilled scientists with cutting-edge technologies in Israel and the ability to adapt to changing conditions. The small local demand forces companies to seek international markets.

In addition to finance, valuable non-financial contributions and barter can be leveraged as supplies and services.

The financial structure of a for-profit incubator in the US further indicates the role of state and city governments in the capital investment, Box 11. With such initial support and prudent management, the Lexington Business center, Elkhart, Indiana brings an annual profit to its owners which is ploughed back in to expansion and improvement of facilities; the state benefits by the creation of local jobs, taxes and an entrepreneurial culture in the community.

Box 11: Structure - Lexington Business Center

Debt Structure

State of Indiana \$500,000 Half as conditional grant and half as Loan @ 6.75% 20 year schedule

**City of Elkhart \$400,000 Infrastructure improvements
\$165,000 Loan @7.45% 20 year schedule**

Total \$ 1,065,000

Development costs

\$250,000

Building purchase

\$400,000

Infrastructure improvements

\$315,000

Renovation*

\$100,000

Operational to break-even (equity)

Total \$1,065,000

***In addition, owners put in 'sweat equity' equivalent to \$ 100,000**

In addition to state support, the incubator program must attempt to mobilize private sector involvement, in mutual interest. To the extent that incubators are perceived as government projects, private sector support is less likely. Business can be persuaded to participate in the program through the Patrons Club, foundations, purchases of know-how and supplies, and as investors in tenant equity and know-how. The starting point is recognition of the kinds of assets and benefits that may attract private investors.

Incubator-as-investment in enterprises

An incubator is a hybrid development tool which is a synthesis of two elements: real-estate development and enterprise development. They involve some property in the form of physical facilities from which revenues can be derived. TBIs may also want to realize the potential of investing in the intellectual property which is embodied in inventions, new products, patents, research, and software.

In order for property to serve as an attraction for private investment, it should preferably reside in private ownership. If owned by government organizations, the state could transfer property to private control without entirely giving up its interest on the basis of a long-term (minimum 20 years) master lease. The incubator could use the property as collateral for a mortgage loans subject to local practice. Alternatively, government could sell the property (at concessionaire price) under a covenant that, when and if the use of the property for incubation ceases, ownership reverts to the government.

When an incubator facility is owned by a private entity, then a wider range of financing options come into play, such as a real estate partnership. The incubator could be the general partner and partnership subscriptions would be sold to investors, who would thereby each obtain a share interest in the property.

Early-stage ventures that an incubator houses would be candidates for private investment. Incubator management should be in a position to help an enterprise prepare and market its investment prospectus. An alternative is royalty financing, which avoids many of the problems of either debt or equity financing.

4.4 Incubator benefits

Financial sustainability may be defined as the state where operating revenues consistently exceed operating expenditures. Certain non-cash charges, such as depreciation and reserve for bad debts are accrued to cover actual costs, including the costs of replacing and repairing equipment and facilities. One-time start-up costs such as site acquisition and facility construction or renovation, and the initial operating deficit, are not included in such a definition of sustainability.

Entrepreneur benefits

Benefits for the member companies and affiliates would be as follows:

Firms in the incubator have a greater likelihood of success. The careful selection of members and mentoring by management and by peers, can triple the proportion of successfully incubated businesses (as compared to those starting in the open market). This is a major benefit for the entrepreneur and the community. Further, initial rental expenses are generally lower than elsewhere and the terms of agreements are more flexible to allow for business fluctuations.

The TBI can enhance the firm's credibility for accessing capital from private financial institutions as well as other governmental programs. Incubator member businesses can be developed to serve as feeder units to industrial estates and large enterprises at home and abroad.

Also, the members do business deals among themselves. The social environment enables them to share experiences and not feel that their difficulties are unique or a result of misfortune or incompetence. The efficient networking and creation of role models are important assets. Owners are able to generate business contacts in academia, industry, government and the financial sector, which facilitate access to potential customers as well as to foreign investment and technology.

Benefits for sponsors and local governments

Incubators could have significant impact on strengthening the respective local agencies and through entrepreneurial activities. Specifically, the benefits include the following:

- **Augmenting the infrastructure for small and medium scale business growth, thus promoting regional development.**
- **By providing focused support, the business incubator will create viable businesses and well-paid jobs. Some of these businesses would expand rapidly, creating even larger direct plus indirect employment in the future.**
- **In addition, based on experience in other countries, one direct job from a technology-based business would create up to one indirect job.**
- **Further, the incubator would assist existing companies outside the building, through outreach services.**
- **The above activities would generate income for the community and taxes for the state. The US experience is that there is revenue of US\$ 4 to 5 from corporate taxes for every one dollar of public subsidy.**
- **By the diversification of technology-based products and services, improved productivity and quality, increased exports from the region can be expected.**
- **Strengthened linkages with university provide consultant opportunities for the faculty and experience on engineering and business for students. It also enhances coordination between departments within the university.**
- **Existing large businesses, public and private, would be able to develop new sources for components and services through subcontracting, opportunities for acquiring innovations and for investment of funds in new ventures. Through “mentoring” of the entrepreneurs, the large companies would share their business experience and also fulfill their social responsibilities.**
- **The incubator could actively promote women-managed ventures, or be designed specifically for them. It could also empower youth and seniors.**

Overall, a properly managed business incubator program could provide significant benefits to the local community in economic terms as well as enhancing the synergy between enterprise university - research - government.

Specific Benefits:

The following specific gains can be expected from a technology incubator.

- (1) **Enterprise creation**

The typical pattern of enterprises entering, graduating and dropping out of the incubator are projected below. At the end of the 4-year initial operations, the incubator could support some 20 companies in its premises (with perhaps a greater number of affiliates outside). In addition, out of the total of 51 entrants, about 25 would have graduated and 22 failed, a failure rate of around 33%, (considerably below failure levels of small early-stage businesses outside the incubator).

<u>Incubator</u>	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4</u>	<u>Year 5</u>	<u>Total</u>
New Entrants	8	12	15	16	16	66
Graduating Company	-	2	4	9	10	25
Terminating Company	1	4	5	6	6	22
Companies - Year End	7	13	19	20	20	-

As the pilot incubator gains experience in selecting and supporting businesses, success rates should improve.

(2) Employment generation

Typically the entrepreneur groups selected to enter the incubator may have average of 2 persons each, growing to an average say 12 persons at the end of 4-5 years. Thus, the companies in the incubator and the graduated companies can create many direct jobs (as well as jobs at the “affiliates” outside the incubator and indirect jobs). The investment of around US\$ 500,000 for building renovations and initial operations can result in some 400-500 good jobs, excluding jobs in affiliates and indirect jobs. As the graduate companies grow in knowledge-based products, some at 20-30 percent a year, cost per job would decline.

(3) Other benefits

In addition, there are benefits which are not rapidly quantifiable, such as: building of technical and managerial capacity; commercialization of university research; promotion of entrepreneurship and changes in the “culture” of university-industry-government relationships; improved survival rates and enhanced growth of companies in the incubator program, resulting in higher sales; income and taxes for the community; and overall enhancing pride and self-esteem of the people. The case example in chapter 9 indicates the overall effects.

ACTION KIT

The TBI is a micro-economic tool for nurturing entrepreneurs, who create enterprises, which in turn generate direct and indirect jobs as well as other non-quantifiable benefits. It is *not* a grand solution to problems endemic in an economy or society. To make the tool effective:

- Keep the capital investment for renovation and other preparatory costs down, possibly under \$ 500,000 provided a vacant building in reasonable good condition can be secured. This lowers the need for credit and reduces the debt burden.
- In the cash flow projections, structure the rent, services and other income to generally cover expenses within say the 5th year of operations. This offers the prospect of reducing (or eliminating) dependence on subsidies.
- In this period, the benefits to sponsors, university, community and state (in taxes realized and jobs created per \$ of net subsidy) can be significant. Importantly, the entrepreneur is helped to survive and graduate as an enterprise.
- In surveys of sponsors and tenants, both seem to express satisfaction at the benefits provided by incubators.
- Sponsors, mainly governments, continue to provide financing for new incubators, indicating that in their own calculations, the returns are significantly higher than the public investment.

THREE - IMPLEMENTING

*Don't be afraid to take a big step
when one is indicated.
You can't cross a chasm in two small steps.
David Lloyd George, 1936*

5. Implementation Actions

Following on the preparatory work, the start of implementation is a big step forward. The critical path in the establishment of the TBI is taking possession of a vacant space from the city, university or other sponsors and its renovation, or the acquisition of land and the construction of the new facility. Major delays can also be caused setting up the organization structure and in mobilizing the financial resources.

5.1 Preliminary actions prior to startup

After the finance is assured and the renovation or construction underway, other tasks such as developing the management team, marketing the incubator and selecting tenant-members can be initiated.

A series of activities lead up to the initiation of incubator operations:

<i>Activity</i>	<i>Month(s)</i>
<i>1. Appoint Board of Directors and hold first Board meeting. All actions hereafter are responsibility of the Board;</i>	<i>1 - 2</i>
<i>2. Secure consensus among key stakeholders on purposes, type and mission of incubator</i>	<i>1 - 2</i>
<i>3. Finalize consultancy contract for advisory services on implementation and initial operations;</i>	<i>1.-2</i>
<i>4. Complete legal work for the establishment of the TBI</i>	<i>2 - 3</i>
<i>5. Establish the project implementation and construction management structure;</i>	<i>2 - 3</i>

6. **Finalize negotiations and sign lease agreements for incubators' use of land/space on low (or no) rent basis for initial 10 year period;** 2 – 3
7. **Select competent manager and arrange for hands-on apprenticeship training at operating incubators;** 2 – 4
8. **Prepare engineering specifications, invite bids, finalize contracts for construction/renovation work.** 3 – 4
9. **Set up Steering Committee and Advisory Committee;** 3 – 5
10. **Board to finalize operating procedures, incl. selection criteria, rentals, service charges and agreement for members;** 4 – 6
11. **Initiate selection process for 5 – 8 entrepreneurs to enter incubator;** 4 – 7
12. **Initiate arrangements for tenant financing;** 4 – 7
13. **Organize Pre-incubation/Entrepreneurial Workshop;** 5 – 6
14. **Board and management organizes services for members;** 5 – 8
15. **Complete construction and procure office equipment/furniture;** 5 – 9
16. **Promote outreach services and enroll affiliate members to be serviced outside the TBI;** 6 – 9
17. **Install furniture and equipment and prepare to induct first batch of tenants.** 7 – 9

Such a schedule provides a basic framework for pre-opening activities and the approximate time sequencing for reasonable development of an incubator program.

5.2 Construction management

The principles of construction management are similar to those of good incubator organization: clear responsibility and concomitant accountability. Without these, chaos and misdirected use of resources will increase costs and time dramatically.

Project construction team

The main sponsors/Board establishes a Construction Team, under a Project Manager with relevant experience. It should be small, including a representative of the owner, contractor (On-Site Construction Manager), and architect.

Project manager is administratively in charge of the construction project, allocates responsibilities and authority, to ensure that the Contractor meets schedule and provides technical direction. As representative of the owner he is responsible for adjustments to the architectural and construction plans, decisions on behalf of the owner, and referrals on those requiring additional approval for speedy resolution.

He also initiates project related activities, such as purchase and installation of equipment, signage, etc outside the responsibilities of Architect.

Architect is responsible for the original design and implementation of such changes as are revealed to be necessary to meet specific goals of the Owner.

Construction manager is responsible for implementation of the architectural plans with appropriate labor and materials as specified, construction-related permits and licenses as well as work-site security and safety.

Project planning and scheduling

Pre -planning process begins with consideration of the various elements of the project and their interrelationships. This forms the basis for sequencing requirements and resources, shortening the construction cycle and minimizing cost.

Architectural drawings form the basic reference document for the construction process. They establish the general scope and details of construction, including the bill of materials. Complete sets of drawings must be available to the construction team, in order that the impact of choices be specified, opened to discussion and resolution prior to actual construction. The plans must be constantly reviewed with provision for notification and authorization of change orders

Cost (and time) estimation is the responsibility of the Construction Manger. The honest presentation of these elements allows the Owner to make choices and keep the project on track. Knowledge of individual cost (and time) elements is essential to achieving the design results on-budget and on-schedule.

Project scheduling involves the careful sequencing of activities, including associated materials and labor. The detailed schedules not only set time and cost benchmarks, but also provide the basis for considering trade-offs in project execution. The more complete and well considered the schedule, the less the Contractor will need to include “contingencies” in the cost and time estimates.

Bidding for the project has both legal and technical aspects. The local law and custom must be obeyed rigorously, construction documents be unambiguous, and a forum for questions provided. The timing of each element of the process must be clear, distinct and sequenced properly. Throughout the process, concern for both impropriety and the appearance of impropriety should guide individual actions

Project and contract administration

Administration of the project requires defined responsibility, with sufficient local authority delegated to the construction team to make all but major changes to the project. The weekly meeting is a key event for program coordination and resolving issues. Honest assessments of progress relative to the work plan provide opportunity for timely interventions.

Contract administration begins with signing agreements with the successful bidder, ensuring that these are clear and legally appropriate. Penalty and bonus clauses as well as standard payments must have unambiguous trigger points and amounts. Professional fairness requires that such payments be made within the letter and spirit of the agreements. The team should routinely update cash flow forecasts, ensure that funds are available when needed to meet contractual obligations, document all change orders, figuring the impact into the cash forecast.

The project manager is responsible for a final project walk-through to compare results and put together a final checklist of fixes required before project end. Finally, Contract Administration, working with Project Administration, should ensure that complete “as built” drawings are completed prior to the end of the project.

5.3 Organization structure

An incubator is a business much like the tenants it serves; consequently, it must be run in a business-like way if it is to advance the cause of its tenants and sponsors. This belief must begin with the formation of the incubator and continue through the daily operations, at every level and at every stage.

The organization of the TBI is based on the concept of local autonomy and control. As such, the ownership of the incubator is vested in the local sponsors, formed explicitly for this purpose. Since incubation brings together many aspects of economic development, an independent entity can facilitate interaction with existing structures.

The main components of TBI organization could be as follows:

Under the owners, the Board of Directors (Board) has responsibility for overall supervision of operations (see below). It is expected to meet quarterly or oftener if needed, to provide general program monitoring and set policy to guide day-to-day activities of the incubator. The Board may authorize one or more committees, delegating specific responsibilities to each. Such committees, meeting more frequently than the full Board, may include:

- 1. Executive Committee: Composed of a few members of the Board, the Executive Committee undertakes operational responsibilities between***

regular meetings of the Board. During the development stage it may serve as a steering group to guide construction and preparatory work.

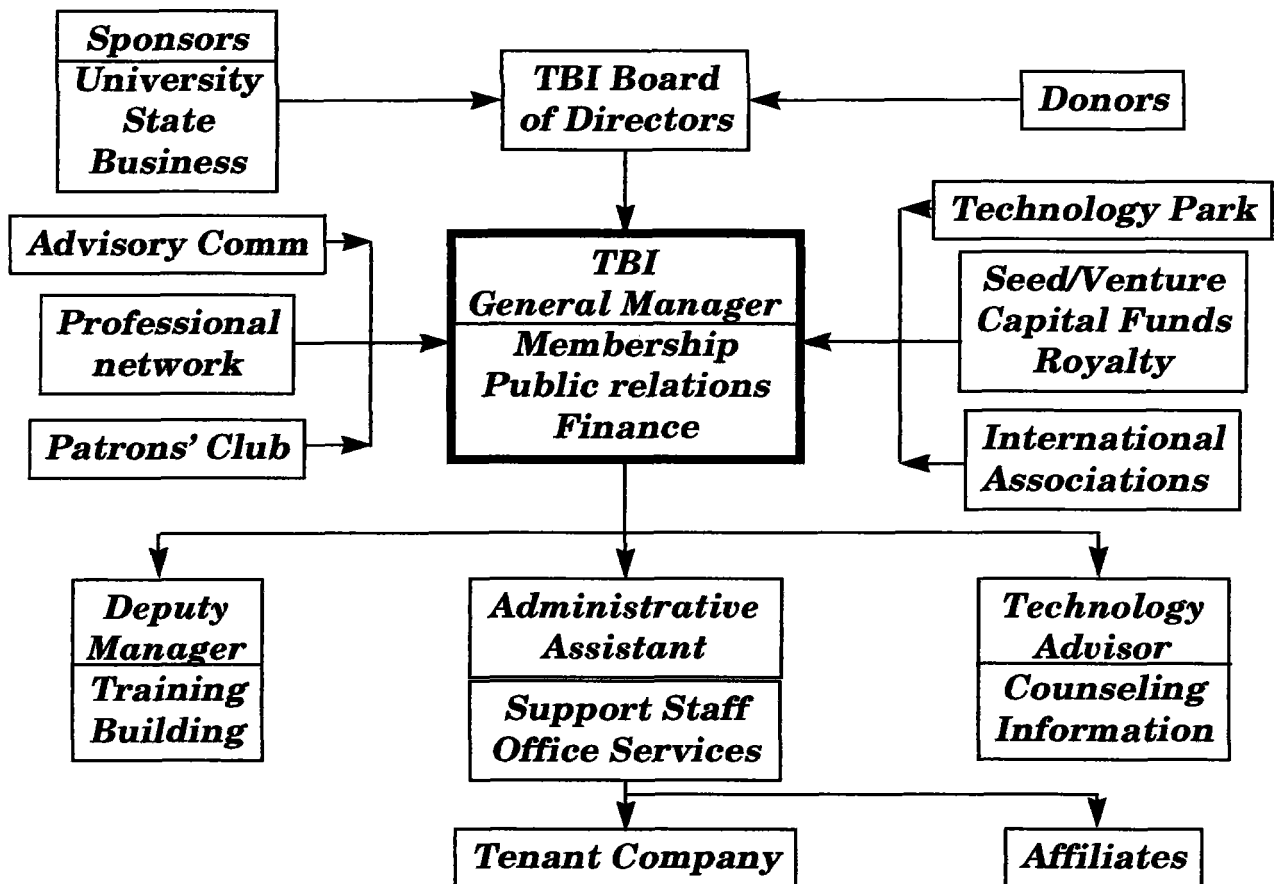
- 2. Audit Committee: Generally three members of the Board, empowered to retain independent, outside audit of the financial operations of the incubator on an annual basis.*
- 3. Personnel Committee: Generally three members of the Board, charged with responsibility to develop and implement personnel policies for the incubator staff, including compensation of key members.*
- 4. Advisory Committee: Consisting of experts drawn from the university, chamber of commerce, industry and other agencies, to advise on the selection of tenant businesses, and their exit. This committee may co-opt special expertise as needed.*

A suggested structure is indicated below, Figure 9. This may vary from case to case to give consideration to local preferences and personalities. Further, it may begin small and develop as the responsibilities and emerging needs dictate.

Role and responsibilities of Board

The Board of Directors, the focal point for program development, is composed of say 10 – 12 members of the business, academia, and government communities, with fiduciary responsibility for the funding and operation of the incubator. It is expected to approve major capital expenditures, annual capital and operating budgets, annual audits and financial statements, and staffing levels. In addition, it may authorize entering into agreements with donors for acceptance of physical and fiscal support and contracts with third parties to support the development of the incubator.

Figure 9: Typical TBI organization structure



The Board's involvement should be enhanced so that it feels a real sense of responsibility for the incubator's success. It has to be equipped to mobilize local support, oversee the manager's performance, and become a strong advocate of the interests of the incubator. The directors should be given the opportunity to see operations of incubators and understand the spirit of entrepreneurial venture creation.

In many developing country situations the Board is weak and symbolic. Unless it is strong and visible, it will not attract responsible leaders. Armed with consistent and well-reasoned policies, the incubator staff and tenants have the overall guidance to ensure effective operations. The Board has the significant responsibility to provide liaison between the incubator (and its tenants) and the university, business, banking and international communities, and to mobilize the financial and other resources. With its role in the selection of tenants, each member has a vested interest in their success.

The Board's tasks comprise:

- **Commission and evaluation of Strategic and Operation Plans**
- **Evaluation of annual Operating Budget and annual audit**
- **Establishment of Policies and Procedures including tenant admission/exit**
- **Approval of major capital expenditures**
- **Establishing job description and hiring of the incubator manager**
- **Establishment and approval of reports on operations, audits, budgets**
- **Approval of debt and equity investments**
- **Review of performance of key employees**
- **Review and approve Manager's recommendations on selection of tenants.**

Staffing the incubator

The management team typically consists of a few positions, each playing a key function in the overall operation. The size depends on the number of tenants and their dominant characteristics, type and complexity of services provided, services for affiliates outside the incubator, the sponsors' agenda, and the availability of funding. While average team size at U.S. incubators is about 3 persons, a TBI in a developing country may need say 4-5 persons, adding staff as services provided and income warrant. It must be built up progressively based on emerging work load.

The small initial team would support approximately 15 to 20 businesses within the incubator and another say 20 to 50 affiliates outside. The main responsibilities could be allocated as follows, with each person serving multiple-functions as needed:

- **Manager: Responsible for overall coordination, particularly incubator promotion and performance, financial management, networking with Board, university and community. S(he) also has responsibility for early identification of constraints to tenant success, followed by corrective actions and referral to competent business and technology specialists.**
- **Deputy Manager: Responsible to the Manager for member services, training programs and buildings.**
- **Technology adviser: Responsible to the Manager for technology support, counseling and information programs focused on tech-venture creation.**
- **Administrative Assistant: Support to Manager on public relations, computer systems, administration.**
- **Receptionist: Support to members, documents and information, office-related services.**
- **Security Officers: Twenty-four hour security operations and maintenance and janitor services. This function could be sub-contracted.**

- **Doorman and office boy (optional): General support for both management and members.**

Professional Consultants may be engaged to provide specific technical support for tenant companies, in fields such as product and process design, marketing, manufacturing, accounting, law, personnel, public relations, and export.

Qualifications of manager

The manager will have overall responsibility for providing leadership on growth and day-to-day operations of the TBI. Typically, his/her qualifications include:

- **Background in small enterprise development, preferably with experience of starting and growing a self-owned business.**
- **Knowledge of the local community and formal/informal network of contacts within university, government, private, and non-governmental organizations.**
- **Consulting skills, in order to provide managerial, technical and business strategy advice to tenants.**
- **Familiarity with problems of creating enterprises in advanced technologies, in the rapidly globalizing environment.**
- **Excellent written/verbal communications skills and computer literacy. Proficiency in English language is essential to stay abreast of international business developments.**
- **Interpersonal skills to interact with tenants, the Board, service providers, bureaucrats and politicians. Raise funds, liaison effectively with the stakeholders and handle staff, all under conditions of uncertainty.**
- **Unqualified integrity, unsurpassed enthusiasm, mature business judgment and a total commitment to the success of the incubator, its tenants and the owners.**
- **Understands design and implementation of accounting and control systems to ensure proper stewardship of resources.**
- **Available to work long hours with dedication to make the incubator succeed.**

Where is such a Renaissance person to be found? Generally, researchers and professors do not have entrepreneurial and management skills, but of course there are exceptions. Experience indicates that women often have the nurturing skills to support the entrepreneur and make good incubator managers.

A person with talent and potential has to be searched, then given opportunities for training and development, and properly remunerated. The incubator Boards at times advertise in the (inter)national media to secure a qualified pool of applicants.

Duties of manager

The main duties of the Manager are: to manage incubator finances and fund raising; select tenants and develop good rapport with them; promote the incubator; mobilize a support network and develop business advisory services. In the early years, (s)he may need to cover other functions as well, such as extensive mobilizing of sponsors, structuring operations for the Board, evaluating a range of service providers, and organizing the counseling, training and building services.

Specifically, the duties cover:

Program Promotion:

- **Plan and begin a marketing campaign to raise public awareness, inform potential investors, recruit tenants, and mobilize support in the community.**
- **Prepare monthly activity and financial reports for the Executive Committee, and quarterly reports for the Board.**
- **Engage, motivate, discipline and supervise the staff.**
- **Develop cooperative arrangements with the universities, research laboratories, banks, chambers of commerce / industry, sponsors, and other programs which deal with SME promotion.**

Facility Operations:

- **Develop operating procedures to help make the incubator more efficient, its tenants more successful, and meet the expectations of the community.**
- **Design and implement rent schedules, fee structures, and other revenue generation mechanisms, subject to Board approval, in order to move the Incubator towards financial sustainability within five years.**
- **Install and supervise an accounting system to ensure proper stewardship of all funds.**

Support for tenants and affiliates:

- **Evaluate and recruit prospective tenants and affiliates in close consultation with the Advisory Committee; negotiate final contracts.**
- **Mobilize (in)formal network(s) to assist tenants in their needs, including an educational program of seminars and workshops**
- **Link tenants to university / laboratory faculty and facilities for research analyses, testing, prototype development, etc.**
- **Facilitate interactions among tenants, specifically taking advantage of opportunities to develop supplier / customer relationships.**
- **Develop financing strategy and business development plan with each tenant as appropriate, including equipment lease / purchase,**

accessing banks, government, venture capital and private sources of finance.

Manager's use of time: A typical US manager spends much of the day on relationships with board, university, community, and fund-raising.

<u>Activity</u>	<u>Percent</u>
<i>Direct intervention with clients</i>	<i>17.0</i>
<i>Creating/maintaining external resources</i>	<i>11.0</i>
<i>Fund raising</i>	<i>9.0</i>
<i>Building management</i>	<i>10.0</i>
<i>Incubator marketing (recruiting)</i>	<i>11.0</i>
<i>Incubator operations</i>	<i>13.0</i>
<i>Educational / training programs</i>	<i>6.0</i>
<u><i>Non-incubator responsibilities</i></u>	<u><i>23.0</i></u>
TOTAL	100.0

Ideally, half the managers time should be spent on working with tenant companies.

Qualifications and duties of deputy manager

The Deputy Manager should have complementary experience and skills to those of the Manager, focusing on day-to-day operational issues. These generally include:

- Consulting and training skills, to provide managerial, technical, and marketing support,*
- Organize maintenance of the building and procurement / repair of equipment and facilities.*
- Excellent written and verbal communication skills and computer literacy.*
- Ability to organize maintenance of the building, equipment and facilities.*
- Skill in collecting accounts receivable.*

The final selection of the deputy is done by the Manager, with support from the Board.

Qualifications and duties of Technology Adviser

In a TBI, a person with a strong interest and experience with issues of technology venture creation is necessary.

- While not necessarily a scientist, technologist or engineer, a technology orientation is essential, including counseling and training experience on IPR, ethics and environmental issues,*

- **Experience in starting and running a knowledge company would be valuable, Operating data bases, technology sourcing, and proficiency in Internet and WWW applications,.**
- **Familiarity and contacts with the local technology establishment, in order to access expertise and equipment,**
- **Knowledge of sources of risk finance and due diligence process, to help firms secure research and operating capital,**

Qualifications of Admin assistant/Receptionist

An administrative assistant is critical to the success of the incubator. Usually this person is the first contact that people have with the incubator and tenants. Generally, one person can handle the administrative duties as well as answer the telephone, until the time that the number of tenants grows to more than 10 companies. The following qualifications are desirable:

- **Strong work ethic and. caring personality**
- **Professional appearance and demeanor.**
- **Excellent computing and communication skills.**
- **Capability to organize all office equipment and shared facilities.**
- **General knowledge of business and office procedures.**

The administrative assistant will have to assume some responsibility when either or both the incubator manager and deputy are absent.

Expansion of the incubator staff

As is often the case, the financial resources of the incubator prevent the hiring of sufficient staff to optimally meet the varied needs of the tenants and the facility. This requires the management team to become resourceful in securing skilled help from Board members, college students and staff, service providers and others.

Interns can be secured through universities, student professional groups, referrals from current interns and career placement centers. Interns with special capabilities can help both incubator and tenants, while acquiring added experience. However, they need to be properly supervised and given meaningful responsibilities. State programs such as in Brazil and in ATDC, Georgia Tech, Atlanta, provide support for engaging interns for the incubator as well as for its tenants.

5.4 Training of management team

Training consists of several interrelated steps beginning with a gap analysis for each individual team member, the identification of skills necessary to perform the target job, and comparing those needs with the

capabilities the incumbent brings. Typically, the basis of the skill identification starts with a written job description, approved by the Board. Skill needs change as the organization is required to meet new client demands. Defining and communicating expected training outcomes and job performance are critical.

The objective is to have all team members focusing on the same organizational goals. Therefore, the training should start with the contribution that each member is expected to make to these goals.

For prioritizing the needs, defining outcomes, formulating the training program and allocating resources, the questions to be addressed are:

- **Who will do the training?**
- **Where is training to be done?**
- **What training method are most effective?**

Effective team training needs can often be done by the use of simulations, that is, some exercise that is not job related, to identify dysfunctional team behavior such as aggression, withholding information, and other attitudinal problems. The Incubator Business Plan can be used as a source of direction for the overall cohesive and functional development of the team.

Training program for managers

A comprehensive program has the following components:

(1) In-Country Orientation: Apprenticeship abroad should be preceded by an in country orientation program to maximize effectiveness. It provides the basic knowledge of facilities available at home and the role of the incubator in support of local economic development.

(2) Overseas Training: This is intended to give exposure to existing incubators, either in an incubator with comparable operations or in the USA/Western Europe due to the breadth of their experience.

Management staff of the first Ukraine incubator and the first Mexican incubator (CEMIT in Cuernavaca) had management training at the Rensselaer Polytechnic's Incubator at Albany, New York. Managers from the Baltic States spent an apprenticeship at Rutgers University, New Jersey, and teams from the Indonesian program were trained at the University of Texas-Austin Incubator. Managers from several Latin American incubators received training at Twente University, Netherlands in 1992 under the auspices of the European Community's 'Columbus Project'.

Intensive hands-on experience can be provided in a four-week program:

Week 1: Theoretical and practical background in new venture creation and economic development. Lectures, case histories, and preparation

of business plans will help attendees to understand the mission of incubators.

Week 2: Visits to other incubators, technology parks, economic development and other agencies to broaden the perspective and set up business contacts.

Week 3: Practical work within a well-run incubator to understand the role and activities of management and staff, and how they interact with the tenants.

Week 4: Work within the tenant companies, to understand the needs of clients and how they interact daily with the incubator and the community.

The best time for the course is when work on the incubator building is near completion and before tenants are admitted. If earlier, the newly appointed manager and staff will not be familiar with the environment and the requirements of their incubators, and thus will be unable to effectively apply the knowledge gained.

(3) Continuing training at home: This is important for the continuous development of the incubation modality in a developing country. In addition to a review of practices and current global experiences, the training gives the opportunity to reflect on the operations of the incubator in the context of its mission, and, by interacting with the trainers, to help resolve vexing technical and political issues.

The incubator manager and all staff should attend. In addition, each tenant could send one representative, preferably the manager. Officials from university, local government, chambers of commerce and other organizations working with the incubator may also be encouraged to participate. The faculty should include professionals to discuss local business and patent laws, accounting, tax and financing procedures, and speakers from the local community, such as successful business people, government agencies, banks, etc.

As the incubator management team and entrepreneurs are busy people, a course of short duration could include:

- An audit of the operations of the incubators;*
- Detailed operating plans, procedures, and management systems and a budget for the incubator;*
- Business plans for selected tenants (and the Incubator if one does not exist) with financing plans and applications.*

Thus, the initial incubator business plan will be re-evaluated on the basis of the operating experience to date. An up-date of the tenant requirements will also emerge. The incubator budget and break-even analysis will be

refined by the manager, who then will be re-committed to achieving the required goals.

Importantly, continuing education involves participation in national societies to develop potential contacts as well as hone professional skills. These include NBIA (National Business Incubation Association, Athens, OH), EBN (European Business Innovation Center Network), ADT (Arbeitsgemeinschaft Deutscher Technologie und Grunderzentren, Germany), ANPROTEC (Brazil), AMIEPAT (Mexico City), HESPA (Higher Education Science Park Association, Moscow)

5.5 Marketing the incubator

The incubator, no less than its members, must establish an effective marketing program. Not only does this encourage quality businesses to join the program, but also disseminates the message of entrepreneurship to the general public. In designing the plan, several issues must be addressed and included in the TBI business plan:

- *Besides space, what other services will be provided to add value to tenant operations, based on their needs and gaps in the market?*
- *What kinds of prospective entrepreneurs are to be targeted, initially and later?*
- *Where, when and how will the marketing campaign be conducted? If it is too early, expectations are needlessly raised.*

Main methods used by successful incubators are (1) printed materials such as brochures, fact sheets, news items and newsletters, (2) speeches to influential groups, news conferences and pre-incubation workshops, (3) the media, print advertising and public announcements, (4) new communication channels such as Internet based Web pages and links, (5) involvement of local civic and business leaders.

Influential board members have a special responsibility in spreading the message, and so does the management team. News of success breeds success, news of dissatisfaction with the incubator or of failure of a tenant can quickly damage the incubator's reputation, taking months to rebuild it.

An aggressive marketing program takes two parallel tracks:

The first track is directed at the entrepreneur (the target market) and explains the benefits of being associated with the TBI. It is said that in some cultures it is not considered useful to be resident in an incubator or to pay fees for the services provided, or to leave the incubator. Further, that these attitudes are aggravated by mistrust of programs sponsored earlier by government institutions. The marketing program needs to dispel such fears.

The management has to focus its efforts in getting that first dynamic group of firms into the facility and insure their success, as this would help attract others. The goal should be enlist perhaps 5-8 entrepreneurial firms initially. Incubator literature, brochures, marketing pieces, direct mail items etc. need to address the importance that the incubator and its management will play in the growth of the firms.

The second track is directed at the key sponsors, particularly the university, city administration and private sector. The marketing program needs to clearly explicate the concepts and the benefits of supporting the incubator.

In the case of university-related TBIs, it is not enough that the top administration endorses the incubator, but also that faculty in related departments, including the business school, are fully briefed and brought on board. Their positive involvement can significantly help while their dissatisfaction will hurt incubator prospects.

Lao Tzu's advice to governors of a state in ancient China applies as well to the board of an incubator. "Govern the state by being straightforward; wage war by being crafty; but win the empire by not being meddlesome".

ACTION KIT

The critical path in incubator development runs through securing the vacant building or land, finding the finance to renovate or build, and completing the construction work. If these activities are well in hand, the other implementation actions can run concurrently and the first tenants selected and inducted within 9 to 12 months. The telescoping of these actions requires:

- Clearly delegate authority and responsibility for the construction management, setting realistic schedules and budgets, then rewarding those responsible for meeting targets, penalizing them if they don't.
- Set up the organization structure in a manner that makes the TBI board responsible for policies and high-level relationships, promoting the incubator program and mobilizing finance, selecting the manager and overseeing performance. Then, the working committees should be left to do their special tasks and the manager enabled to do his/hers.
- As the selection of manager is critical to the success of the entire program, seek out the best through referrals, publicity and interviews; once an entrepreneurial person is appointed, orientation in-country, provide hands-on apprenticeship training at a comparable incubator, and continuous re-training opportunities thereafter.
- Utilize the best possible (not necessarily the most expensive) resources to launch a media campaign for marketing the TBI. This starts with determining the incubator's strengths and the needs of the target market, followed by activities that can satisfy the market and accomplish the objectives. News on successes achieved widely disseminated, are the most effective marketing tools.

6. Selecting tenant companies

Incubator operations include the full range of activities directed towards selecting entrepreneurs, servicing and graduating them. The key to successful operation is providing support to help early-stage, entrepreneurial ventures develop and grow.

6.1 Business plans for entry to TBI

The incubation program addresses common problems and causes for business failure, first, by selecting entrepreneurs with better than average opportunities to achieve success. Second, by developing a support program to help entrepreneurs meet their needs and overcome their problems. Finally, the incubation program constantly re-evaluates the changing needs of its members and develops specific interventions.

Some causes of business failure

While an incubator cannot protect all businesses from the multitude of issues that confront them, it can address many of the common causes of failure. The leading causes and approaches to solutions are as follows:

- Inadequate capital: Seek capital through a variety of, debt and equity vehicles.**
- Product or service not needed: Demonstrate market need as a precondition for entry into the program, seek advice on marketing.**
- Excessive overhead: Seek reasonable space at flexible terms, reduce fixed costs.**
- Insufficient commitment from owner: Guidance and mentoring.**
- Bad luck and/or timing: Business planning, guidance, counseling, mentoring.**
- Poor understanding of business: Guidance, counseling and training.**
- Problem of location and space: Seek information, advice.**
- Poor accounting controls: Business planning, education and training,**

The business plan

Businesses seeking entry to the TBI should have a plan — or be helped to formulate one — in order to articulate their goals and consequent needs, force management to focus on inconsistencies and missing elements, such as a financing strategy. The plan need not be lengthy, but must be reviewed regularly and updated as necessary. Some questions remain in the minds of entrepreneurs, Box 12.

With a completed business plan the partners understand each other far better. Employees can take actions consistent with the plan. Further, investors can assess the risks and rewards of the investment. The incubator

team can identify development issues and build a program of business support. It provides: benchmarks to track performance; the means for assigning priorities; and the financial proposal for attracting investors, partners and employees. While these are good reasons for a plan, often only the requirement for financing will force an entrepreneur away from the daily problems to the often agonizing challenge of developing a plan.

Box 12: Questions about business planning

Isn't this for big companies only?

No, small companies need plans even more to sort out the inconsistencies and provide focus on areas critical to business success.

How does planning help management?

It helps focus scarce resources on critical areas and obtain necessary financing.

Can't I hire someone to do this for me?

The plan is the embodiment of the concept of the entrepreneur. A professional can help, but key inputs are required from management.

How can I know all the answers?

You can't. But asking the questions allows you to determine key needs for research.

How often do I have to do this?

As often as the business changes, probably once a year initially. (After gaining entry to the incubator and securing finance, you will probably throw that plan away!)

What's in it for me?

Business success with reduced personal and professional stress (together with less pressure on your family and staff!).

A mistake is to have a professional, usually an accountant, prepare the business plan. Accountants will, by nature, focus on the financial aspects of the business, particularly the historical ones. Importantly, the plan must have significant input from the owners of the business. It should begin with the customer's needs, leading to marketing, service and personnel issues. These drive the financial aspects of the plan which will define the growth path of the business and the strategy needed.

6.2 Tenant selection

The selection of growth-potential, quality tenants sets a standard of professionalism that attracts others of the same kind. Is picking winners a legitimate purpose for a partially subsidized facility? The key is to accept those who can be helped to develop an enterprise capable of contributing to

the economic growth of a community and rejecting those who are involved in a flawed business concept, or who do not have the capability to start and grow a business, and who will eventually hurt themselves and their community.

Characteristics of entrepreneurs:

There is some confusion in the literature on the definition of Entrepreneurship, which is often considered equivalent to small business. Since entrepreneurship is a more glamorous and up-to-date term, the tendency is to call all small businessmen and businesswomen entrepreneurs and to change the title of courses and journals from small business to entrepreneurship. Obviously, just naming the small business owner an entrepreneur does not change the personality, outlook, experience, activities and goals of the person and the business. Similarly, calling a small business management course an entrepreneurship course does not change the objectives, syllabus, pedagogical methods and outcomes of the course.

Ongoing self assessment

Entrepreneurial characteristics are not always evident when a person launches an endeavor, but they are acquired over time with the challenges of building a successful business for the first time. These characteristics can be reinforced when the entrepreneur participates in a TBI program and interacts with the management team and with other entrepreneurs.

Incubator manager and entrepreneur must assess the entrepreneurial attitudes of the key members of the business, on characteristics and questions such as:

- Self motivated: Achievements in the past/What adversity have they overcome?***
- Achievement: Determine how a person sets goals/Are they achievable?***
- Power: Power needs can be destructive/What need does person have for control?***
- Affiliation: Need for acceptance, support and reassurance/Where do they get these?***
- Money as reward, not goal: Why do they work, What are they trying to achieve?***
- Internal self control: Review business background/How have goals changed?***
- High energy level: Questions which reveal routine and schedule /When do they start and end their work day?***
- Get others to share their vision: How do they motivate employees/How they share their vision?***
- Controlled risk taker: What tough decisions have they made/What risks have they taken?***

Potential clientele

Principal sources of entrepreneurs for TBIs include the following:

- ***University and public research institutes,***
- ***SME support programs,***
- ***Medium and large industrial plants,***
- ***Professional service firms,***
- ***Other rapid growth businesses,***
- ***Disadvantaged groups (including women, seniors and youth).***
- ***Military science and engineering establishments,***

Tenant selection is especially important if the incubator has limited space available or working with part time staff. The Advisory Committee should include successful businesses, chambers, government, banking and academic participants who would review tenant applicants, according to agreed sequence and criteria. This committee could advise the incubator manager, who would then have responsibility for the selection of tenants, with overall concurrence by the Board. If, however the Board meddles in this process (as many boards tend to do for political reasons), it becomes difficult to hold the manager responsible for the support given to the tenant.

A special concern in developing countries is to identify, prepare and select women-owned businesses for entry to the incubator. The cultural milieu may require special services for them, including the possibility of empowerment incubators focused on women entrepreneurs.

Tenant selection process

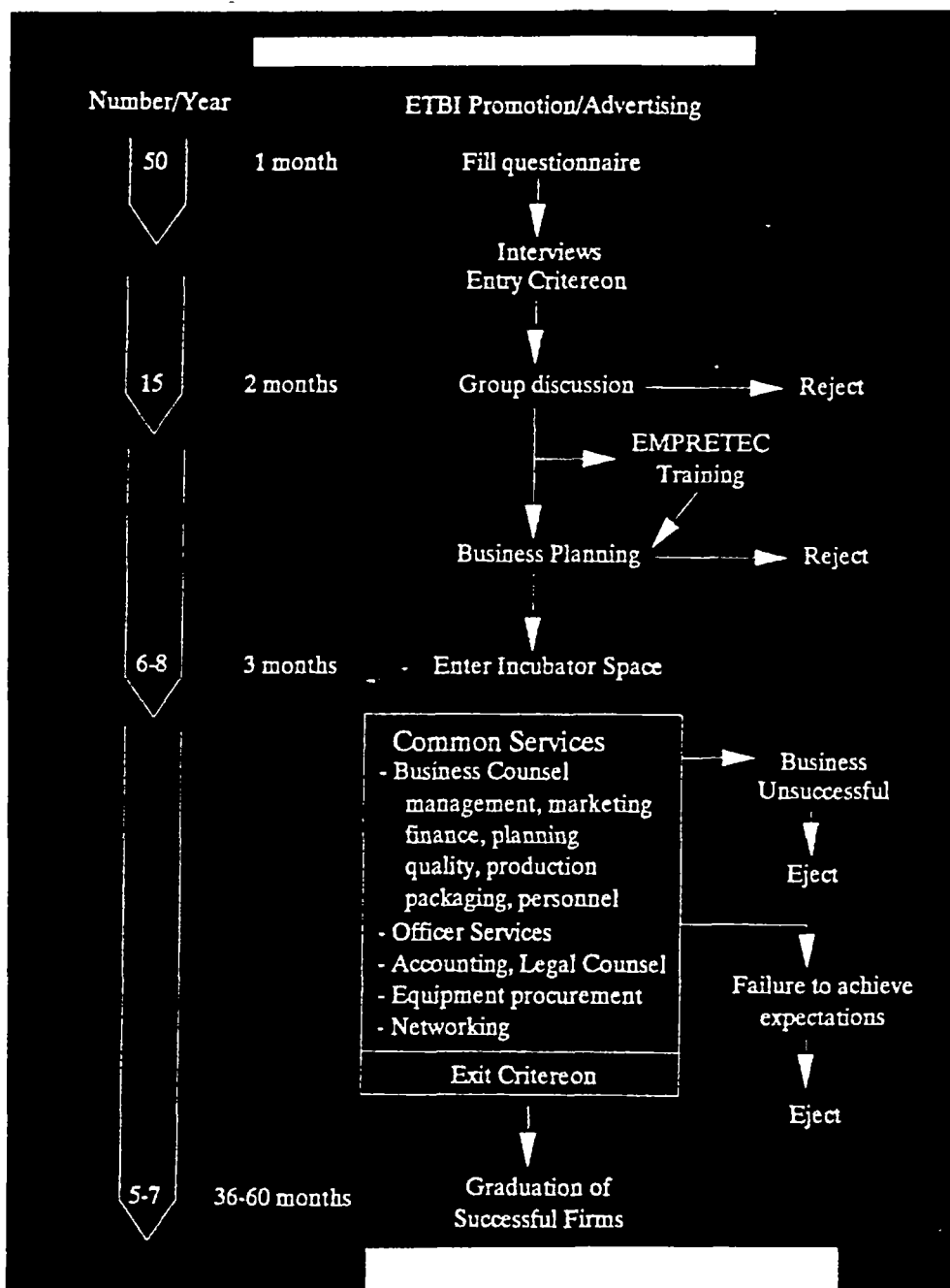
When an incubator seeks to “grow” companies, it must have a selection process through which it evaluates and selects tenant firms which are most likely to succeed. By what criteria will it admit companies into the incubator? How will the incubator judge success? When and under what circumstances will it “pull the plug” on tenant companies? What, if any, exit policy exists, and how does this apply to the selection of incoming firms?

Criteria for selection of tenants are outlined in Annex 4. The tenant selection process is shown in Figure 10.

A majority of businesses are very small and employ one or two persons. These micro-enterprises, often called lifestyle businesses, do not have significant potential for generating income and employment. Others generate good income and have the capability to become larger but prefer to remain small. Entrepreneurial business are typified by rapid growth. They are big businesses that happen at this moment to be small. The early Microsoft and Apple Computer come to mind when talking about this type of higher potential company. These are the ones that incubators seek.

Applicants to the incubator should be required to submit a business plan complete an application form before final acceptance into the incubator. The business plan should generally cover the key elements in the TBI plan discussed earlier. A draft application form is in Annex 5, to be adapted to the incubator's needs. Temporary occupancy in the incubator can be provided while the entrepreneur works with the incubator management to develop a business plan. A check-list for assessing the applicant's business plan is in Annex 6

Figure 10: Tenant Selection Procedure



Selection criteria

Important criteria for tenant selection are in three levels, of which the most important are the business aspects.:

General:

- Potential for business growth**
- Ability to create jobs**
- Ability to generate net profit and pay incubator rentals**
- Potential to strengthen and diversify the economy**
- Increase local tax base**
- Management resides in the community**
- Compatibility with Incubator objectives and existing tenants**

Technical:

- Value-added by innovation**
- Core competence**
- Time to market**
- Patent situation**
- Uniqueness of concept**
- Access to external expertise/faculty/facilities**

Business:

- Market knowledge and focus on specific industry**
- People-oriented manager, able to attract a good staff**
- Ability to develop a network of cooperative relationships**
- Good communicator, with knowledge of English and computing**
- Small business management and marketing skills**
- Integrity and capacity for hard work**
- Ability to handle crisis and risk**

The Advanced Technology Development Center at Georgia Tech, utilizes a 4-step process involving in-house experts to assess the management, money and technology, and graduate students to assist in surveying the market. Criteria for evaluating entrepreneurial opportunities are in Annex 7.

For a company with growth potential, a balanced team with business experience is preferred, since the wide range of experience needed to grow an enterprise rapidly is seldom found in one person. The incubator will provide some of the skills necessary and training programs will also augment management capabilities. The incubator seeks entrepreneurs with good "people skills", that is, the ability to work well with others, to delegate authority, to attract a team, and to develop a network of contacts.

The entrepreneur should know who the customers are and how to reach them. Ideally, the structure of the market should be one where no major competitors are already entrenched and a large share of the market can be obtained. There should be high value added, and gross margins that are

high in order to provide a cushion for the mistakes that will be made. Competitive advantages for the product should exist, such as legal or contractual advantages. The company should be able to gain proprietary protection through patents or proprietary processes.

In the financial area profit after tax and positive cash flow should be high as the business matures while time to break-even is low. Return on investment should be substantially above prevailing interest rates. Most tenant application's focus on the technology aspects of the business, to the neglect of the market and management. Careful reference checking and interviews by successful business professionals are important steps in ensuring the entering class of the incubator meets the goals of the incubator. Proactive recruitment programs include referrals from successful professionals, from businesses to service providers.

6.3 Exit policy

While the policy for entrance is reasonably straightforward, the process of exit is far more complicated. The incubator is designed for short-term support of growing businesses. It will be successful to the extent that it develops new enterprises to enter the market, and also deal with flexibility and sensitivity with those who show no capacity to do so. To monitor the performance of all its tenants, a monthly report from them could be helpful, together with evaluations and mentoring. A member performance check-list is included as Annex 8.

When there is no subsidy in incubator rentals or services (or when the space is not fully occupied) there is less need to terminate a tenant's occupancy. Some incubators today may keep even some of those who have spent 5 or 6 years in the facility.

Business development leads, simplistically, to three alternatives:

Business closure, latent or survivalist business, business success.

Business closure, through either voluntary or involuntary processes, is an essential part of the business development process. The incubator management must deal with such closures humanely and consistent with the needs of the incubator to maintain a healthy environment. Failed businesses should be humanely and quickly removed, preferably before the news of the failure becomes public to spare the business and the incubator as much embarrassment as possible.

Latent business is the most difficult. These, sometimes referred to as the 'living dead', are identified through monthly monitoring and continuing discussions. Their business plan keeps changing as they encounter a series of setbacks, often attributable to sources outside the control of business management. As soon as this pattern of non-development becomes evident, incubator management must intensify the normal counseling, including

advice on quick closure of the business to avoid dissipation of the human and financial assets.

Of interest is the U.K. experience on the traditional exit requirement of non-expanding businesses from incubators. Such a business is allowed to continue in its space provided it is viable and capable of paying its way. For instance, British Steel (Industry) would sell such spaces to a professional landlord to be run as a multi-tenant facility, and build additional incubation space. It also builds 'progression units' for those businesses who do not want larger space but need somewhere to go. These kinds of arrangements should be of interest in many industrializing countries.

Successful business: A major challenge for manager (and Board) is removing a successful business to make room for new startups. Under the pressure to maintain a non-subsidized incubator, the temptation to allow a successful tenant to remain is strong. Graduation guidelines are necessary, but are not a substitute for true understanding of the mission of the incubator.

Post graduation support is appropriate to ensure continued strengthening of business practices. Typical support includes referrals for technical / business assistance. The incubator-entrepreneur history provides a foundation for subsequent investors. Each incubator must maintain contact with graduates and also compile information on their performance which can be useful in evaluating the performance of the incubator itself.

ACTION KIT

Incubators seek winners. This is a determinant of the high success rates of companies going through the incubator and also a cause for criticism of the modality. In setting entry and exit processes, incubator Boards must consider the imperatives of developing successful tenants and of maintaining viable incubator operations:

- As typically, one in ten candidates may gain entry to the subsidized space and service, selection policies should be fair and seen to be fair.
- A rudimentary business plan can be started in a pre-incubation workshop, and the tenant then assisted to complete it as a condition of proper entry.
- While money is usually on top of an entrepreneur's litany of problems, in practice the biggest problem is often an inadequate understanding of the potential market and management practices. The ability to produce and sell a quality product in a competitive market place should receive serious attention.
- Whether structured or not, the selection process typically comprises: a group discussion where the incubation process, its obligations and benefits, are explained to prospective tenants; then an application is filled out; followed by interviews to assess the general suitability, the technology considerations, and, importantly, the business, management and marketing aspects.
- The exit process is the most difficult for both incubator manager and the tenant business, requiring flexibility and sensitivity.

FOUR – OPERATING

*No single thing abides but all things flow
Fragment to fragment clings; the things thus grow
Until we know and name them.
By degrees they melt, and are no more the things we know
Lucretius (c. 99 – 58 BC)*

7. Serving tenant companies

The planning, establishment and maturity of a business incubator, as indeed of the businesses it nurtures, should be a continuum. In industrialized countries, the environment has a strong technological orientation and the culture promotes curiosity and self-reliance, from school onwards and on through adult life. This is not so in most developing countries. Consequently the training, counseling and networking services to be provided by the TBI have to be responsive to this context and directed towards a seamless progression.

In the developing country situation, the main types of support needed by tenants are:

Training → Counseling → Accessing Networks of Services and Finance

7.1 Training for tenants

Training can be given informally, through consultation and assistance to the prospective tenants by the incubator staff, private and state-supported service providers. Due to its limited initial experience and time for this purpose, incubator staff capacity has to be supplemented by external trainers.

Entrepreneurship development

Many of the prospective incubator tenants require advance training (pre-incubation) in order to be admitted to the incubator by developing at least the draft of a business plan. Such training should have both a simple theoretical basis and especially a how to practical basis. Therefore, it should be given by people with practical experience, rather than by academics and government officials.

As entrepreneurial skills are generally inadequate, significant efforts are needed in continuously tutoring the tenant companies on the ED essentials such as business strategies and management, keeping accounts and making financial projections.

Formal courses could be given at the incubator site with the help of outside contractors. Busy entrepreneurs are reluctant to absent themselves from their business for more than one day per week and therefore such courses are best given on Fridays and Saturdays (with time off for religious observances). Courses should last all day with theoretical instruction in the morning and practical work on business, financial, production and marketing plans, etc., in the afternoon.

A series of short but formal training courses should be initiated. These will be targeted at tenants or those considering starting a small business in the future. Courses could cover business subject areas such as:

- ***Developing a business plan***
- ***Marketing strategy and exporting***
- ***Strategic planning and partnering***
- ***Financing your business***
- ***Production and supply chain management***
- ***Technology business management***
- ***Technology sourcing and IP protection***
- ***Managing university and research linkages***
- ***Internet and electronic commerce***
- ***Quality management***
- ***Managing human resources***
- ***Financial planning and budgeting***
- ***Inventory control***
- ***Negotiating***

The courses should have both a small business component, such as How to manage a successful small business, and an entrepreneurial component, such as How to recognize an opportunity, create and grow a successful new venture.

The NxLevel program for entrepreneurial support was developed by the University of Denver and US West, a phone company in the U.S. A typical course covers:

- | | |
|-------------------------|--|
| <i>Session 1</i> | <i>Introduction – Overview & Entrepreneurship</i> |
| <i>Session 2</i> | <i>Planning & Research – Entrepreneurial Essentials</i> |
| <i>Session 3</i> | <i>Organizational Matters:– Management & Legal Structure</i> |
| <i>Session 4</i> | <i>Marketing–“Behind the Scenes:”– Analysis & Understanding</i> |
| <i>Session 5</i> | <i>Marketing–“On Stage:”– Strategies, Tactics & Implementation</i> |
| <i>Session 6</i> | <i>Financial Overview:– Books, Records & Controls</i> |
| <i>Session 7</i> | <i>Managing Your Money: – Financial Planning, Budgets & Assumptions</i> |

- Session 8** **Managing Your Money: – Developing & Using Cash Flow Projections**
- Session 9** **Understanding & Using Financial Statements**
- Session 10** **Financing Your Business: – Alternative Sources of Money**
- Session 11** **The Deal Making Process:- Negotiating in the Real World**
- Session 12** **Your Business Future: – Managing Growth & Plan Completion**

7.2 Counseling and networking

A complete portfolio of advisory services has to be developed and the delivery customized to each segment of the incubator population. These services should generally complement those available outside the incubator, not compete with them. Some tenants can be counseled by the management in response to specific queries, others may be approached on the initiative of the team. General topics should be handled through expertise developed in-house, others would need special inputs through networking with university faculty and external professionals. Yet others could be assisted by the Board members.

Some of this counseling is without a fee; work needing serious consultant time has to be paid for by the tenant. Leading accounting and management consultants can be induced to contribute some days of pro bono work, on the basis that some of the tenants would engage their services in future.

In all situations, some prioritization of assistance is required, as the incubator staff resources are limited. Further, given the galloping pace of technological change, the team can only cover a part of the possible needs.

Marketing assistance

Since marketing is key to the development of the business, especially in an era of 'customer focus', a variety of forms of assistance are needed. This ranges from strategy development to services such as desktop publishing. Incubator management can provide perspective for identification of market segments, prioritization of targets, pricing, advertising, alternative distribution and sales strategies, Box 13.

Box 13: Marketing services at Hong Kong TBI

The Hong Kong Industrial Technology Center provides a variety of marketing advice and assistance. In 1998 this included 94 major product launches and six exhibitions. Its services include:

- **Marketing strategy development**
- **Positioning, channels of distribution, pricing**
- **Web page links**
- **Promotion of tenants through incubator marketing**
- **Open houses**
- **Trade shows and exhibitions**
- **Company and product brochure assistance**
- **Articles in newsletter and media coverage**
- **Discounts on printing costs**
- **Discounts on newspaper advertising**

Technology services

At U.S. incubators, services most in demand are networking with external professionals. Table 8.

**Table 8: Research and technologies services at US incubators
(Valid percent responses)**

Services	Yes, direct	Yes, by referral	Both	No, rarely/never
Consulting faculty, students	51.9	30.8	13.5	3.8
Organize access to external facilities	62.7	15.7	17.6	3.9
Locate key technical staff	27.5	45.1	21.6	5.9
Use data bases if researchers	46.0	34.0	12.0	8.0
Finance research and development	27.8	45.1	3.9	23.5

Source: Tornatzky, et al (1996)

Research commercialization may require help in technology ferreting, that is, pro-actively identifying emerging results from a large research portfolio, and promoting their commercial use. Conversely, existing tenants can be given access to a faculty profile data base of talent at universities in the neighborhood, in order to find the expertise and research results they need. Incubator management can assist in identifying technologies at outside publicly-supported research through new on-line search of databases and retrieval services.

A service facility in demand at the incubator in the Technology Park Malaysia, Kuala Lumpur is a rapid product prototyping unit, which can create precision components to meet tenant specifications. The Hong Kong Industrial Technology Center with focus on multimedia, telecommunications, microelectronics and software provides machine shop, network test-bed and measurement facilities to its 45 tenants. While

conventional mixed-business incubators provide the software of development (training, counseling, networking), technology-focused tenants can benefit by use of shared hardware (testing, prototyping, clean rooms, wet labs, distilled water, etc).

On the legal side the services needed at a TBI, in addition to company incorporation, are to facilitate know-how licensing agreements, patent reviews, intellectual property protection and non-disclosure procedures. Such special work is mostly on a referral basis.

Management teams in today's second generation technology incubators need to establish many new, in-depth programs, in order to keep pace with rapidly changing technology and business development.

The role of selected US university-related incubators in promoting technology businesses is indicated in Box 14 below.

Box 14: Operations at US university-related incubators

The Advanced Technology Development Center (ATDC) at the Georgia Institute of Technology, Atlanta, and the Ben Craig Center (BCC) at University of North Carolina, Charlotte, are among the best of the 50 or so US university-related incubators.

ATDC started in a renovated high school in 1981 and moved to a new building in 1984. It operates the Entrepreneurial Services Program for moving technologies to the market, as well as faculty research and corporate research programs. ATDC now reports to the Georgia Tech Economic Development Institute, which reports to the president of Georgia Tech.

The incubator focuses on early-stage, research-based companies with technologies of a proprietary nature. It has developed a 4-step Due Diligence Program of interviews and reviews to select growth-potential applicants. The main facility (7,700 sq m) has 29 companies and 20 at the branches. There have been 29 graduates (up to 1996), as indicated below:

	<u>Members</u>	<u>Graduates</u>	<u>Total</u>
<i>Companies</i>	49	29	78
<i>Revenues, US\$ million</i>	13.4	252.4	265.8
<i>Employment</i>	227	1,910	2,137

The average jobs come to 5 per member company and 65 in graduates, average revenues \$0.3 mill at members and \$ 8.7 million in graduates. Through a state expenditure of \$ 20 million since 1981, some 2,100 jobs have been created together with other promotion functions for Georgia state. The benefits for companies at ATDC are essentially the increased creditability and access to facilities through proximity to a renowned institute, less so the space and services associated with an incubator.

BCC, Charlotte is a non-profit corporation supported by the public University of North Carolina Foundation. The incubator is in a well-designed, \$ 3.5 million building (5,000 sq m space, see layout, Annex 3). It has 24 tenants and 6 graduates. The bulk of the tenants are in technology services (41%), and software (24 %), the rest in instruments, chemicals, and electronics. BCC also has an affiliates program and a Small Business and Technology Development Center. Since 1986 it has assisted 130 companies.

The university services most valued were student employees, faculty consultants, library and lab services. So were the typical incubator services such as accounting, marketing and business plan preparation. BCC actively promotes its international activities with a campus in Germany. See Box 4.

At BCC and ATDC, the sponsors and tenants both valued the positive contributions the incubators were making to their respective objectives. Both incubators continue to operate on significant subsidies, without any apparent need to become financially self-sufficient.

Sources: Culp and Shapira, 1997; Sarfraz Mian, 1996, Mark Schaffner, 1999.

Informal networking

Informal networking takes place at all times when management and tenants get together in the conference room, during coffee breaks, near copying machines, etc. The layout of the incubator and open doors should encourage and facilitate this process.

In addition organized networking has proven to be very beneficial. This usually takes place at breakfast or lunch seminars, Box 15. A way could be as follows. Every participant is given a color coded name tag, different color indicating whether the wearer is incubator management, client company, banker, government official, etc. During the networking period persons are given the opportunity to take the microphone to introduce themselves and present their problem. At the end of the session a person with a common interest contacts the questioner with a question, exchanges cards and provides information and advice. Networking is also a good way for community leaders to become involved with the TBI and its tenants.

Box 15: Informal networking

Some ways of informal networking are as follows:

- Come prepared with business cards, a pen and a small notebook. Know what you want to accomplish at the event. Develop several different ways to start a conversation. Exchange business cards and make notes on the back of the cards***
- Know how to describe your business in one or two sentences. Be positive, friendly, enthusiastic, and act as if you are the host, not a guest. Don't be afraid to approach people. Strangers are friends you haven't met yet***
- Try to spend no more than ten minutes with each person you meet. Listen more than talk. You have two ears and one mouth; use them in that proportion.***
- Follow up promptly with the people you meet and the contacts they give.***

7.3 Finance for tenants

A variety of financing sources is necessary to meet the evolving needs of companies. The management support that a small business receives with an investment by a skilled investor often is worth significantly more than the money. Beyond the formal sources of funding (Table 9), the incubator staff can help access "factoring" services (selling of accounts receivable), short-term working capital loans, contact with private investors (angels), and other sources of capital and support. Obtaining capital on appropriate terms requires prior planning and development, often more than a year in advance.

Table 9: Stages of Business Capitalization

- 1. Pre-seed or Embryonic**
Credit cards, Private Investors, Personal savings
Family and Friends
\$5,000 - \$30,000

- 2. Debt and Equity, including convertible instruments**
Loan and Equity Funds
Bankers and Investors
Private and Government loan guarantees
Private Investors (Angels)
\$100,000 - \$1,000,000

- 3. Venture Capital (relatively rare)**
Venture Capital Funds
Supplemented by commercial credit
\$3,000,000 - \$20,000,000

- 4. Strategic Alliances/Partnerships**
Joint Ventures
Investors
Partnerships
Customer/Supplier credit

Many financing options exist for entrepreneurs, from private sources through banks to friends, family and 'angels'. Each has its own requirements, both formally and informally, ranging from appropriate loan amounts, application procedures and collateral. Knowing these requirements is the basis for determining "gap-filling" financing strategies. A venture should not be supported without a clear program for subsequent financing; to do otherwise raises the significant risk of growing a business into failure.

There is a misconception that venture capitalists and angels finance most small businesses. In practice, the sources in U.S. are: Owner equity (27.1 %), equity from friends and family (15.4 %), bank loans (19.9 %), trade credit (17 %), other debt sources (15.4 %), angels (4.9 %) and venture capital (2.4 %) [Source: Off road capital/Federal Reserve National Survey of Small Business Finances, 1998].

Restrictive conditions on debt financing at some state-sponsored schemes, including targeting capital equipment at the sacrifice of working capital, implicitly constrains the development of technology businesses. The tax holiday for a decade provides advantages of the loans after the early years,

which are frequently loss producing. The application process, from a few months to over a year, must be factored into the financing strategy.

Funds within the TBI

An in-house fund for incubator tenants should be established so that it can provide various types of capital on flexible, negotiable, variable terms which accord with two basic goals:

- 1. Helping, not harming, the enterprise: It is possible for financing to undermine rather than help an enterprise if, for example, it is in the form of a loan with high fixed payments which jeopardize the business when an economic downturn occurs, or equity that is not structured to allow follow-on equity financing.*
- 2. Assurance of payback from the investment portfolio overall: Incubator enterprises, and their financing, should be viewed as a portfolio of investments, not just one at a time. It is unrealistic to expect full payback from each enterprise, but one must manage so that all funds provided, plus the allocation for expenses and interest, is recovered within say, five years. Thus, the performance of the investment portfolio overall is the prime concern.*

The major types of capital which an incubator fund should be prepared to provide to entrepreneurs are:

- Debt (short term loans as working capital);*
- Equity (venture or "seed" capital);*
- Near-equity: debt on flexible terms, including delayed initiation of repayments, and debt convertible to equity;*
- Royalty financing (payback on the basis of 5-10% of sales).*

The major uses of capital are:

- 1. Working capital: to finance payroll, materials, small equipment.*
- 2. Equipment leasing in order to fill orders or produce goods for expected sale.*
- 3. Fixed asset financing: to finance large or heavy equipment and facilities.*
- 4. New product development: to finance prototypes, test marketing, pilot production and the like prior to full-scale marketing and production.*

Fixed asset financing is usually provided through long-term debt, because equipment can serve as collateral and facilities can be mortgaged. Capital to develop new processes and products is the most risky. Such pre-venture financing is best obtained through government R&D project grants, but sometimes with venture (equity) capital.

The major need among new or early-stage enterprises is for working capital. Entrepreneurs usually start their businesses with seed capital, obtained from personal savings, relatives, friends and associates. Then, because such young companies have not been in business long enough to

develop a "track record" or a bank line of credit or sufficient assets, they are not bankable. When they inevitably come to a point where they need working capital for any purpose, they cannot borrow. This can severely limit the growth of a young enterprise. Incubator managers, therefore, should give priority to the provision of working capital.

Revolving loan fund: An appropriate way to provide working capital is through short-term loans (usually 90 days, up to a maximum one-year term), possibly through a revolving loan fund. Revolving means that as old loans are repaid, the funds are recycled by making new loans, or, more conventionally, draws against a fixed commitment are repaid within a short period of time, with an interest rate determined by the average balance outstanding. Interest rates should be at or near market rates. In addition, a premium of one to five percentage points should be added in order to establish a loan loss reserve within the fund. Loans would be originated by the incubator manager and approved (or disapproved) by a loan review committee established by the Board of Directors.

Royalty financing: It may be desirable for an incubator to establish a royalty-financing fund for two purposes:

- 1. Financing support services to tenants which are not paid for out of fees-for services or subsidies; and*
- 2. Providing capital for technology business development or major expansion.*

The payback to the fund would be on the basis of a percentage of enterprise sales. This, likely in the range 4-10 percent, would be negotiated between the incubator manager and the entrepreneur seeking financing so that the incubator could obtain a payback of say 200 percent of financing within five years. The agreement should include a provision whereby the entrepreneur can call or pre-pay the payback commitment by providing cash, equity, conversion to a loan or some combination of these. Royalty financing commitments would be made largely on the basis of entrepreneurs' business plans.

By placing funds raised to support entrepreneurs' needs on deposit in a local commercial bank, they might also be employed to induce the bank to provide loans to tenants or to guarantee a portion of such loans. These funds should be professionally managed in separate accounts from those for incubator operations. The committee to review financing applications should include individuals with enterprise development, business financing and accounting experience.

Finally, it is important that an incubator manager establish payback monitoring procedures and collection techniques. Monthly due dates for loan repayments should be monitored for all loan recipients and the creditors called if there is more than a week delay in expected payments.

Royalty payback need to be monitored through monthly operating statements showing the total sales per month, confirmed by annual professional audits, with penalties assessed on late payments. The incubator manager is in a strong position to obtain repayments from tenants, as he or she is the one who negotiates their leases and is fully involved with their operations.

Seed capital funds: Risk capital networks are becoming a mechanism for bridging the capital gap between the entrepreneur's own resources and the more traditional sources for second and third round financing such as banks and venture capital firms. The manager should maintain a list of possible funding sources, both for incubator and tenants. It is important that the potential lenders be kept advised of the on-going activities in the incubator. The more successful the incubator is in doing its job, the more likely it will be to receive favorable treatment when funding is requested. To the extent that an incubator is well-financed, it has money that it can invest in serving its enterprises; and when the latter are well-financed, they are in a better position to pay rents and fees to the incubator. There is potential for incubators to receive royalties on incubator companies' sales, or shares of equity in their companies, in lieu of market rates for rents and service fees.

7.4 Real estate management

Real estate management is the administration, operation, marketing, and maintenance of property as an investment. These issues may not ensure the success of the incubation modality, but they can contribute to the failure of the process.

The deputy manager of the incubator can perform this function. He keeps an eye toward long-term property appreciation as well as short-term cash flow. He follows a plan that governs all aspects of the physical plant, tenant relations, financial operations, market positioning, and community image-building. He is responsible for maintaining value in properties by improving the net operating income through efficient procedures, optimization of rental income and capital improvements.

The maintenance philosophy should be to maintain the TBI in such a manner as to: provide a safe, clean environment for the tenants and visitors, ensure that the facility operates efficiently and economically, and the appearance of the building and grounds is in keeping with the image the Incubator exhibits to the community.

With a limited budget, the manager must carefully deploy resources to see that the physical condition of the facility neither inhibits the mission of the incubator nor becomes a black hole for limited resources. In general, like the member firms, the facility must be clean and functional, requiring the following activities:

Maintenance/Operations Activities

Physical Operations

Janitorial

Preventative Maintenance

Grounds Maintenance

Improvements

Finance, Budgets and Accounting

Capital Expenditure Budget

Rent Rolls

Long Range Financial Projections

Marketing and Leasing Space

Space Analysis

Facilities Management

Daily Repairs & Maintenance

Security

Facility Inspections

Space Planning

Market Surveys

Accounting Procedures

Purchasing

Rental Commissions

Marketing Program Development

Establish Tenant Improvement

Space allocation: Ingenuity must be used to ensure that maximum revenues are obtained from every square meter of the facility. A full incubator raises a number of issues: 1) should some members be "graduated" to make room for new members, 2) how will the needs of expanding members be accommodated, 3) should additional facilities be explored. A non-full incubator raises a different set of issues: 1) what are the problems in the design and operation of the incubator that reduced the demand for space, 2) how can the deficiencies in the marketing program be rectified.

Leasehold improvements: Special tenant needs may require a different layout or additional utilities and facilities. Modifications may be made by the incubator management to suit tenant requirements, with costs shared with the tenant. Or the tenant may make the necessary changes in return for concessions in rent.

ACTION POINTS

Once the tenants have been selected and the incubator starts operations, the challenges for Board and management are organize a range of support services to help start-up and early-stage firms to take their product or service to market:

- Training, particularly on entrepreneurship and management skills is a priority as scientists may lack the essential business skills,
- Counseling is required on issues such as marketing, accessing external expertise and facilities, sourcing data bases for information on trade and technology, protecting intellectual property, and recruiting staff. This can be provided by incubator staff directly or referrals, through informal networks or formal arrangements,
- A major task is to help the firms secure the finance needed – seed, debt and equity. As the firm reaches maturity, venture capital becomes an option, including electronic access to business angel networks.
- The TBI itself could initiate in-house financing mechanisms such as a revolving fund, equity in tenant companies and royalty arrangements.

8. Enhancing and assessing performance

While national budgets and donor programs for supporting small enterprises decline, the need for targeted services to help generate employment, innovation and entrepreneurship is rising. Technology incubators as well as other business development services are now being reviewed, special measures are being devised to enhance their performance and more rigorous assessments are being made of their financial sustainability.

8.1 Good incubator management

All societies have small enterprises, but the concept of entrepreneurship to be supported by a TBI is focused on those with a reasonable potential to achieve some scale. Forming a link between mercurial entrepreneurs and the established business, government, and university communities creates continuing stress at high levels. Since entrepreneurs are emotionally and financially engaged in their business, the manager must act as their mentor and guide to identify problems before they emerge and help in their solution.

TBI performance has to be constantly monitored through systems of staff meetings based on regular reporting. A suggested schedule of monitoring procedures is in Annex 9.

Operation challenges

Once operations are underway, the manager is required to be a successful business executive, with broad technical and political experience and sensitivity. is frequently underpaid, and has no identified career path. The Board must recognize these incongruities and develop its own program for management support and development. These inherent stresses are reflected in reports of insufficient time to handle the myriad of tasks that occupy each day. The management problems range from intervention in intra- and inter-firm personnel conflicts to pricing of services to accounting problems.

Management includes the challenge of collection of moneys owed. Incubators that tolerate overdue accounts run the risk of turning the facility into a home for hobbies and failed businesses. Reactive tactics include late payment charges in terms of a fixed-charge penalty and daily interest at market rates for unsecured personal debt. Proactive approaches

include on-going monitoring of member operations, including their financial statements.

Even successful businesses go through periods of cash deprivation, while others may be habitual defaulters. The manager's task is to deal in a fair manner and to recognize potential problems before the bad debts imperil the financial health of the incubator itself. The challenges faced by a manager, on the negative side, may include dealing with theft, dishonesty, marital difficulties and tenants moving into the incubator (because they were evicted from their apartment).

The success of the incubator requires the development of extensive contacts in the community. These include successful business professionals, government at all levels, educational institutions, and service providers (e.g. accountants, attorneys, consultants). Maintenance of a good network requires skill in providing the reciprocal value that is the essence of relationship development.

To be effective, the Board must be drawn from a number of organizations, from government to entrepreneurs, each with different culture and expectations. Significant time must be devoted by the incubator management in developing and maintaining a healthy relationship with the Board members. This results in a mutual understanding of different perspectives without compromising basic goals.

While "marketing" may be viewed as newspaper articles and advertisements, the successful incubator will emphasize the personal, hands-on process of determining and meeting the needs of entrepreneurs, which is the best form of promotion. Creativity will extend a modest marketing budget by becoming an effective spokesperson for the entrepreneurial process and by aggressive development of opportunities for free publicity to the incubator program.

The dedication of the tenants to their business concept may contribute to destructive business practices. Poor business skills are rampant and their re-mediation must be handled aggressively, with consideration for the roles of all parties. Problems range from treatment of staff to product pricing, from honesty with customers and suppliers to preoccupation with a specific aspect of business operations to the neglect of critical aspects. Genuine and continued interest in each member is the key to this monitoring and support.

The manager must realize the truth of the country saying 'crops do not grow on land that does not feel the shadow of the owner' and visit tenants regularly. Good practices are outlined in Box 16.

8.2 Enhancing financial sustainability

A large proportion of incubators the world over depend on some form of subsidy. But as support budgets decline, incubators are increasingly being required to generate the bulk of revenues internally, towards a greater level of self-sufficiency. A measure of their success is the capability to reduce dependence on external subsidies, while meeting the objectives of their sponsors and the support needs of their tenants.

Box 16: Good incubator operation practices

According to NBIA, incubator operations should embody the following practices;

- 1. Concentrate on the development or collection of support services that nurture start-up or emerging businesses. Providing below-market rental rates should not be the primary focus of the incubator;**
- 2. Value the growth and development of individual companies beyond their ability to pay rent;**
- 3. Be judged on their ability to create new businesses or help nurture emerging companies, not on the number of jobs directly created. Successful, growing businesses will create employment opportunities;**
- 4. Be structured so that the property element takes a secondary position relative to programs since serving businesses is the core of quality incubation programs. However, the facility can offer the following tangible and intangible benefits:**
 - * a positive cash flow resulting from successful incubator facilities management,**
 - * a centralized place for entrepreneurs to meet,**
 - * a focus for small business support programs in the community,**
 - * opportunities for valuable interchanges among entrepreneurial firms;**
- 5. Be viewed as one possible component of an integrated, overall, regional economic development plan and be designed to reflect the strengths and weaknesses of the region;**
- 6. Be designed so that program outcomes match both the short and long-term benefits required by sponsors;**
- 7. Work from a clear mission statement with quantifiable goals and objectives tied to an evaluation process which rewards quality performance;**
- 8. Be run by highly skilled, street-smart managers who are willing to wear a large number of hats, e.g. those of: general business counselor, triage nurse, facilities manager, psychologist, and investment banker;**
- 9. Recognize the inevitable tension faced by the manager who functions as both advocate for the companies and landlord of the facility;**
- 10. Set up and run operational policies and systems in a business-like fashion.**

Source: NBIA Regional Training Institute

Products and services have to be priced at a level in excess of the full cost of supplying them. This profit margin is a measure of the value provided by the business. Incubator management must establish costs as well as prices for each service offered. Monthly analysis of volumes and profits of each service provides an opportunity to continually assess the value of each offering. This constant review is necessary since the needs for various services change as current tenants mature and new tenants arrive.

Improving incubator cash flow

As maturity is approached, TBI management can initiate additional moves to strengthen the financial sustainability of operations, in anticipation of the time when local, national or international crises may inevitably reduce or terminate subsidies. These measures include:

- Raise rents and rent vacant spaces, where feasible.***
- Find other sources of income including grants and barter arrangements.***
- Get deposits with orders and collect receivables promptly.***
- Consider royalty and equity financing to generate deferred income.***
- Equip the building with Internet and collect fees from company users.***
- Cut out activities that are unprofitable and not valued by tenants.***
- Sign up for volume discounts on long distance telephone service.***
- Install the best equipment you can afford to save on maintenance.***
- Look for used equipment when you don't need the latest technology.***
- Compensate staff well and motivate them to higher performance.***
- Reduce cost in time and money of staff turn-over.***

As the incubator industry enters a new age of growth under conditions of global change, the third generation incubator will need to provide different and more intensive technological support for tenant firms than now.

Benchmarking of performance

Studying and emulating good practices of comparable incubators has potential for enhancing performance. In the corporate sector, benchmarking programs have had mixed success as adaptation of existing work habits and mind-sets poses problems. You may learn to run the same race faster, but you really may need to be on another track altogether!. Then again, as Will Rogers said, 'Even if you are on the right track, you'll get run over if you just sit there'.

A bench-marking exercise was initiated at Polish incubators in 1995. This compares performance coefficients including incomes and operating expenses per sqm of rented space, capital investments per sqm and per job created, subsidy from state, rentable space out of gross, occupancy rates, and job creation per unit of state subsidy. Persuading incubators to share such information is not easy, even with assurances of anonymity. Yet, where feasible, such cooperation to compete can be fruitful.

8.3 Assessment framework

As business incubation programs are a fairly recent phenomenon, the history of incubator evaluation is similarly short, beginning in the late 1980s with studies by Campbell and Allen (1987), Allen and Weinburg (1988), and Campbell (1988). These initial studies evaluated incubation

largely in terms of the number of new jobs created and the success or failure rates of incubated businesses.

Early attempts to evaluate incubation in terms of costs and benefits include a 1990 study in the State of Michigan by Thomas Lyons and a 1992 Ph.D dissertation by Mark Rice. In 1996, Markley and McNamara published an analysis of the economic and fiscal impacts of two US incubation programs on their local and state economies, taking into account the economic activity generated (sales, payroll, cost of goods, taxes paid, etc.) as well as secondary benefits in terms of jobs and income as a result of multiplier effects in the economy.

A study by the Southern Research Council focused on best practices and tools from 50 incubator programs (Tornatzky, etc 1995). Safraz Mian (1997) has proposed a model for assessing university technology business incubators in terms of an “integrative framework” that examines program sustainability and growth, tenant firms’ survival and growth, and contributions to the sponsoring university’s mission. Incubator managers cite the most important measures in evaluating performance as: numbers of jobs created, clients served, and companies graduated (NBIA 10th Anniversary Survey, 1996).

Approach to benefit-cost assessment

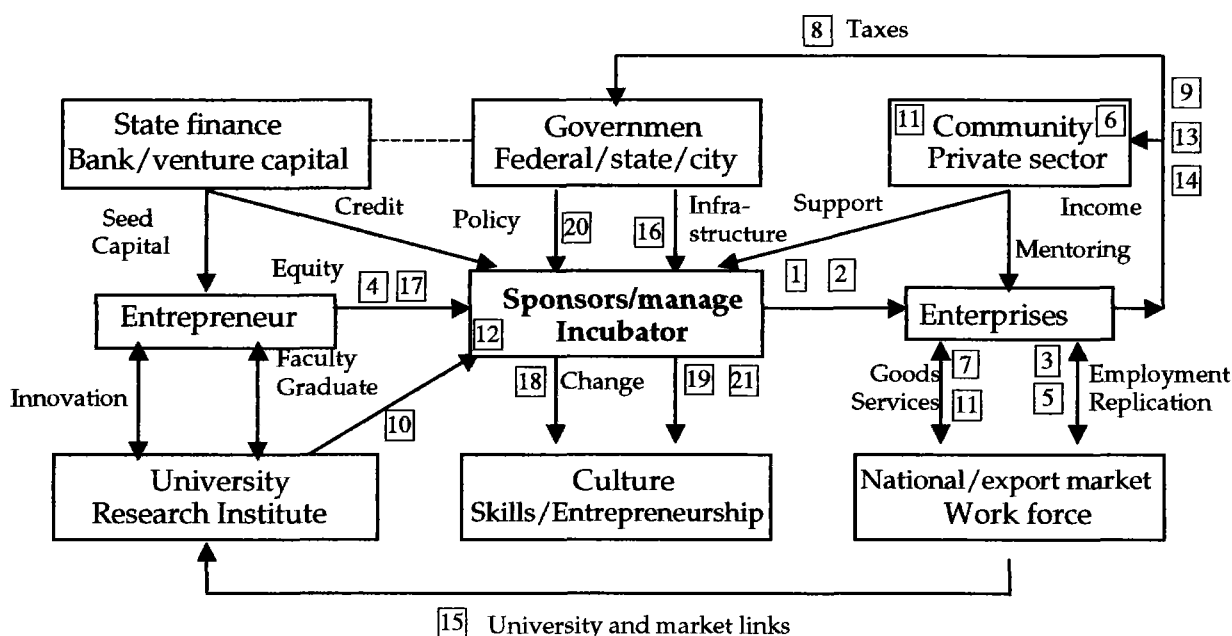
Good measures of performance of an incubation system are the medium-term benefits accruing to small businesses, sponsors, local community, region and nation, Figure 12. The overall system benefit-cost assessment requires that donors make provision for – and pursue – the collection of the needed information by the management team on firms in the facility and those leaving.

The parameters and time-horizon of sustainability for all BDS systems have yet to be properly defined. Ideally, the effects of a particular mechanism need to be isolated from other external factors. Further, the performance of a comparable group inside could be compared with those outside the facility. Such assessments have seldom been made, as the definitional and data collection tasks require time and money, both in short supply with incubator managers.

Starting at the business planning stage itself, criteria for measuring the incubator's future progress could be set out. This helps in evaluating performance and also in designing incentive packages to motivate management staff. Performance indicators could cover the following loops: Efficiency of incubator operations: Number of firms assisted with different services; number of tenants in incubator and employees/tenant; occupancy rates; exit rate of tenants, and evaluation by tenants of management and services.

Sustainability of incubator: Compared to business plan projections for actual income per year, actual expenses per year, years to break-even, and years to show cumulative surplus; match of tenants to entry and exit criteria; enhancement of real estate value; number of graduating and failed firms over given years; and evaluation by sponsors as well as tenants of incubator effectiveness.

Figure 12: Assessment of Impacts, Effectiveness and Sustainability



I. Impact/Outreach

- 1. Enterprises created
- 2. Survival rate of enterprises
- 3. Jobs generated (6 years) in incubated/affiliated firms in graduated firms indirect jobs
- 4. Entrepreneurs reached
- 5. Replication of "pilot" model
- 6. 'Extra-curricular' activities

II. Effectiveness

- 7. Employment per net \$ subsidy
- 8. Taxes paid per net \$ subsidy
- 9. Income, sales & exports
- 10. Research commercialized
- 11. Disadvantaged groups helped
- 12. Incubator expansion

III. Sustainability

- 13. Revenue surplus (6 years)
- 14. Services cost recovery
- 15. Univ.-business relations
- 16. Stakeholder satisfaction
- 17. Tenant satisfaction
- 18. Changes in culture
- 19. Enhancement of skills
- 20. Leveraging state policies
- 21. Enhanced self-esteem

Impacts - social and economic: These include direct and indirect jobs created by incubator tenants; added value of tenant firms; research commercialization; utilization of university laboratory staff and services; specific services to disadvantaged groups; increase in tax base; growth of regional economic activity; and non-quantifiable benefits such as enhancement of entrepreneurship and more supportive government policies towards small businesses. Further, the outreach effects and the replicability of the TBI program to other regions is of interest.

The case study in Chapter 9 attempts estimates of performance of two TBIs in Brazil, based on the data available.

8.4 Monitoring performance

Monitoring performance of both incubator and incubatee begins with monthly operating reports. These provide a summary of operational and financial characteristics of each tenant and the incubator itself. Careful review of the monthly report is the basis for characterizing the activities of each entity as well as its development through time. Based on the analysis of the reports, compared to the original business plans, deviations from plan should be the basis for discussions about potential corrective actions. A check-list for monitoring member performance is in Annex 8.

The tenant business plan provides the baseline for determining exit criteria. On the one hand, “graduation” is “exit” based on success of the business beyond the ability of the incubator to accommodate its growth. However, “graduation” is not the only basis for exit from the incubator. Failing businesses need help from incubator management in identifying the causes, while accepting that business failure is a natural (and essential) part of a free market system. Prolonging an obvious failure only results in a dissipation of scarce resources. Ensuring that management and employees retain the dignity due to them as entrepreneur sets the basis for later re-engagement and, hopefully, ultimate success.

The monthly report on tenant provides not only for reporting of income and expenses, but also for self-report of services received from the incubation process. With this report, and the evaluation provided, Incubator management, including the Board of Directors, has fundamental data for program assessment.

ACTION KIT

A designated workspace and one-on-one counseling services that a TBI provides are more expensive than group approaches, and can only be justified when results are commensurate with costs. The imperative of enhancing incubator requires:

- *A Board and management fully abreast of innovative developments in venture creation, with networks of support to make a real difference in the progress of the nascent business,*
- *Continuous efforts to learn from other incubators and adapt good operating practices to local conditions and needs,*
- *Special measures to improve the overall incubator cash flow through increased revenues and prudent management of expenditures.*

This in turn calls for monitoring and assessment of the effectiveness, impacts, financial sustainability and outreach of incubator operations based on data collected on all pertinent aspects of the incubator, tenants and graduates.

FIVE – LEARNING FROM OTHERS

*Go to the people, learn from them.
Start with what they know, build with what they have.
And with the best leaders, when the work is done, the task accomplished,
the people will say, 'We have done this ourselves'.*

Lao Tzu (circa 700 BC).

9. Case Study: Technology Incubators in Brazil

Brazil has developed a dynamic TBI program. Some of their practices are of interest for possible adaptation to industrializing countries. Others such as the significant dependence on continuing state support should be avoided.

9.1 Background

Incubators began in Brazil in the mid-1980s through an initiative by the National Scientific and Technological Development Council (CNPq), and growth accelerated after 1993. Brazil had 74 business incubators (1998), most in the South and South-east, with the objectives of economic development, technology commercialization and employment generation. Some 614 small enterprises are located in the incubators and employ 2,700 persons, of whom 29 percent are women. The tenants are in computing software (33 %), services (17 %), electronics (14 %), biotechnology and chemistry (9%), mechanics (8%), food products (5%), and other categories. The incubators have 407 affiliated companies who work in their own premises. Some 226 companies have graduated from the TBI program.

The incubation industry is well supported by the Service for Support to Micro and Small Business - SEBRAE, with the National Association of Institutions Promoting Advanced Technology Ventures - ANPROTEC. The Program for Human Resources for Technology Development (RHAE) as well as the Studies and Projects Financing Agency (FINEP), the National Bank (BNDESPAR) and state funds such as FAPEMIG also provide financing. Further, government agencies support "bolsistas" - student interns assigned to work with incubator firms.

More than 30 universities in Brazil, covering one-fifth of total college students, participate in incubator projects, mainly in technological fields.

Among the largest sponsors of incubators are federal-state agencies (52 percent) and private not-for-profit/for-profit organizations (40 percent of total). For instance, the Federation of Industries Sao Paulo (FIESP) runs a dozen business incubators as its contribution to entrepreneurial venture development.

9.2 Institutional analysis of Biominas and Parqtec

The locational, implementation, governance and management factors of the Biominas and ParqTec incubators are reviewed below. The main characteristics are summarized in Table 10.

Location

As noted, business incubators need to be sited where there is a strong business infrastructure with availability of scientific talent, good living conditions, and positive government and community support. On these counts, both the Biominas and ParqTec incubators have good locations. Both plan major technology parks linked to the incubators.

Table 10: Characteristics of Biominas and ParqTec incubators

	<u>Biominas</u>	<u>ParqTec</u>
Start of operations*	1997	1990
Building	Custom-built	Renovated
Gross area, sq m	2,850	1,417
Rentable area, sq m	1,080	550
Tenants numbers		
Resident	5	15
Affiliates	30	33
Graduates	1	21
Business survival rate	100%	82%
Tenant concentration, %		
Biotechnology	60	-
Informatics	-	20
Mechanical	-	47
Other	40	33

*** Both incubators began “virtual operations” a few years earlier**

Biominas: Minas Gerais (MG), the second largest industrial state with its capital at Belo Horizonte, has traditional strengths in minerals, mechanical and automotive manufacturing, and now in biotechnology. MG has an impressive technical infrastructure, with universities such as UFMG, Vicosa, Ouro Preto and Uberlandia; research institutes Rene

Rachou, FUNED and CETEC; support agencies such as FAPEMIG and SEBRAE; and a vibrant private sector with BIOBRAS as a world-class insulin producer. MG now has seven incubators.

The Biominas incubator in Belo Horizonte occupies a prime site of 10,000 sq m land adjacent to the publicly-funded, multi-disciplinary research laboratory - CETEC. It is a custom-built, modern functional, building with excellent biochemical laboratories and computing services for shared use.

ParqTec: The city of Sao Paulo in Sao Paulo state (SP) is Brazil's major business hub. Some 200 km to the north-west is the city of Sao Carlos, population 200,000, which has the distinction of having the highest density of PhDs in science/engineering – one for every 230 inhabitants. Industry is concentrated on consumer goods and mechanical appliances. It has two public universities and private learning centers, laboratories for cattle and animal protein development, and over 70 enterprises in aeronautics, software, new materials and robotics. Fundacao ParqTec de Alta Tecnologia houses the CINET incubator and the SOFTNET incubator together with related support facilities.

Business planning and implementation

Biominas: The sponsors began operations in 1994 in vacant laboratory space provided by CETEC while the new facility was being planned. This was a good move as it helped prepare both the prospective tenants and future incubator staff while giving advance promotion. During this period five biotech-related companies were assisted. Three of these are now tenants in the new incubator and the others are affiliates. The new building layout was designed by local architects and business plan prepared by an expert mission under UNDP auspices. The main delay was in mobilizing the significant funds needed for new building construction. Operations were started in the custom-built facility in June 1997. In 1998, it had five resident members occupying about 40 percent of available space and 30 affiliates. It is planned to serve 15 to 20 tenants in the future.

ParqTec began operations in 1984 by nurturing tenants in the physics laboratory of UF Sao Carlos. Then, a house was rented down-town, and in April, 1990 the incubator moved to its present site in a industrial area, equidistant from the universities. The time from virtual operations to new site was about five years, but the move to a renovated building took only six months.

The investment in Biominas (about US\$ 1.9 million) is high because of the new construction and the extensive, common bio-tech lab facilities being provided. ParqTec began is in a renovated space, costing under \$ 400,000. The alternative approaches were warranted by the nature of businesses

being incubated. Both need to review their space allocations in order to increase the rentable space in relation to the gross building areas.

Incubator sponsors and objectives

Biominas and. ParqTec are sponsored through partnerships with government at the city, state and federal levels and with local universities, research institutes and private business. Both were developed on local initiatives with significant national support. The sponsors have contributed financially and continue to be actively involved in supervising the operations and mentoring the tenant-businesses. Such involvement is not usual in other industrializing countries.

Biominas incubator's specific objectives are: creation of new business opportunities, employment and products with high added value, and the development of entrepreneurship in technology-based businesses.

In accordance with the wider vision of promoting investment and technology transfer in Minas Gerais and linking up to international issues in biotechnology, Biominas works closely with the MG State Government, Belo Horizonte municipality, and agencies such as FAPEMIG, CNPq, SEBRAE and EMRAPA.

ParqTec has the official mission "to offer the means for the creation of world-class technology-based companies". Its objectives are:

- **Creation of a pro-business environment that allows the businesses to concentrate their efforts on the technological development of their products,**
- **Transfer of technologies generated at the universities (USP - UF S. Car) and at research centers.**

Fundacao ParqTec has overarching responsibilities for its incubators as well as technology promotion for Sao Carlos. While enterprise development is the primary purpose, job creation and technology commercialization are significant concerns.

Governance and management

Biominas incubator is a unit of Biominas Foundation, headed by a Superior Council with members representing SEBRAE, university community, state government, incubated companies and the Foundation. An interesting function of Biominas is to help procure imported equipment and supplies for its member companies at an average service charge of 5 percent. It derives an income stream while the companies avoid bureaucratic delays and benefit by a tax deduction on a temporary "gift", as the equipment stays nominally on Biominas books until it is fully depreciated.

The management team comprises the Executive Director with overall responsibility for the Foundation. The manager supervises the incubator and a laboratory coordinator oversees the use of the shared lab facilities. The management was trained by interactions at incubators in Brazil and through participation in conferences of Program BOLIVAR, ANPROTEC and International Association of Science Parks (IASP).

ParqTec incubator is one of several programs organized by Fundacao ParqTec. A High Council oversees an Executive Board which manages the incubator, business school, business modernization center, Research and Advisory Center. The High Council, advised by an Advisory Committee, formulates policies, elects the Executive Board and approves the annual budget. Management consists of 5 persons: general manager, technical manager, computer specialist, and two librarians. Again, the team was trained through participation in seminars and visits abroad. In both incubators, remuneration is comparable to salaries paid in the private sector.

9.3 Support networks

In our interviews, the managers rated the levels of their relationships with local government as “very cooperative”, with universities as “cooperative”, and with private sector as “neutral”. They claim that their competitive advantage vis-a-vis other business development services in the region is in providing better inter-actions among the tenants/affiliates, and ready access to Government agencies, finance institutions and external networks of professional services as well as affordable space, conference rooms, computing facilities. These linkages and facilitation services contribute, in large measure, to the success of TBIs in Brazil.

Biominas sees its future challenges as finding growth-potential biotech entrepreneurs as tenants, paying back the FINEP loan starting in 1999, helping the tenants to adopt the International Standard Practices in use of biotech facilities, and moving towards financial sustainability. ParqTec has consolidated its operations in the last decade. Its challenges are to generate income for enhancing services and to attract seed and venture capital for its companies.

Both incubators seem buoyant about their future, provided that the global economic situation does not seriously depress Brazil’s economy – a development which would impact the markets for tenant products and levels of public support.

Services and client base

While the Biominas and ParqTec incubators differ in their facilities, history and the types of enterprises incubated, they share a professional,

comprehensive approach to SME development. Many of the individuals entering Biominas and ParqTec are university faculty, graduate students and researchers who have no prior business experience. The personalized services provided by the incubator management help raise their confidence and reduce their isolation. Both incubators offer a range of counseling, training and support services as well as shared facilities such as use of reception, meeting and exhibition rooms, parking, security, telephone and messaging. Their seminars and promotion efforts reach beyond the incubators to large numbers of scientists and entrepreneurs in the communities.

Biominas' services most used are help in business plan development, technology sourcing and securing licenses and permits from Government agencies for pharmaceutical products. Facilities provided on a cost recovery or fee basis include: fax, photocopying, electricity, long distance telephone, wet lab space and equipment, temperature-controlled storage for raw materials/products, and special areas for washing and sterilization.

ParqTec covers, in the base rent paid, use of common facilities, computer laboratory, Technical Information Center, and mechanical workshop. Counseling services are offered (at subsidized rates) in the areas of accounting, legal issues, marketing, financial and tax administration, registering of trademarks and patents, and visual communication. Services for which ParqTec charges separately are fax, photocopies, long distance telephone, electricity, Internet access. To the larger business community, ParqTec offers technological and marketing services, and assists in organization of trade fairs, commercial networks and participation in the Centro de Comercializacao Tecnica of SEBRAE - Sao Paulo.

Markets served

Both have a number of women beneficiaries: owners of two tenant firms (out of five) and the F. Biominas executive director are women. At ParqTec incubator, the director is a woman, and there are two women-owned enterprises and at least two among graduated firms.

Biominas has focused on the incubation of firms in the fields of biotechnology and fine chemistry. Current tenants and the graduated enterprise are involved in the development and marketing of diagnostic kits for uroculture, production of hydroxyapatite for bone repair, specialized packaging for pharmaceutical products, and consulting in biotech commercialization. The alliance with Biominas has helped DIAMED, a Swiss-based, medium-sized company in medical diagnostics, to adapt and enter local markets.

ParqTec has assisted tenants in incorporation, patent application, trademark registration and proposal writing. Its tenants and graduated

firms are involved in the production of opto-electronic products, digital sound processing technology, industrial process controllers, chromatography columns, automotive alarms, software applications, process simulation training, internet/ intranet networks, low wattage transmitters, micro- terminals for automation, test equipment for automatic braking systems, and consulting services in ecology, environmental management, medical equipment, computer security applications.

Profiles of a tenant at Biominas and a graduated from ParqTec outline the kind of support provided, Box 17.

Sources of seed capital

Most of the seed capital used by incubated enterprises comes from the personal savings of entrepreneurs, supplemented by government grants, subsidized technical assistance, and loans or investments from relatives and friends. Other sources of support for Brazilian incubators are SEBRAE (40% of respondents) followed by city governments (17%), CNPq (14%), FINEP (8%), FAP's (8 %), and others (Guedes and Filartigas, 1998 survey).

Funding for SEBRAE comes from a set aside portion of federal payroll taxes, through privately-managed state organizations. Its mission is to support SMEs through activities that include regional development initiatives, research studies and assessments of geographic regions and economic sectors, business training and roundtables, and funding for incubation programs. According to SEBRAE-MG: "We subsidize the operating costs of the incubators and monitor their performance in our role of a social and economic accelerator. The return expected is that the incubator be successful in providing the conditions for small enterprise development".

Box 17: Incubator Tenant Profiles

Biominas tenant: CEPA Biotecnologia

CEPA Biotecnologia entered Biominas in February, 1995, at which time it had six employees and no revenues. Utilizing technology licensed from Suma Laboratories, a Cuban firm, CEPA produces diagnostic kits for uroculture and distributes a variety of medical supplies. It entered the Biominas incubator in order to scale up its production process, and to get assistance in licensing and registering its products with the Brazilian Health Ministry. By mid-1998, CEPA had a payroll of 30 employees and average sales of 150,000 reals/month, (about US\$1.54 million/yr).

The CEO indicated that the availability of certifiable laboratory facilities in the incubator had accomplished two things: First, it greatly reduced the initial capital investment needed by CEPA, which otherwise would have had to build its own facilities elsewhere. Second, the excellent infrastructure of the incubator made it possible to get new products to market more quickly. No disadvantages were mentioned.

ParqTec Incubator Graduate: Opto Eletrônica, S.A.

Opto Eletrônica (Opto) is one of Brazil's outstanding examples of a successfully incubated enterprise based on technology transfer from the university community. Today, São Carlos - based Opto employs 100 persons and, during 1997, had revenues of US\$ 9.1 million from the sale of optical and electro-optical products. Opto mirrors are widely used in commercial laser scanners, and Opto has captured a 30 percent share of the world-wide market for "cold light" reflectors used in dental chair lamps. In addition, it produces and markets patented laser measuring and positioning systems, microscopes for ophthalmologic surgery and anti-reflective coatings for eyeglasses.

With assistance from the ParqTec program, Opto was founded in 1985 by members of the faculty of the Institute of Physics at the University in São Carlos. The CINET incubator provided legal assistance for incorporation and the filing of patents, and a convenient initial business location. After one year in the incubator, Opto "graduated" and now occupies a 7,200 sq. m. site not far from the ParqTec Foundation. Opto's first customers were labs at Brazilian universities which were having difficulty in acquiring optical equipment due to import restrictions and cost. Opto products today are exported to the US, China, Italy, Korea, and many countries in Latin America. In addition to its facilities in São Carlos, Opto has a commercial office in São Paulo and a subsidiary in the U.S. at Northbrook, Illinois.

Biominas Foundation is now actively involved in trying to develop new sources of private venture capital. It expects to gain access in 1999 to seed capital funding through the BID Development Bank. Current sources of financing include FINEP (Financeiro de Estudos e Projetos) for equipment backed by loan guarantees from SEBRAE, and FAPEMIG (Fundacao Amparar a Pesquisa do Estado de Minas Gerais) for R&D, funded through

a 1 percent rebate of social security taxes paid to the federal government from Minas State.

ParqTec Foundation reports that the major sources of funding for its incubated enterprises are the entrepreneurs' own resources and seed grants from the State of Sao Paulo under the RHAE and PIPE programs. ParqTec is working to establish a revolving loan fund utilizing credit from the Inter-American Development Bank. For the longer term, SEBRAE-Sao Paulo is working on the establishment of a \$30 million venture capital fund.

The RHAE program, funded by the State of Sao Paulo, provides research and development grants of up to R120,000 over a 3 year period to enterprises to hire technical personnel. A new program of small business innovation research grants, begun in 1997, is patterned on the SBIR program in the United States. It is funded by the Sao Paulo Science Foundation and administered by SEBRAE São Paulo.

Biominas and ParqTec Foundations, along with their respective incubators, are well integrated with major SME support programs in Brazil. There appears to be a consensus at all levels in support of business incubation as a tool to promote economic development through the cultivation of tech-based SMEs.

9.4 Financial viability and outreach

Assessments of incubator performance have difficulties in securing investment and operating cost information, because at times it is not available, or because incubators consider this as confidential. In both cases here, the managements made special efforts to present the data requested. Estimates of incubator income and expenses at ParQtec and Biominas are in Table 11.

Cost effectiveness

The evaluation methodology in this study uses a combination of qualitative description, quantitative analysis, and stakeholder perceptions. The stakeholders interviewed for this purpose were the public and private sponsors as well as the incubated enterprises themselves.

Biominas: Due to limitations on leasable space, it is unlikely that the incubator could become financially viable solely on the basis of tenant rents and fees for services in the near-term. After one-and-half year of operation, about half of the rentable space remains vacant as management is being selective in its choice of tenants. Repayment is scheduled to begin in 1999 on the \$540,000 loan from FINEP used in the construction of the new facility. Although the support by SEBRAE to Biominas is relatively lower than at ParqTec, there is a reasonable prospect of operational break-even in the coming year.

Interviews with stakeholders point to continuing support for Biominas on the part of the Municipality, State and federally funded programs. Biotechnology is an economic focus for Belo Horizonte, and Biominas serves as a “flagship” for this. Under normal conditions, state agencies would continue their funding; it is problematic whether they could continue present levels in the face of an economic crisis.

**Table 11: Income & expense at ParqTec and Biominas
All figures in US\$,000. Rate R/\$ =0.84**

	<u>PARQTEC</u>			<u>BIOMINAS</u>	
	1996	1997	1998	1997	1998
REVENUES					
<i>Rental Income</i>	24.4	38.6	39.4	28.9	81.7
<i>Fees from Tenants</i>	2.1	2.1	2.5	3.1	12.9
<i>Utilities Cost Recovery</i>	9.2	18.5	18.5	-	-
<i>Partnership with SEBRAE</i>	139.4	62.2	239.4	186.0	186.0
TOTAL REVENUE	175.1	121.4	299.8	218.0	280.6
EXPENSES					
<i>Manager</i>	27.7	38.6	32.9	36.0	54.0
<i>Admin Assist/tech adviser</i>	0.0	0.7	4.5	10.0	5.0
<i>Lab coordinator</i>	-	-	-	7.0	13.4
<i>Receptionist/Secretary</i>	0.8	2.5	4.2	7.3	14.3
<i>Other Professionals</i>	22.8	26.8	33.4	37.9	48.4
<i>Fringe Benefits</i>	5.9	8.4	10.9	-	-
SUB-TOTAL STAFF	57.3	77.0	85.9	98.2	135.1
<i>Bldg. Maintenance/Cleaning</i>	31.9	70.6	70.6	8.0	17.5
<i>Utilities/Telephone (net)</i>	18.5	24.4	23.5	30.8	48.4
<i>Travel & Promotion</i>	1.3	0.8	20.2	3.2	3.2
<i>Supplies</i>	0.7	1.3	0.7	4.5	9.3
<i>Audit & legal</i>	9.1	9.1	20.2	3.2	4.9
<i>Insurance</i>	5.0	3.8	4.7	-	-
<i>Publications</i>	-	-	56.3	-	-
<i>Interest/debt repay</i>	-	-	-	30.4	39.7
TOTAL EXPENSES	123.7	187.0	282.1	178.3	258.1
OPERATING SURPLUS (DEFICIT)	51.4	(65.6)	17.7	39.7	22.5

ParqTec: The ParqTec annual revenue from services (in relation to total) is considered low. Support through the partnership with SEBRAE constitutes about half of revenue, on average. While an operating subsidy is not unusual, particularly for incubating technology-based enterprises the world over, the level is high.

The Foundation plans to achieve greater financial self-sufficiency through the development of the São Carlos Science Park on a 172,000 square meter property that it owns in a prime industrial location. Planning for the first 3,500 sq. meter building has been completed along with a master plan. The first structure will house the ParqTec headquarters as well as incubator for 64 additional enterprises. The master development plan also includes industrial sites for lease to technology-based enterprises as well as two multi-tenant buildings and a convention center.

The incubator is one of seven ParqTec Foundation integrated programs designed to establish São Carlos as the “Capital of Technology” in Brazil. ParqTec has organized a week-long technology fair in Sao Carlos every year. It has demonstrated an entrepreneurial approach to technology-based SME development that maximizes the use of volunteers, public and private sector resources, local universities, and intensive networking with civil society.

Jobs and taxes generated

An approach to evaluating the effectiveness of incubation programs is to look at the number of businesses incubated, the success rate, and the number of jobs created by incubated firms. As noted, both incubators have to aggressively recruit more tenants and affiliates as well as increase the throughput of graduating businesses.

The figures in Table 12 below should be considered as preliminary, as it is often difficult to get data from privately-held firms on sensitive topics such as sales, payroll and taxes. At ParqTec, the tenant firms have 69 employees while 17 (of the 21) graduated firms have 168, making a total of 237 jobs.

Table 12: Jobs and taxes, 1997 (approximate), US \$

	<u>ParqTec</u>	<u>Biominas</u>
Jobs (tenants and graduates)*	237	92
1997 payroll	\$1,854,000	\$1,030,040
1997 sales	\$9,846,990	\$2,558,320
1997 payroll taxes payable	\$463,500	\$258,510
1997 corporate taxes payable	\$590,820	\$153,500
Total taxes	\$1,054,320	\$412,010
Initial Investment in incubator	\$383,000	\$1,940,000

***This includes current tenants plus the one graduate tenant at Biominas and 17 graduated firms at ParqTec for whom information is available.**

Taxes are estimated at 25% on payroll and 6% on sales

As ParqTec has been in operation at its present location since 1990, it has more results to evaluate in compared to Biominas which has been operating only since July, 1997 in its new permanent facilities. The 1997 estimate of

public capital and operating subsidy for ParqTec and the personal and corporate taxes payable would be approximately as follows, based on the data available:

Total jobs (with employment multiplier of 1.5)	357
Capital cost subsidy per year (20-year straight line depreciation)	\$ 19,150
Operating subsidy per year (average of last 3 years)	147,000
Capital and operational subsidy per year	\$166,150
Total subsidy over 7 years	\$1,163,050
Subsidy cost per job (excluding jobs in affiliates)	\$ 3,258
Estimated payroll & corporate taxes by tenants & graduates	\$ 1,054,320
Return on public investment as taxes per year (per \$ subsidy)	\$6.34

The subsidy per job should decline at ParqTec as more technology-based firms graduate and continue to expand, and as additional incubator space becomes available. For mixed-use incubators, which typically have much larger areas and less services for tenants, the subsidy cost per job can be much lower. A point to note is that while the investment is made once, the jobs continue, and it is useful to think in terms of "job-years" in the stream of benefits.

1997 taxes realizable from sales and payroll of ParqTec tenants and graduates are about six times the subsidy.

Stakeholder and tenant perceptions of program effectiveness

Stakeholders at both incubators indicated satisfaction that the programs are meeting their expectations. The major benefits expressed were as follows: Help in dealing with bureaucracies resulting in faster permits; Valuable assistance in marketing and faster time to market for new products; Excellent infrastructure and labs; Interaction with other tenants; and Legal assistance.

The tenants interviewed felt that the programs were of value to them, as they provided: Good location for a startup venture; Access to facilities such as labs, telephone, internet, and fax service; Valuable marketing assistance received; Legal assistance for incorporation and patent development; and Business training on site.

To summarize, the ParqTec and Biominas incubators studied have had impacts on their respective city and state economies in nurturing entrepreneurs and creating sound enterprises with good survival rates. ParqTec has generated employment with public subsidy of around US\$ 3,258 per job, without including jobs in affiliates. The estimated return in the form of taxes could be about \$ 6 per dollar of public subsidy.

ACTION POINTS

The success of the Biominas and PargTec TBIs is due to a variety of factors. The results are impressive:

- The linkages to universities and research institutes have resulted in commercialization of some technologies.
- Sponsors and tenants at both incubators have expressed satisfaction with the results achieved, particularly the help in marketing, business planning, and securing government permits.
- Both are assisting their government sponsors in promoting technological development together with other social aspects such as reinforcing the cultures of entrepreneurship and university-research-business cooperation.

Their success is due in large measure to:

- Committed financial and political support by the respective MG and SP state governments as well as federal agencies,
- Meaningful linkages to technical universities and research institutes,
- Excellent partnership with private sector companies in the city and state,
- Scientific and entrepreneurial talents of the tenants and dynamism of TBI managers.

That being said, Biominas and ParqTec have the major challenges ahead of:

- Enhancing their operational effectiveness through innovative activities and creative financing, increasing occupancy and higher fees for quality services, and increasing the number of affiliate companies and anchor tenants, in order to reduce dependence on state subsidies.
- Continuously raising the skills of their management teams through interaction with ANPROTEC and, on a selective basis, with the international incubator community.
- Implement information systems which will provide the data required for monitoring, benchmarking and evaluating performance.

To move towards self-sustainability, both should also press forward with establishing their technology parks.

10. Lessons learned & future trends

Business incubators share a characteristic with other forms of human endeavor — success is multi-faceted and complex. Success comes from accomplishing a number of tasks quite well. Success is often serendipity. And success, like beauty, is often in the eye of the beholder!

10.1 Lessons learned

Lessons have been learned, sometimes the hard way, on supporting the start, survival and success of technology ventures in some 25 restructuring and industrializing countries. Their skill endowments and business infrastructures are generally poorer than those available in the industrial world, and strategies have therefore to be customized to meet their conditions. The emerging technology park and incubator operations in some Asian countries and the trends towards convergence point to the driving forces which make for success. They also indicate the actions that governments, business and stakeholders should take to mobilize these forces.

Business incubators are diverse in their types, purposes and missions and very much dependent on the local community needs. Good practices (not necessarily best, which are specific to time and place) should be identified and adapted to the local context. The main lessons emerging from the recent experiences of planning, implementing and operating TBIs are summarized below.

A. In the planning stage

1. Establish realistic goals and select strong partners

The success factors in goal-setting and sponsorship are to search for and identify:

- The proper niche and mission for the incubator depending on local endowments.***
- Pro-active public-university-private sponsors willing to invest their reputation and energy, with clear understanding of their responsibilities and expectations.***
- Sponsor commitments which are serious, not rhetorical, and in writing if necessary.***
- Consensus on the purposes and parameters of the TBI, expressed in the form of a mission statement.***

Example: The Foundation Biominas biotechnology incubator in Brazil represents an excellent example of collaborative efforts between private biotech entrepreneurs, the Minas Gerais state government, and Belo Horizonte municipality, the public research institute CETEC, several local universities, together with federal financing agencies such as SEBRAE and FINEP. They have a strong commitment, articulated vision of building a technology park adjacent to the TBI, and a mission of promoting technology in their respective states.

2. Create linkages to research, learning and professional communities

Successful technology incubators invariably have:

- **Preferred access to, or an embedded association with, the resources of a major research laboratory or technical university. Importantly, this also provides the aura or halo-effect of respectability for both incubator and tenants. The differences in cultures of academia and business have to be recognized and reconciled to the extent feasible.**
- **Well developed networks of professional friends and alumni, who may contribute an annual subscription to a Patrons Club, provide mentoring to individual tenants and serve on a advisory committee, and**
- **Synergistic system of agencies which provide the financial, research and business support, to mutual advantage.**

Example: A good example of mutually supportive mechanisms is at the University of Texas Austin. The Austin Technology Incubator is linked through the Center for Commercialization and Enterprise to the NASA Commercialization Center, the Software and Entrepreneurs Councils, the Texas Capital Network and IC2.

Similar synergies are in evidence between the Rensselaer Polytechnic Institute faculty, students and alumni, its Venture Affiliates network for mentoring, Center for Technological Entrepreneurship, and the RPI Incubator and Technology Park.

3. Leverage state policy and legislative support

The supportive environment for sound incubator performance requires:

- **Stable political and economic regimes, providing positive support, or at least a level playing field, for private sector initiatives.**
- **Competitiveness strategy which has analyzed the sub-sectors of advantage, selected the change agents and markets.**
- **Human resources development which helps build the full range of specialization needed, from technician to researcher and manager.**
- **Regulatory and legal systems which facilitate tech-venture creation, despite the inherent risks, and**
- **Functioning systems for banking, property, stock markets, taxes, property and environmental protection.**

Example: Technology Park Malaysia (TPM) and its incubation system, within the Multi-media Super Corridor, are key components of the Government's Vision 2020 which, among other aspirations, is pursuing a radical transformation to a modern technological society. The state has made a massive investment in TPM, which was then turned in to equity ('corporatized') and now functions as a private-public entity. The other interesting features of TPM are the support facilities such as the precision prototyping center, CAD-CAM center, extensive documentation center and recreation center. A robotics development and a biotech center are under implementation.

4. Select a location with good business infrastructure.

Mistakes in location are permanent ones, often fatal to survival.

- **While political support is necessary, the site selection must be based on commercial, engineering and environmental considerations.**
- **While connected to knowledge bases such as technical universities and research laboratories, it should also show some signs of entrepreneurial energy. Business, cultural and recreational facilities in the vicinity are a plus.**
- **While it is easier to start in a developed urban environment, politics may call for balanced expansion to backward regions. For a TBI, this must be resisted.**

Example: The Isando Enterprise Center of South African Breweries is well located in an industrial area adjacent to Johannesburg international airport. The incubator occupies 2,300 sqm of well-renovated, functional space at an old brewery complex. SAB's Project Noah has not only demonstrated sound engineering skills at rehab'ing a derelict building, on-budget and on-schedule, but also its corporate responsibility in creating alternative jobs for laid-off employees.

5. Plan the physical facility to stimulate inter-action and creativity

To B(uild) or not to B(uild) a custom facility, that is the first question. It depends primarily on the availability of suitable vacant space and of funds for new construction. Essential design features of the facility, new or renovated, are:

- **Functional and flexible space, 2,000 sq m (with provision for expansion), of which ideally three-quarters should be leasable,**
- **Layout to provide circulation and inter-action between tenants,**
- **Specific technology-related features such as Internet connectivity, effluent disposal, loading dock and storage, and perhaps selected shared equipment,**
- **Above all, a friendly efficient appearance of both building and staff, to attract and serve creative people.**

Example: The Ben Craig Center, Charlotte, N Carolina adopted the option of starting in a rehab space, then moving to a splendid custom-designed building. The 2-storey, 5,000 sqm, structure (layout in Annex 3) has both an attractive appearance and a fine juxtaposition of spaces for tenant interaction, seminars, recreation and incubator management. The University of North Carolina Charlotte Foundation borrowed the money toward the \$3.5 million cost, and has leased it to BCC Inc.

In industrializing countries, attractive incubator buildings with good layouts are at Istanbul and Ankara, Turkey, supported by the state small business development agency (KOSGEB) in partnership with the local technical university. The challenge is to be attractive in design but functional and affordable.

6. Undertake a rigorous feasibility and business planning exercise. Essential to the preparatory process is the analysis of feasibility and the discipline imposed by the business plan. This is the road map, pointing to the attractions and danger zones along the way. This preparation requires:

- Design the incubation system in the framework of national priorities, building on the local culture and securing consensus among stakeholders, at every step.**
- Design of support services must be based on the real needs of the potential ventures and add value to their operations, while being affordable.**
- Financial projections need to be realistic, but recognizing that the incubator itself is a venture and not without risks. At the same time, it must have the prospective of becoming self-sustaining after initial subsidy.**
- In the preparatory process, local consultants need to be given opportunities to build their own experience, supplemented by selected external inputs.**

Example: Many TBIs in industrializing countries have been started without a formal study on the grounds that a state sponsor is already willing to provide finance, and economic conditions are so uncertain that a plan would soon become obsolete. Earlier in Mexico, CONACYT was indeed willing and able to finance incubators initially, but then economic conditions changed, funds became scarce, and some incubators had to close. Managements should plan to move towards a reasonable level of self-sufficiency, as rapidly as possible.

At Technology University Jamaica, the feasibility analysis builds upon an existing Entrepreneurial Extension Center. Despite the sound business plan and local support, it has taken two years to mobilize the finances needed from international sources. But the incubation of student-entrepreneurs is already underway before the new incubator building is ready.

7. Exploit on to the new information and communications technologies

The internet is revolutionizing the way that incubators and their tenants work. The impact over the next decade is impossible to predict, since the pace of change is so rapid. However, some trends are clear. The importance of physical facilities will diminish while services will become more important. "Virtual" incubators will provide services to physically remote "tenants". The internet will enable start-up firms to source technology and raise funding from a wider base. Incubators around the world will be linked together in a virtual community, which in turn will facilitate the spread of good practices. Finally, a large number of start-up firms will be producing products and services for the internet or enabled by the internet.

8. Secure 'patient money' for TBI operations

The single greatest hurdle to the incubator and tenant operations is requisite finance. Sponsors need to ensure that:

- **Requisite funding for implementation and working capital will be made available from the outset.**
- **Operating expenses are controlled while revenues are expanded from rentals and services, to move towards break-even when operations have matured**

For the tenants, the management has to:

- **Secure information on credit, equity, royalty, grant, and other finance sources.**
- **Help tenants prepare a business plan and financial strategy.**
- **Develop, where possible, an in-house seed capital facility for short-term commercial credits.**

Example: Governments in some countries have seen incubators as a part of the support system for nurturing entrepreneurship, which can create enterprises, some of which can create important innovations and significant employment. Among these are Israel, Turkey and Brazil, where a large proportion of incubator income comes from continuing state subsidies. This is equally so in many OECD countries. Countries such as Poland have had large resources from the donor community, which later create their own problems of dependencies.

Non-financial support to the incubator and barter of services can be very helpful. For instance, a Business Residency Program at the Center for Business Innovation, Kansas City, Missouri, provides university graduate students to work with the tenant companies, with affiliates outside, and also as part of incubator staff. The program is funded by foundations and the university. A similar state program in Brazil provides graduate students (bolsistas) to work with incubator companies, to mutual advantage.

B. During the implementation

9. Select and train a dynamic management team

Searching, training and motivating the best possible team is key to success:

- **Management team has to be lean and not mean, but accessible and supportive,**
- **Its training, at home and abroad, is continuous, acquiring new skills for changing needs,**
- **Its time and energy have to be allocated as much to the tenants themselves, as to strengthening the community network, responding to the sponsors and board, and raising resources for the incubator and its clients.**

Example: In many situations, it has been extremely difficult to recruit a manager of the needed profile, despite repeated advertisements and extensive interviews. A selected person with some business experience will not join if the board is not willing to pay a private sector salary; or she would insist on staying in the capital city and commuting to the incubator an hour away; or after joining will soon leave as no real authority for operating the incubator has been delegated.

For the incubators in Indonesia and Malaysia, the management teams were trained at US incubators and NBIA conferences, but the turnover has been high. Managers for Brazil and Mexico have been trained mainly in-country through their associations. The China Association for International Science and Technology Cooperation (CAISTIC) is now organizing annual courses in Shanghai for managers from industrializing countries. There is clearly a case for a structured program or institute dedicated to the special needs of developing countries.

10. Select and prepare entrepreneur groups

Careful choice contributes to the success of the entrepreneurs and the incubator:

- **In many developing and post-communist countries it is desirable to “pre-incubate” a growth-potential group before entering the incubator, in order to revive repressed entrepreneurial aptitudes. They also need to be supported after leaving the incubator.**
- **Word of mouth is good promotion to attract candidates, but needs to be supported by a continuing marketing campaign,**
- **Special care is needed in selecting the initial batch of tenants, in order that the incubator can start with a reputation for success,**
- **Like the venture capitalist, the incubator management must look for the “3-Ms” – Management, Market and Money (and only then, Technology).**

Example: The Advanced Technology Development Center at Georgia Tech, Atlanta, has a structured four-step due-diligence program to make the best selection from a pool. First, an internal consultant makes an overall review of the 3 Ms+T and compatibility to the incubator's goals. Then, graduate students help in survey of the potential market for the proposed innovation, a difficult but essential task. Next, a senior consultant makes an in-depth assessment of the growth potential and the financial and human resources that are planned to be mobilized. Finally, a panel undertakes an in-depth validation of the applicant's business plan and strategy.

This "due diligence" process takes two to six weeks, involving some 10 to 80 hours of staff time. ATDC may accept the client as a full member in the incubator, or on a provisional basis with specified milestones. The due diligence process also serves to guide the development of the selected company through the incubation and beyond. Whether so structured or not, every TBI needs to establish a proper selection process.

C. During incubator operations

11. Organize to provide quality, value-adding services

Ultimate incubator aim is to launch its tenants into trajectories of growth through:

- **Tailored programs of direct intervention on capacity building, counseling, and networking services, suited to each tenant's needs.**
- **Linkages to the best available professional services in the community, to lab facilities, faculty expertise, graduate student and interns,**
- **Informal networking to secure practical advice from successful entrepreneurs and finance from business angels,**
- **Optimize the allocation of the manager's time, in order to respond to tenant's needs on request, and pro-actively through monitoring its performance.**
- **Focusing on gaps in the technopreneur's skills, usually financial management and marketing, as well as special needs for shared hardware.**
- **All at the most affordable terms, keeping also in mind the need to raise cash for the incubator itself.**
- **And, easing the exit of those whose efforts are not likely to bring the product or service to market despite all efforts.**

Example: Despite the importance of direct support to tenants, most incubator managers can spend less than one-fourth of their hours on this, due to pre-occupation with sponsors and boards, maintaining political and financial support

Among industrializing countries, the Hong Kong Industrial Technology Center is expanding its range of support to its members and helping put HK

in the forefront of advanced technology development. In addition to HKITC's traditional services, its annual TechWorld Expo and monthly Technology Investment Forums have matched new ventures with venture capitalists, its hosting of high-level delegations and missions to Silicon Valley, Israel, UK help in acquiring new experience and promoting its companies. In future, the incubator's IT graduates can move to the new Cyberport while hardware oriented companies opt for the Science Park

12. Enhance TBI performance and raise income

- *Make regular cash-flow projections into the foreseeable future (12 to 24 months), to flag impending problems requiring focused efforts.*
- *Become results-oriented, exploring innovative ways of augmenting revenues, This includes possibilities of raising rents, renting out any vacant space, delivering new services for emerging needs.*
- *Review ways of reducing expenses, (and/or searching for new sources of grants and operating subsidies).*
- *Consider and experiment with innovative schemes of financing, such as equity investments in tenant companies and royalty arrangements, to create flows of deferred income.*
- *Raise the skills of the incubator management team through continuous learning opportunities at conferences, through courses, Internet access to data, information and knowledge.*

Example: Only a small proportion of the world's incubators are private, for-profit (perhaps under 10 percent). One of these, Lexington Business Center at Elkhart, PA, USA, is showing a 30 percent plus return on equity through prudent management, no-frills facilities, bartering of some services, and through positive state and city involvement. TBIs need to provide custom-built facilities with larger capital investments and focused technology-related services requiring trained staff and special services.

13. Monitor the performance and assess the effectiveness and impacts

Success calls for constant vigilance and improved performance, not complacency. Towards this end, management has to:

- *Organize and maintain a management information system based on modern computing applications to record (and take corrective actions on) its operations and those of tenants and graduates.*
- *Formulate common definitions and methodologies for assessing incubator effectiveness and agree with sponsors from the outset upon quantifiable measures of success.*
- *Develop, where feasible, a national benchmarking program to evaluate performance compared to peers.*
- *Based on demonstrations of incubation benefits/costs, persuade stakeholders of its usefulness to the community and country.*

- **Plan to replicate the pilot experience and enlarge the outreach and impact, by planning an expanded incubator network.**

Example: Incubators are receiving net public subsidies for investment and working capital of \$ 3,000 to 6,000 per direct job created, and are returning 4 to 6 times that in taxes per \$ of subsidy. Here again, there is no common understanding on the content of subsidy, good direct and indirect job, and the time horizon to be considered.

Recent studies on the Michigan incubators are a beginning; these can be elaborated and extended, particularly in the context of serious donor concerns on sustainability of all small business development services.

A criticism of incubation is that it can provide space and support to only a limited, selected set of potential winners. In practice, affiliate programs and nation-wide networks seek to enlarge the incubation benefits.

In Uzbekistan, Indonesia and Egypt, as soon as the initial pilot incubators were in operation, the authorities initiated the preparation of master plans to add another 20 or more incubators.

14. Create an outward-looking incubation system for the future.

Globalization, accentuated by Internet and Web technologies, poses special challenges for TBI 2000 while providing the means for collaboration across borders, both intra- and inter-nationally. This requires incubator managers to:

- **Plan for an international orientation, whereby foreign companies can be facilitated to enter their market and local companies to venture abroad.**
- **For this purpose, develop not only world-class facilities but, importantly, the multi-cultural, multi-lingual and international business skills for supporting companies with different perceptions and practices.**
- **Assist their local companies, to decide whether they have the wherewithal to enter international markets, and then, prepare the strategies for exports, joint ventures and other means.**
- **Promote the incubator and its tenants by hosting international technology/ business delegations, organizing missions abroad, and participating in international conferences.**

Example: The China IBI program is an ambitious effort, currently serving overseas Chinese who have the capital and expertise to come home and some foreign companies.

Further, similar trans-nationalization is underway through support to German companies in Shanghai and Atlanta, US companies in Germany through the Ben Craig Center branch, and international companies at IBI, San Jose.

10.2 External success factors

The national and international factors outside the incubator greatly influence the success of incubation. The relevant government, corporate, banking, donor and non-governmental organizations have to be brought into the venture creation dialogue. The factors affecting success can be summarized as follows:

- **National technological leadership on the creation of tech-based enterprises, boldly articulated and disseminated, with incentives for innovation and risk-taking.**
- **Macro-economic framework which stimulates innovation and markets for new goods and services, together with a strategic vision, developed in consultation with local communities, entrepreneurs and stakeholders.**
- **Commensurate investments in scientific research and technology development, engineering and management consultancy, technical education and continuous learning, quality assurance and environmental preservation, electronic connectivity, transport and communications infrastructure.**
- **Long-term plans for developing Convergent Enterprise Support Systems encompassing the full range of small business development services, anchored possibly in a business incubator and technology park.**
- **Regional and national programs for facilitating nascent entrepreneurship from school onwards.**
- **State programs to deploy patient money for investment and working capital at the incubator together with readily accessible sources of credit and risk capital for the tenants.**
- **Symbiosis between the established large corporations and the early-stage incubator companies, not only as an expression of corporate citizenship but in terms of mutual benefits.**
- **Relationships developed with relevant agents at national and international levels, particularly consulting, manufacturing and service sectors, banking, professional legal and accounting services, business associations and chambers,**
- **Transparency and honesty at all levels.**

Overall, the development of a reinforcing support system calls for sensitivities to global concerns of equity and ethics, gender balance and environmental preservation.

10.3 Future incubation trends

The international response to the needs of developing countries has to be based on their present conditions for establishing and operating incubators as well as on future trends. The discernible trends are:

- **Technology orientation will continue: Exponential change in software and Internet, microelectronics and communications systems will create opportunities for small firms, especially in the more advanced developing countries. Special-purpose TBIs will be required for bio-medical and computing companies. There are also opportunities for blending advanced techniques with traditional processes, as in agribusiness, textiles and environment.**
- **Internet and Web will continue to transform the way businesses work, large and small, in industrial and soon in industrializing nations. Incubator managers and their tenants who are on top of this revolution will win, the others left behind. Use of the Internet and Web is rising rapidly in many of the advanced industrializing countries, and with spread of better hardware and credit cards, e-commerce is not far behind.**
- **Venture creation and employment in small towns and rural settings. A better model will be needed for addressing bottom-up, regional development. This will call for appropriate choice and blending of technology, higher value-added in agribusiness, environment and energy-conservation, light engineering and chemicals, for both domestic and export markets.**
 - **Enhanced professionalism in incubator operations. The managers of the future may have to be accredited by a national association, in order to demonstrate and continuously upgrade their venture creation, technology sourcing and networking skills.**
 - **Stronger emphasis on assessment and monitoring of performance. Incubators will have to be weaned away from dependence on state subsidies more rapidly and demonstrate their effectiveness, impacts and financial sustainability.**
 - **“Third generation” incubation systems will use the Internet to provide services not only to selected tenants within its walls but, increasingly on an outreach basis to small existing businesses in their own premises and businesses graduated from the incubator.**
 - **Pre-incubation of potential entrepreneurs. will be needed While ideally entrepreneurs must start with their own innovative concepts, the need has been expressed for “project profiles” from which they may choose and develop a business.**
 - **While some governments recognize the need for financing the initial costs of establishing incubators as social investment, most others have yet to be persuaded that this a proper use of public funds.**
 - **Private corporations and chambers are beginning to take the incubation process seriously, based on demonstrations of mutual benefit. Further, corporate responsibility calls for focus on the ‘triple bottom line’ of economic, social and environmental sustainability.**

- ***TBIs linkages to technical universities and research parks. This has increasing potential of synergy, to mutual advantage.***
- ***Development of post-incubation programs to provide continuing support, including the development of strategic alliances with current tenants and large enterprises/graduates, while monitoring the results of the incubation process.***
- ***Implementation of hub and satellite systems to provide economies of scale in incubator operations, and possibilities of development of franchising arrangements for greater outreach and enhanced professionalism.***
- ***As the world gets smaller, the transnationalization of business will grow. Already software companies are working round the clock in real time.***

Expansion and enhancement of incubators

The present 500 incubators in developing and transition countries can be expected to grow at the rate of about 20 percent annually, that is, two new incubators being established each week over the next 4 to 5 years. Such growth will come from:

- ***Countries which are now planning or have recently started incubators (These include: Morocco, Tunisia, Syria, Palestine, Lebanon, Jordan, Kenya, Senegal, Tanzania, Zimbabwe, Pakistan, Sri Lanka, India, Vietnam, Slovenia, Myanmar, Thailand, Iran, Ecuador, Albania, Bulgaria, South Africa and several central Asian countries).***
- ***Countries which plan significant expansions of their programs (for example, China, Indonesia, Romania, Ukraine, Russia and Egypt in the next 4 years).***
- ***Countries which plan major enhancements of existing incubator operations (including Brazil, Turkey, Malaysia, Mexico, Hungary, Latvia, Czech Republic and Poland).***

Intra-national and international cooperation

As incubators begin to come into operation, the need is felt for a forum to facilitate interaction. Starting in 1992, the Mexican Association of Business Incubators and Technology Parks (AMIEPAT) has been organizing to

- 1) assist existing operations and create new ones, through annual conferences, training opportunities,***
- 2) compile and disseminate information on planned and on-going activities,***
- 3) harmonize approaches and influence national policies towards a more supportive role for incubators and tenants.***

Similar associations are active in China (CASTIP) and Brazil (ANPROTEC), and have been formed in Indonesia (AIBI), Belarus (BIA) and Egypt (EIA), each with its own orientation. In addition to incubator staff communicating with each other, the tenant businesses also may benefit from the opportunity to mutually explore trade and technology partnerships.

The most active areas for industrial and industrializing countries to interact have been the regular conferences of the National Business Incubation Association (NBIA, USA), the European Business and Innovation Center Network (EBN, Brussels), the German Association of Technology Development Centers (ADT, Berlin), and the Innovation Centers in Eastern and Central Europe (ICECE). Also active on park-incubator collaborative issues are the International Association of Research Parks (IASP, Spain) and the Association of University-Related Research Parks (AURRP, USA). Each year participation from industrializing countries has risen. These countries also are now able to access the international experience through web-pages on the Internet.

In industrial countries, especially active have been the Australian and New Zealand Association of Business incubators (ANZABI), the Canadian Association of Business Incubators (CABI), Italian Agency for Entrepreneurship Promotion (SPI), the UK BIC and science park associations, and the newly-formed Japan Association of New Business Incubation Organizations (JANBO).

The twinning of industrializing country incubators with their counter parts abroad has been an effective means of technology transfer. Thus, Rensselaer Polytechnic Institute, New York, provided staff for a Kiev, Ukraine incubator, the Turkish and Uzbeki programs have been collaborating with the link of a common root language. Some of the high-tech incubators in Israel are linked to US communities.

Multilateral support

UNDP, and its UN Fund for Science and Technology (UNFSTD) have initiated incubator programs in over 20 countries and organized seminars for planners to meet on incubator issues at Libreville, Gabon (1988), Ife, Nigeria (1990), Beijing, China (1991), Cuernavaca, Mexico (1991) and Tianjin, China (1995). UNIDO has provided significant help through its Practical Guidelines for Business Incubators and Financial Planning Software. UNESCO through its university-science-industry linkage program is helping strengthen university-affiliated incubators.

Milestone events in stimulating cooperation among industrializing countries were the Inter-Regional Workshop on Creation of Technology-

Based Enterprises, Cuernavaca, Mexico, November 1991, and the Tianjin Inter-regional Workshop, September 1995.

The World Bank, International Finance Corporation, the European Bank for Reconstruction and Development, and other regional banks have indicated interest from time to time. European programs, such as the Columbus Project have helped train Latin American incubator managers. Both EC-PHARE and USAID have provided significant assistance to central and east Europe and Former Soviet Union countries. The extent of German collaboration with central and east European countries is extensive, comprising joint technology parks and twinned incubators.

The business incubator and its tenants can benefit through cooperative arrangements with other TBIs at the national and international levels. In countries where both resources and the time to catch-up are limited, it makes good sense to exchange experiences and to learn both from the mistakes and from the success of others.

11. Postscript - New incubation models for the new economy

As noted, business incubation has evolved in the last 20 years from experience with the earlier industrial estates and small enterprise service centers. The 'first generation' of business incubators in the 1980s were essentially offering good, affordable space and shared facilities to carefully selected entrepreneurial groups. In the 1990s the need was recognized for supplementing work space with counseling, skills enhancement and networking services to access professional support, technology and seed capital, for tenants within the facility and affiliates outside; this led to the 'second generation' model.

Starting in 1998, with the moves toward globalization and the New Economy, a new 'third generation' incubation model is emerging. This is intended to mobilize Information and Communications Technology (ICT) and other advanced technologies, towards creating knowledge-based ventures and economic growth. The world total has risen sharply to around 3,000 business incubators in year-2000; many of these new incubators are ICT-based and are for-profit operation.

11.1 The driving forces

As noted (section 1.1), the pace of technical change continues to accelerate. Today the bulk of Internet users is in the U.S. (about 120 million of the world total 150 million). By 2005, U.S. users are expected to rise to around 180 million, together with about the same number in the rest of the world. A large proportion will be in the more advanced industrializing countries such as China, Brazil and India. In Latin America, Internet hosts have grown fast, with over 10 million users (March 2000). The share (about 4 % of world total) is considerably less than in the Asia/Pacific region (23 %). But this situation is improving rapidly as foreign investment rises in Latin American ISPs, portals and B2B usage.

ICT has been the driving force for globalization – the rapid movements of ideas, lifestyles, trade, business and finance (reportedly a trillion million dollars circling the globe each day). Those already economically strong are

prospering, while many others are falling behind. The widening 'digital divide' between the 'knowledge-haves' and 'have-nots', between countries and within them, is causing serious concern in the international community. Further, there are the troubling issues of privacy, the toxic chemicals used by high-tech industries, the problems of sustaining high productivity while raising employment.

Globalization, in the framework of what is now called the New Economy, calls for quickening the pace of technological innovation, along the whole chain of activities starting with the identification of a new concept to meet a market opportunity, followed by its intensive pursuit to commercial realization. The force propelling innovation and entrepreneurship in the U.S. today has been the rapid growth of venture capital. From a level of \$ 3 to 4 billion in the early 1990s, the VC funds deployed have risen more than 10-fold to \$ 46 billion in 1999.

In the context of venture creation, the distinctive features of the New Economy have been defined as follows:

The old economy, you learn a skill. The New Economy is lifelong learning. The old economy is concerned with security; the new is risk-taking. The New Economy is job creation; the old is job preservation. The old economy is capital equipment. In the new, it's intellectual property that matters. The old economy is about the status quo. The New Economy embraces speed and change. The old economy is top down and highly regulated, and tends to be a zero-sum game: You win, I lose. The New Economy is distributed, and instead of being highly regulated, we form public/private partnerships. If the old economy is zero sum, the New Economy is win-win.

-John Doerr, Kleiner Perkins Caufield & Byers¹

11.2 Enter the ICT Incubator

We are now experiencing an exponential growth in for-profit incubation systems for accelerating the start and growth of ICT-enabled ventures. The Harvard Business School in its recent survey² identified 356 such

¹ Quoted in O.M.Chinsoom, *Incubators in the New Economy*, MIT, June 2000

² Hansen, Nohria, Berger, *The State of the Incubator Marketplace*, June 2000

incubators around the world. Of these 222 are in the US (that is, about 25 % of the total U.S. incubators). The others include Canada (14), UK (28), China-Hong Kong (11), and Brazil (10).

The distinctive feature of the venture creation process in this millennium is the speed at which it has to move. Typically, the preferred growth plan comprises:

Develop e-business concept (possibly in an incubator)

Sell to potential partners

Attract say \$20 mill+ in VC to build brand awareness

Enter market and develop an income stream

GO IPO! in 12 to 15 months

Target growth of 100% plus every year

The overall purposes are to achieve compression of time to market to realize the first mover advantage, time to value by raising market share, time to liquidity measured in many millions and in months, not years,

To cater to the above start-up scheme, the third generation incubator has to provide the essential value-adding services to its portfolio of ventures, namely, Hi-tech space and equipment with shared administrative support; Management, marketing expertise and networking; seed capital and rapid access to larger venture capital in exchange for equity and management support.

The business infrastructure and entrepreneurial energies must exist in a country or region before this incubation model can be initiated.

Business models

These high-tech incubators (also called 'catalysts', e-launchers, green-houses and 'accelerators') are, in effect, a composite of:

High-tech	Management &	Rapid access	= Techventure
+	+ information	to risk capital	Accelerator
workspace	service		

These are being developed in a number of variants: They may forego space rentals and fees in exchange for equity in tenant businesses while others provide management services and high-tech space against commercial charges together with facilitated access to venture capital. Some have the main objective of developing a portfolio of rapid-growth companies.

Examples of Internet Incubators in the U.S. are indicated below.

Examples of Internet Incubators in U.S.:

eHatchery, Atlanta: Funded by idealab

High tech, plug-'n-play building, staff 45. Uses special software tools (eg eCeleration, hatchware)

Takes equity up-front (30 % avg., \$ 250,000 to 2 million) in tech-enabled businesses, to IPO in short time-frame

Cambridge Incubator, Boston: DFJ, Boston C, Sun, PwC

High-tech bldg, staff of 40 + students - Space & services at cost

Invest since June '99 - \$ 12 million in 7 ventures in 2 rounds

Intelligent Systems Incubator, Atlanta: Publicly-traded

Small staff (3 partners +5). Incubates companies without making investment, charges monthly fee for services,

Mostly invests in early-stage ventures outside (50 in last 10 yr, avg. 25%

The Harvard survey cited earlier reached the following conclusions:

- The bulk (92 %) are focused on Internet specific, mainly B2B, software, telecom and content,***
- A small proportion are run by Venture Capital firms (31 %), and most are focused on early-stage companies. The average equity taken in the companies being incubated is 35 %.. Average incubating time is 9 months.***
- While 44 % flip the companies as soon as their equity stake can be sold for good profit; others hold their equity stakes to create a large portfolio of successful firms.***

- ***As most of these for-profit incubators are very young, the model is as yet unproved. 38 % have produced 'graduates' and only 16 % have had a liquidity event (for instance, sold or had an IPO),***
- ***Revenue sources for these incubators comprise equity only (55 %) and fee only (4%), with the balance taking a mix of equity and fees. In return for the equity given up-front, the average seed capital provided is \$ 1.1 million,***
- ***In addition to space with ICT infrastructure, most incubators provide administrative services, group buying programs, accounting, PR legal, and staff recruitment support.***
- ***The incubator staff is say 15 for 5 incubating companies (that is, 3 staff per company incubated). Most of the networking opportunities among the tenants are informal, with some idea-sharing, cross board memberships and sales partnerships,***
- ***In future, there will be a shake-out. Many incubators will seek a wider geographical range, to lower their costs, improve services and increase the graduation rates.***

Accelerators being started by universities

Over a dozen business management schools at leading U.S. universities have started technology accelerator-incubators, such as the University of North Carolina at Chapel Hill, University of California at Berkeley, University of Wisconsin at Madison, and Babson College. Business majors can apply the lessons being learned in the class room to the real-life problems of launching their own ventures. Such ventures get the preferred attention of investors as they have already been vetted by the B-schools faculty and mentored by its alumni.

Universities are also developing programs to invest in the student ventures, guidelines for faculty participation, and curricula to balance the priorities of class work Vs the energy needed to start a company. Some such as Stanford University in California hold the view that business majors must first learn the skills needed for business on a full-time basis, before being diverted to business creation.

It should be emphasized that the above rapid-incubation model has yet to be validated. The sharp decline in U.S. technology-based company stocks during 2000 and the difficulties now being encountered by dot-com companies have, in turn, resulted in some failures in ICT-based incubation. Importantly, such incubators have not yet succeeded in creating value for

their clients. In the longer-term, Internet businesses are expected to grow again and so will the incubation systems that support them. For the present, the initiation of Internet incubators must proceed with caution.

ICT Incubators in developing countries

Regrettably, a large proportion of existing incubators, especially in developing countries, give great importance to physical facilities but offer poor business support services. These need to move fully from the first generation to the second generation mode; this would then set the stage for further transition to the third generation ICT incubators.

For ICT accelerators to start and succeed, the current state policies and regulations for joint ventures in the Internet arena should progressively become more supportive and liberal. U.S venture capital is now entering the developing country Internet markets and many millions more would follow. But this requires the easing of the serious obstacles being encountered by young entrepreneurs in the Internet sector with regard to bureaucratic procedures, joint-venture restrictions, fears of censorship, privacy and software piracy, and financial markets to going public.

With entry of China in to the World Trade Organization and the opening of its markets to international competition, the entrepreneurial energy of educated youth (and their ability to attract venture capital for ICT-enabled ventures) offer the opportunities of transforming the economy and creating new employment. Examples of this ferment are to be found in the university-affiliated technology incubators such as Tsinghua, Tianjin, Wit-hub and Xian, as well as the new Internet Incubators such as Shanghai Business Accelerator.

Shanghai Business Accelerator

Shanghai DCBA is a partnership between Shanghai Jiaotong University, the pioneering Tianjin Innovation Center, and Business & Technology Development Strategies, New York. The company targets Chinese early-stage, Internet ventures, and western firms seeking to enter the Chinese market. The strategic anchor-partners resident in the facility are a new venture consultant group and a law firm specializing in new ventures.

DCBA will have 6,000 sq.m. space in the heart of Shanghai's business district with high-speed Internet access. Part of this will be used for

nurturing Internet companies, and the balance rented out to other start-up firms, anchor tenants and service providers. WitHub Venture Capital is a founder investor while management support will be provided by Jiatong University, Tianjin Innovation Center, BTDS and specialist consultants.

The Virtual Incubator

ICT also makes possible a variant – the Virtual or Cyber Incubator – which enables a variety of businesses to start and grow in their own premises. Advisory and networking support is being provided from a distance, in a cost-effective manner, at rapid speed and from sources worldwide, through a variety of for-profit projects using the Web. With the spread of “always on” broadband connectivity, small businesses can look forward to the Internet providing a seamless virtual extension of their capabilities and reach. These approaches are well suited to countries with some e-connectivity and good scientific personnel, as in the post-communist nations and several Asian and Latin American countries.

The recent United Nations Development Programme initiative³ to launch such virtual incubators on a not-for-profit basis in a pilot scale comprises:

- national web-based portals for small business support initially in, say, three countries in different regions of the world***
- an inter-regional portal, to support, link and create synergies among these national portals and their business clients***

The portals would be well-organized, extensive web sites that serve as entry points to a range of resources, tools, expertise, business opportunities etc.

The national portals would provide early-stage and start-up businesses with (1) relevant information, resources and tools, (2) access to various business services, particularly skills enhancement and counseling in management and marketing, (3) facilitated access to resources including seed equity capital, (4) a platform for entrepreneurs to learn from each other and (5) the ability to connect business-to-business. In addition to developing vibrant networks of small businesses, the national portals would help create a virtual community of business support organizations and service providers in the country.

³ UNDP-assisted Virtual Business Incubators, UNDP, July 2000

The inter-regional service portal would focus on serving the national portals and other small business related institutions by (1) providing relevant generic resources and useful tools, (2) promoting interactions, experience-exchanges and bench-marking opportunities among practitioners under different economic situations, to arrive at good practices for adaptation to their own conditions, and (3) creating a global community for such organizations. Eventually, the global portal would facilitate international e-commerce and the formation of business partnerships among small businesses and with large firms, from developing and developed countries.

Technology clusters

While the spontaneous clustering of like-minded producers of traditional goods and services has been around for centuries in many developing countries, what is new is the usefulness of such cooperation-competition in the advanced technologies. The 'Software Technology Parks' in India (Box-1) have contributed to the country's emergence as a major software exporter. Now, it is not software alone but new venture creation in other fields, and not in Bangalore alone but in Hyderabad, Pune, Bhubaneshwar, and Chennai.

The Zhongguancun Science Park in Beijing, linked to Peking and Tsinghua Universities, the Multimedia Super Corridor around Kuala Lumpur, and the agglomeration of biotechnology firms in Belo Horizonte and Rio are other developments to be watched in future.

11.3 Vast potentials, serious constraints

While, as noted, there has been a shake-down in U.S. dot-com ventures in 2000 and some slowing in the growth of Internet incubators, this model can be expected to revive in the coming years. A variety of new and innovative content and applications in ICT are emerging and will inevitably enter the industrializing countries.

Further, major breakthroughs are taking place in genomics, robotics, pharmaceuticals, nano-technology, advanced materials, and space technologies, which will have profound implications for all countries. The debate on whether some developing countries could – or should – become

players in advanced technologies will continue. But there may be no option for all to be able to adapt and apply these to their intractable problems, while there will be imperatives for the more advanced to acquire and innovate in selected fields, and to support the incubation of technology-enabled businesses.

The serious constraints to establishing the technology business accelerators in developing countries include:

- *Poor protection of patents and the prevalence of ‘copycat entrepreneurship’,*
- *Lack of state fiscal incentives and burdensome regulations on joint ventures and foreign investment,*
- *Paucity of networks of legal, accounting, rapid prototyping professionals,*
- *Inadequate business infrastructure for electronic connectivity,*
- *Serious constraints on quality of goods and services,*
- *Lack of transparency and frankness in business negotiations,*
- *Cultural traits which down-grade even small expenditure on the essential preparatory knowledge inputs, in preference to vast investments on the hardware of physical facilities,*
- *Incomplete understanding among decision-makers on technological issues,*
- *Inability of existing banking systems to assess the risks in technology projects and the lack of venture capital and angel networks.*

Interventions by governments are needed to level the playing field for small businesses, provide fiscal incentives, protect IPR, and promote markets for the companies in the incubator-accelerators. But the boards and managements, with strong business experience, have the prime responsibility for establishing and managing these New Economy incubators.

ACTION KIT

Changing conditions call for new structures. So, as business now moves at Internet speed, the process of venture creation has also to be speeded up. But this approach has prerequisite conditions, such as an advanced infrastructure, an innovation strategy, capital markets geared to risk, a steady flow of deals to match market needs, an education system geared to generating new knowledge and skills.

For traditional incubators in industrializing countries wanting to make the transition to the third generation technology accelerators, the primary requirement is to enhance their current support services for tenant-companies.

For those who seek to establish a new accelerator, the main tasks are to:

conduct market analyses to determine the real needs of entrepreneurial ventures in the New Economy,

design the building and services to meet these sophisticated needs,

mobilize a strong management team with a gene-pool of experiences,

develop networks of contacts with venture capital and management consultants,

launch the intensive preparations needed to develop a new business model which will attract the investment for their transformed incubator and its new tenants, and

undertake the above tasks with speed, using the services of experts with specific e-venture creation experience

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ANNEXES

Annex 1: Technopreneur Profile Focus Group

A. General

1. **Name** _____ **Gender: Male** ___ **Female** ___

2. **Address** _____

3. **Telephone** _____ **Fax** _____ **E-mail** _____

4. **Education Training**

Secondary ___ **Post Graduate** _____

University ___ **Other** _____

5. **Business Activity**

Type of Business

Service

Manufacturing

Commerce

Specify: _____

6. **Preparation Phase**

Early concept ___ **Business Plan in-place** _____

Prototype ___ **Need help** _____

Started operations ___ **Funding Being sought** _____

Business failed _____

7. **If in business, give name and type of activity**

8. **Entrepreneur activity/business started by close family member. Yes** ___ **No** ___

9. **If Yes, state name and type of business**

10. **Current turnover of the business (in US\$ currency).**

Under \$100,000 ___ **Housing** _____

\$101,000 - 300,000 ___ **Owns** _____

\$301,000 - 500,000 ___ **Rents** _____

\$500,000 - 1,000,000 ___ **Leases** _____

B. Obstacles Being Encountered

Type of Difficulty - 5 being "Most" Degree to which experienced

<i>Access to credit</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	
<i>Affordable work space</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	
<i>Equipment work space</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	
<i>Management/other training</i>		<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
<i>Government bureaucracy</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	
<i>Marketing</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	
<i>Access to markets</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	
<i>Technology/research support</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	
<i>Other _____</i>		<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>

C. Services Needed from Technology Business Incubator

Which of the following services would you require when TBI is ready for occupancy?

Affordable work space

100 sq. ft. _____

250 sq. ft. _____

150 sq. ft. _____

500 sq. ft _____

Other _____

Entrepreneurial development

Marketing

Business counseling/advice

Technology/research support

Access to finance

Management/other training

Export / Marketing assistance

Network contacts

Information services

Access to equipment _____

Type of equipment

Meeting\conference facilities

Assistance with incorporation

Interviewed by: _____

Date: _____

Annex 2: Incubator Site and Building Evaluation

Location: _____

Owner: _____

Zoning: _____

Plot Size: _____ **Soil:** _____

Buildings: No.: _____ Size(s): _____
Comment: _____

Elevation: Highest: _____ m Lowest: _____ m Range: _____ m

Drainage: _____

Distance to: Road: _____ m Rail: _____ m Seaport: _____ m Airport: _____ m

Comments: _____

Mass Transit: _____ m **Business Center:** _____ m

Comments: _____

Residential Housing: _____ m **University:** _____ m

Comments: _____

Utilities:	Type	Cost	Specs	Quantity	Comment
	Electricity	_____	_____	_____	_____
	Telephone	_____	_____	_____	_____
	Water	_____	_____	_____	_____
	Industrial	_____	_____	_____	_____
	Potable	_____	_____	_____	_____
	Sewage	_____	_____	_____	_____

Hazardous Waste: _____

Local Infrastructure:

Accounting: _____

Advertising: _____

Attorney: _____

Consultants: _____

Business: _____

Technical: _____

Distribution: _____

Manufacturing: _____

Office Services: _____

Printing _____

Research: _____

Site Diagram (attach map)

Building Floor Plan (attach)

Incubator Building Evaluation

Address: _____

Description: _____

Condition: _____

Site: **Size:** _____ **sqm** **Adjacent:** _____ **sqm** **Fenced:** _____

Size (sqm): _____ **gross sqm** _____ **net sqm** **Dimensions:** _____

office: _____ **warehouse:** _____ **factory:** _____

Construction: **Wall:** _____ **Ceiling:** _____ **Roof:** _____ **Floor:** _____

Exterior Finish: _____ **Floor Thickness:** _____

Clearances: **Clear Span:** _____ **Ceiling Height:** _____

Bay Size: _____ **Column Spacing:** _____

Characteristics: **Doors:** _____ **Drive-in Door:** _____ **Dock**

Doors: _____ **Dock Height:** _____

Rail Doors _____

Parking Spaces _____

Heating Type: _____ **Boiler:** _____ **Air Conditioning:** _____

Features: **Overhead Crane:** _____ **sqm** **Sprinkler System:** _____

 _____ **sqm**

Freezer Room _____ **sqm** **Cold Room:** _____ **sqm**

Security System: _____ **sqm**

Utilities:

Electrical: **Provider:** _____ **Capacity:** _____ **v** _____ **p** _____ **a**

Gas: **Provider:** _____ **Line Size:** _____ **Approval:** _____

Water: **Provider:** _____ **Line Size:** _____ **Approval:** _____

Sewer **Provider:** _____ **Line Size:** _____ **Approval:** _____

Telephone: **Provider:** _____ **Lines:** _____ **Approval:** _____

Internet: **Provider:** _____ **Lines:** _____ **Approval:** _____

Transportation:

Proximity: **Highway:** _____ **Air Freight:** _____ **Barge:** _____

Rail: **Carrier:** _____ **Siding:** _____

Fire Rating: _____ **Service:** _____ **Distance to Service:** _____

Taxes: _____

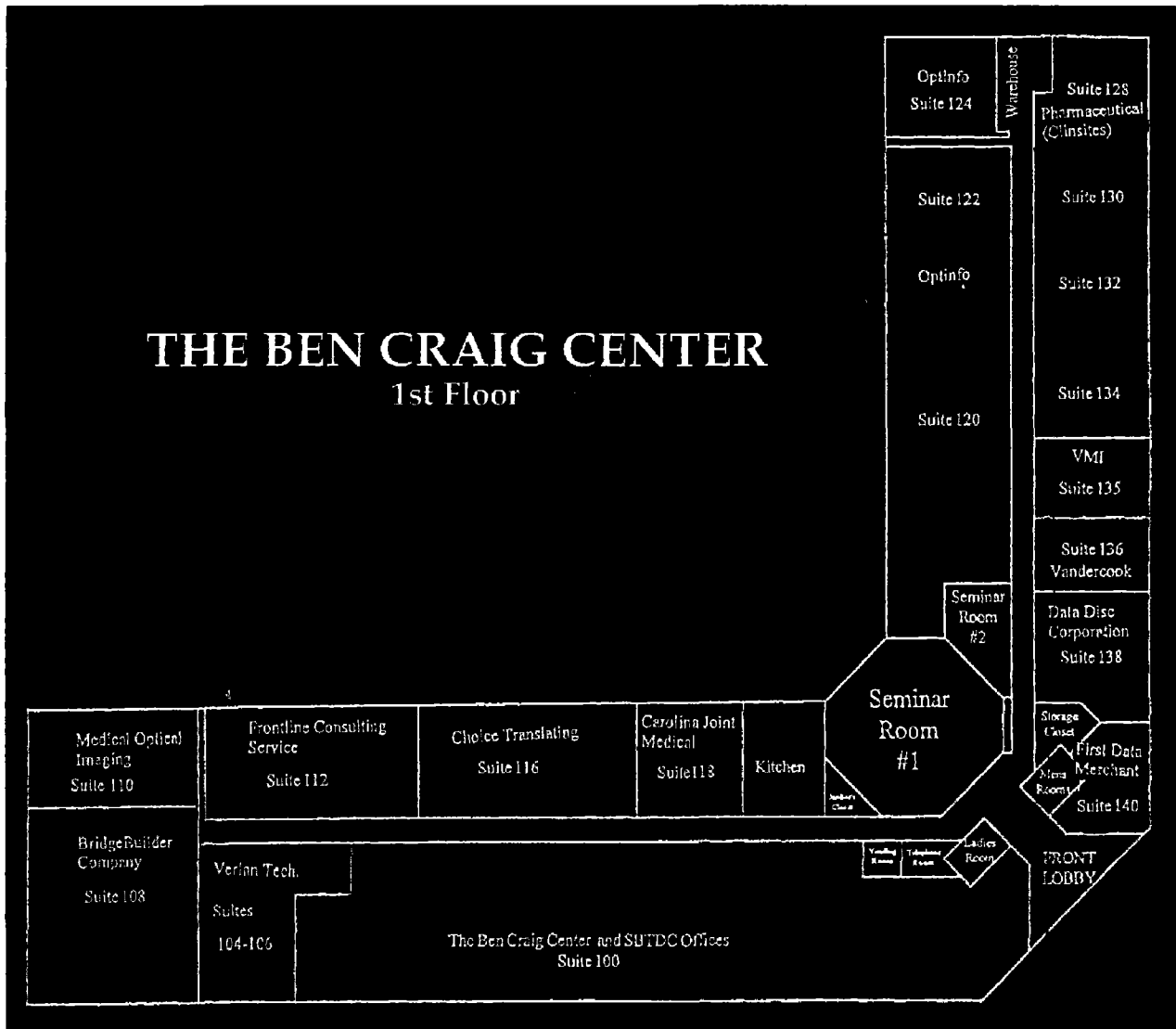
Owner: _____ **Broker:** _____

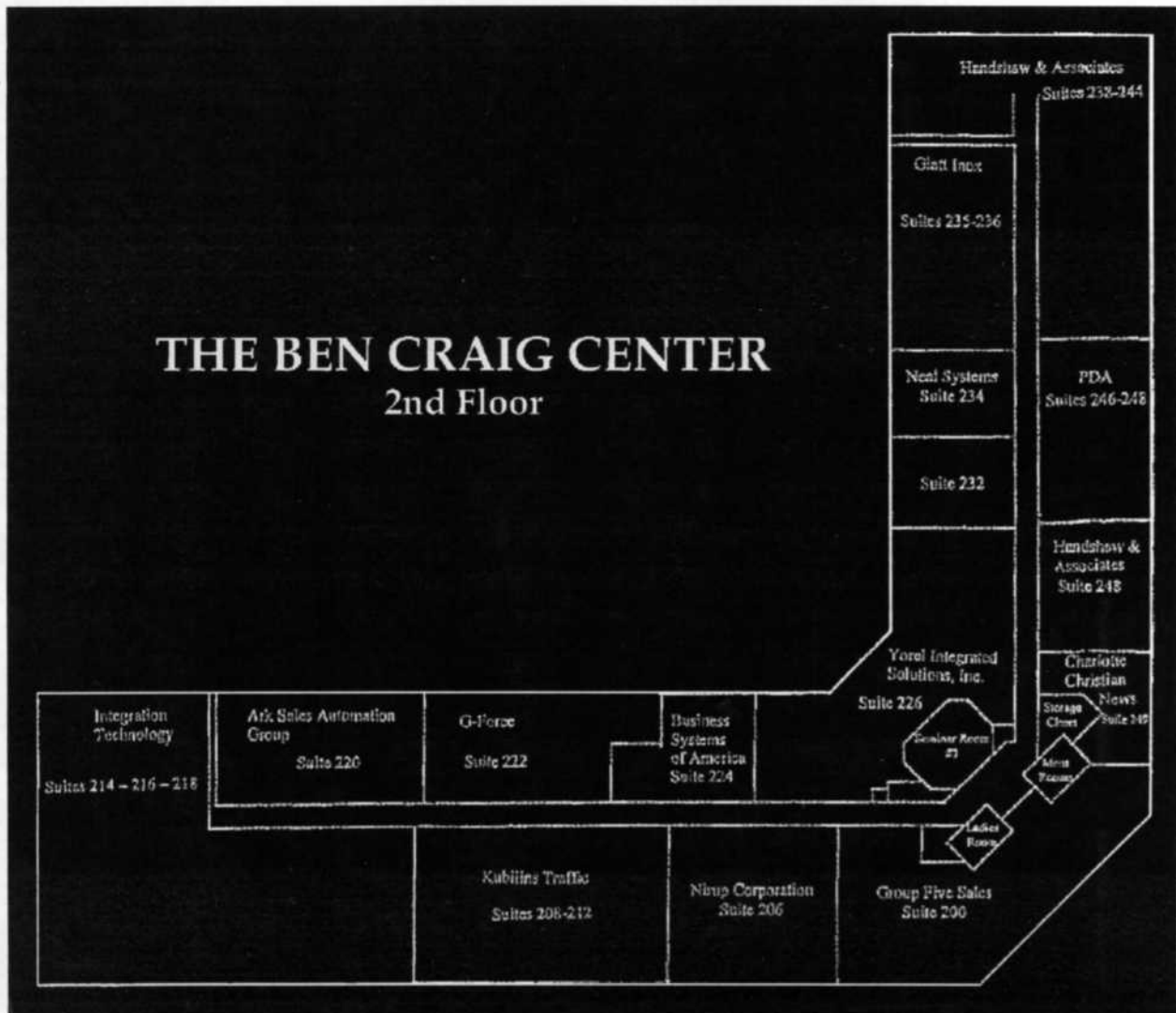
Address: _____ **Address:** _____

Telephone: _____
Fax: _____
e-mail: _____

Telephone: _____
Fax: _____
e-mail: _____

Annex 3: Layout of Ben Craig Center, Charlotte, NC





Annex 4: Criteria for Selection of Entrepreneurs

Identifying the Entrepreneur

The process of identification of entrepreneurs involves determining how to contact them and then interviewing them using the questionnaire. This is to help determine how many there are, their needs and how the incubator can provide them assistance. The assistance needed may vary from site to site and depend upon the nature and type of incubator, i.e., whether the focus is on technology, small and medium-sized enterprises, or regional development.

Entrepreneurs to be interviewed may come from many sources. When incubators start up they often seek existing small businesses that may wish to relocate into the incubator. For new businesses the technically-oriented entrepreneurs are likely to come from research facilities, engineering and science universities or technically oriented businesses. Industrial parks may also provide opportunities to find entrepreneurs. Once operating the existing clientele often provides the majority of new leads.

Management: As management is the most important criteria, incubators look for a balanced team with experience in the business. A team is preferred since the wide range of experience needed to grow a business rapidly is seldom found in one person, although the company may only involve one person initially. The incubator director will provide, initially, some of the skills necessary and training programs will also supplement the capabilities of the entrepreneur. The incubator should seek entrepreneurs with good 'people skills', that is, a person with the ability to work well with others, the ability to delegate authority to others, and have a network of contacts that is well developed and accessible.

Market: A readily identifiable market with the potential of rapid growth is ideal, since this provides an opportunity for competitive entry. The entrepreneur should know who the customers are and how to reach them and secure a large market. There should be high value added, gross margins that are 40% or more.

Competitive advantages for the product should exist and the company should be able to gain proprietary protection through patents or proprietary processes. Production costs should be low.

Financial: Profit after tax of above 10%. Time to break-even and positive cash flow should be under 2 years. Return on investment should be substantially above prevailing interest rates. Capital requirements should be low to moderate: something that the incubator will be able to arrange funding for. Also, there must be some envisioned method to 'cash out' or have the investment liquidated.

Annex 5: Application for Admission to Incubator Program

The information in this application will be used only to evaluate the eligibility of the applicant for participation in the Program. Access to the information will be restricted to Incubator management and staff directly involved in the review process.

Name of Company:

Street Address:

City & State:

Telephone:

Date of Application:

Major Expectations from Incubator Program

Space Requirement: square meters

Date of Entry:

Support Needs:

Company Information

Business Concept:

Customers:

Management Team:

Legal form of business entity:

Attach a copy of the papers and company bylaws and associated documenting legal status of the business entity.)

Company Ownership (owners and percent ownership).

Name & Title or Firm % Ownership

Three business references and three personal references in format below

Name:

Address:

Telephone:

Attach the following: Date

Business Plan

Financial Statements (past three years)

Enterprise Tax Return (past three years)

Personal Tax Return (all officers, past three years)

Applicant's Statement

Applicant hereby certifies that the information and statements contained in this application or attached hereto are true and correct and are furnished for the purpose of gaining admission to the business incubator program. Applicant authorizes Incubator management to investigate this information by contacting its references and otherwise checking applicant's background. Applicant authorizes any person or agency to furnish to Incubator any information that it may have or obtain in response to such inquiries.

Acknowledgment and Release

_____ (Applicant) acknowledges that the Incubator Program has or will provide, directly or in conjunction with other parties (consultants and volunteers), business assistance, technical assistance, funding assistance, education and business networking, office / business services, consulting and other services. In recognition of Incubator's nonprofit status and reduced fee structure, and as additional consideration for Incubator's providing Program Services, Applicant agrees to release, remise and discharge Incubator (and its directors, officers, employees, consultants and volunteers) from any and all liabilities, obligations, claims, demands, causes of action, suits, damages, costs, expenses and compensation of every kind and nature whatsoever, known or unknown, direct or indirect, which Applicant now has, may have had, or could have asserted against Incubator for, on account of, or in consequence of all transactions and dealings by, between or among Incubator and Applicant, including but not limited to the providing of Program Services.

IN WITNESS WHEREOF, this Statement and release is made this _____ day of _____, 199__.

IN THE PRESENCE OF:

_____ Name _____ Witness Name

_____ Title _____ Witness Name

Annex 6: Checklist for Business Plan Assessment

I. Business Description

- **type of business you are planning**
- **products or services**
- **type of opportunity (new, part-time, expansion, seasonal, year-round)**
- **keys for success**
- **growth potential**
- **uniqueness**
- **strengths**
- **weaknesses**

II. Marketing

- **potential customers**
- **size and growth of the market**
- **major competitors (how are their businesses prospering)**
- **sales promotion plans**
- **anticipated market share**
- **pricing**
- **advertising**
- **strengths and weaknesses**

III. Research, Design and Development

- **design or development**
- **technical assistance**
- **research needs**
- **costs relative to competitors**
- **strengths and weaknesses**

IV. Manufacturing

- **location**
- **what influenced the choice of location?**
- **needs for production, e.g. facilities and equipment**
- **key suppliers**
- **available transportation**
- **local supply of available labor**
- **manufacturing costs**
- **strengths and weaknesses**

V. Management

- **key management qualifications**
- **number of employees needed**
- **key functions**

- *plans for employee salaries or wages and benefits*
- *consultants or specialists needed (when and why)*
- *legal form of ownership and why*
- *licenses and permits*
- *key regulations*
- *strengths and weaknesses*

VI. Critical Risks

- *potential problems*
- *major obstacles to success*
- *alternative courses of action*
- *strengths and weaknesses*

VII. Financial

- *Estimated business income for the first year by month*
- *What will it cost you to open the business?*
- *Monthly cash flow for the first year, by month*
- *Personal monthly financial needs*
- *Annual sales volume to make a profit during the first three years:*
- *Lowest annual sales level at which you will make a profit*
- *Pre-opening financial condition: (projected assets, liabilities and net worth)*
- *Total financial needs for the first three years*
- *Potential funding sources*
- *Use of funds from lenders and investors*
- *Security for loans*
- *Strengths and weaknesses*

VIII. Milestones

- *How many months to sustainability?*
- *What are your key objectives in the next three years?*
- *What are the deadlines for each stage of business development?*
- *Strengths and weaknesses*

IX. Annex

- *Attach documents, drawings, agreements, or other materials needed to support your plan initial*
- *Attach names of references, advisers, or technical sources initial*
- *Other supporting documents initial*
- *Strengths and weaknesses*

X. Marketing Checklist

- *How will your customers use your products / services ?*
- *What are your customer's basic buying considerations with regard to:*

price

quality

service

availability

engineering

credit terms

right of return or consignment

- *Past and prospective patterns of product changes in your industry*
- *What are new uses for your products*
- *Describe related products or industry segments you are not now serving*
- *What warranty terms are customarily offered, and what is their cost*
- *Product liability issues*
- *Intellectual property protection:*
 - *Trade secret*
 - *Trade/service mark*
 - *Patent*
- *Your assessment of the nature of demand: (basic/created)*
- *Key customer characteristics*
- *Role of the following - and their needs / expectations*
 - individual consumers*
 - industrial buyers*
 - service buyers*
 - commercial buyers*
 - financial buyers*
 - government buyers*
 - retailers*
 - wholesalers*
- *Your assessment of market early growth mature vintage*
- *Major foreign markets (identity and size)*
- *Discuss the following factors effect on demand:*
 - *Population changes*
 - *General business conditions*
 - *New products, product changes or technological innovations*
 - *Governmental factors*
(e.g. fiscal policy import/export controls, defense activity)
 - *Customer growth*
 - *Energy availability*
 - *Ecological considerations*
- *How much can market be expanded by your company*
- *Discuss the market segmented by:*
 - Customer characteristics*
 - Geographical locations*
 - Product characteristics*
 - Channel of distributions*

- **Pricing policy:**
 - how will you develop market segmentation?*
 - seasonal sales patterns and anticipated shifts*
- **record of product sales performance**
- **Date the product was (will be) introduced / any significant modifications.**
- **Projection of growth or contraction trends for the product lines**
- **Forecast of the following, by year for the next five years**
- **Sales expectations**
- **Market share**
- **Key competitors**
- **total competitive capacity, by year for the next five years**
- **Forecast of the following, by year for the next five years**
- **Sales backlog**
- **Accounts receivable**
- **Attach an assessment of principal competitors and competitive practices, including product, technology and financial**
- **Attach pricing policies analysis for key product lines**
- **What is the sensitivity of both you & your competitors to price changes?**
- **Who is the price leader?**
- **Is good price discipline practiced?**
- **What excess capacity in the industry might tend to depress prices?**
- **Will you be able to pass along cost increases to customers?**
- **Attach an analysis of potential domestic and export customers, including:**
 - **Total number, major types of customers and estimated sales**
 - **Geographical locations and estimated sales by location**
 - **Potential principal customers, annual volume of sales and buying habits**
 - **Proposed contractual relationships with customers**
 - **Government contracting subject to cost regulations or price re-determination**
 - **Special discounts and credit terms to be offered to significant customers methods companies in the industry use to distribute and sell, including:**
 - **Channels of distribution and annual volume of product in each channel**
 - **Conditions in customers' markets**
 - **Nature and importance of the field sales effort**
 - **Manner of compensating sales personnel**
 - **Advertising and sales promotion practices in this industry**
 - **Changing patterns in the distribution process**
 - **Trends among major customers toward integrating, purchasing substitute products or otherwise deviating from existing purchasing habits**
 - **Cost of advertising appeals, media and other sales promotion**
 - **Analysis of distribution and selling costs**

- **Describe marketing methods relating to foreign sales**
- **Review the major elements of marketing, including:**
 - Market forecasts**
 - Departmental costs**
 - Sales and expenses per sales professional**
 - Customer service costs**
 - Order processing costs**
 - Discount pattern by customer groupings**
 - Key customers and total volume of sales, by year for the next three years**

: Adapted from "Checking Into An Acquisition Candidate"; Coopers & Lybrand.

Annex 7: Criteria for Evaluating Enterprise Opportunities

Criterion	Higher Potential	Lower Potential
Markets		
- Need	Identified	Unfocused
- Customers	Reachable; receptive	Unreachable or loyal to others
- Payback to User	Less than one year	Three years plus
- Value added or created	High	Low
- Product life	Durable; beyond time to recover investment plus profit	Perishable; less than time to recover investment
- Market structure	Imperfect competition or emerging industry	Strong Competition or highly concentrated/ mature industry
- Market size	\$100 million sales	Unknown
- Market growth rate	Growing at 30 - 50% +	Contracting or less than 10%
- Gross margins	40 - 50% or more; durable	Less than 20%; fragile
- Market share (5 year)	20% or more; leader	Less than 5%
- Cost structure	Lost-cost provider	Declining cost
Economic Harvest		
Profits after tax	10 - 15% or more; durable	Less than 5%; fragile
Time to:		
- Break even	Under 2 years	More than 3 years
- Positive cash flow	Under 2 years	More than 3 years
ROI potential	25% or more/year; high value	< 15 - 20% / year; low value
Value	High strategic value	Low strategic value
Capital requirements	Low to moderate; fundable	Very high; not fundable
Exit Mechanism	Present harvest options	Undefined; illiquid investment
Competitive Advantage		
Fixed and variable costs:		
- Production	Lowest	Highest
- Marketing	Lowest	Highest
- Distribution	Lowest	Highest
Degree of control:		

- Prices	Moderate to strong	Weak
- Costs	Moderate to strong	Weak
- Channels of resources	Moderate to strong	Weak
- Channels of distribution	Moderate to strong	Weak
Barriers to entry:		
- Proprietary protection regulations advantage	Have or can gain	None
-Lead time advantage in technology, product,	Resilient and responsive; have or can gain	None
-Contractual advantage	Proprietary or exclusivity	None
- Contacts and networks	Developed; high quality	Crude; limited; inaccessible
Management Team		
Team	Existing, proven performance	Weak or solo entrepreneur
Competitor's mind set	Competitive; few; not self-destructive	Dumb
Fatal Flaw Issue		
Fatal Flaws	None	One or more

Annex 8: Member Performance Checklists

Company:

Entrepreneur:

Address:

Phone:

Business Concept

Business Plan including Projections

- **Product(s)**
- **Employees:**
Past Financial Statements
- **Credit**
- **Criminal History**
- **Past Locations**

Term desired:

- **Month to Month**
- **12 Months**

Business Concept Review

- **Company:**
- **Entrepreneur:**
- **Address:**
- **What is it?**
- **Who will buy it?**
- **What are they buying now?**
- **How much are they paying now?**
- **What will they pay?**
- **What is the purchase cycle?**
- **Who is the management team?**
- **What experience do they bring?**

Tenant Requirements:

Space (square meters):

- **Office 1 / 2 / 3 shift**
- **Laboratory 1 / 2 / 3 shift**
- **Production 1 / 2 / 3 shift**
(describe)
- **Special Equipment:**
- **Maximum #/square meter**
- **Dust / Vapor emission**
- **Forklift Required:**
- **Utilities**
- **Water**
- **pressure**
- **volume (est. liters/month)**
- **Electricity (estimated kilowatts/month)**
- **220V**
- **440V**
- **Compressed Air**

- **Hazardous Materials:**
- **Biologically Active Agents (describe)**
- **Solvents (describe)**
- **Flammable Agents (describe)**
- **Explosive Agents (describe)**
- **Services:**
(describe)
- **Special Requirements:**
(describe)

Business Plan Review

- **Company:**
- **Entrepreneur:**
- **Concept**
- **Market**
- **Competition**
- **Management Team**
- **Tactics**
- **Proposed Financial Structure**
- **Financial History / Projections**
- **What are the holes that need to be filled?**
- **Risks**
- **Milestones**
- **Research & Development**
- **Marketing**
- **Administration**
- **Legal**
- **Personnel**
- **Measures of Performance**

Due Diligence Checklist

- **Company:**
- **Entrepreneur:**
- **Address:**
- **Phonelfax:**
- **Review Documents:**
- **Application**
- **Business Plan**
- **Key Management Resume(s)**
- **Articles of Incorporation**
- **ByLaws**
- **Board Minutes**
- **Shareholder Meeting Minutes**
- **Investment Summary**
- **Debt Summary**
- **Criminal History**
- **Legal Filings**
- **Patents/Copyrights**
- **Other Investors:**
- **Who, How Much, Form (documentation)**

Investment Checklist

- **Dates:**
- **Materials to Center**
- **Internal Review Completed**
- **Mail to Committee**
- **Committee Meeting**
- **Response to Applicant**
- **Business Summary**
- **Risks**
- **Exit Strategy**
- **Recommendations:**
- **Financial**
- **Support**
- **Proposed Structure**
- **Committee Disposition**
- **Next Step(s)**
- **Letter to Entrepreneur**

Closing Document Checklist

- **Latest Business Plan**
- **Financial Instruments:**
- **Debt:**
- **Security:**
- **Appraised**
- **Insured/Secured**
- **Payment Schedule**
- **Conversion (if any):**
- **Condition(s)**
- **Date(s)**
- **Warrants:**
- **Option Date(s)**
- **Equity (Certificates)**
- **Re Purchase Agreement(s)**
- **Non Compete Agreement(s)**
- **Employment Contracts**
- **Board Representation:**
- **Date effective**
- **Person assigned**
- **Reporting Requirements:**
- **Frequency**
- **Content**
- **Closing Publicity:**
- **Responsible**
- **Date**
- **Monitoring:**
- **Measures of Performance**
- **Trigger Points & Actions**
- **Key Milestones / Benchmarks**

Annex 9: Schedules for Operating Procedures

A. Daily Operating Procedures

<u>When</u>	<u>Who</u>	<u>What</u>	<u>Check</u>
Start		Unlock Doors & Turn on Lights	
		Check computers/printer/fax	
		Make Beverage	
		Check Tenant spaces	
	Mgr	Review & Prioritize Needs	
End		Check Tenant spaces	
		Lock Secondary Doors	
		Set night-lights & security	
		Lock Main Door	_____

B. Weekly Operating Procedures

Tues		Check consumables level	
		Process re-stock order	
Wed	Mgr	Tenant Board of Advisors	
Thur		Tenant / Management Meeting	

C: Monthly Operating Procedures

First		Copy Machine, Fax,. Log	
1-3		Monthly Billing ex Rent	
3	Mgr	Check Billing ex Rent	
5		Rent payment status	
		Notices for Arrears w/Penalty	
5	Mgr	Monthly Management Report	
10		Rent payment status	
	Mgr	Eviction begun as necessary	
15	Mgr	Executive Committee Review	
18	Mgr	Review Levels of Use	
		(capacity utilization review)	
20		Equipment Check & Maintenance	
25		Prepare Rent Bills	
Last		Distribute Rent Bills	

D. Annual Operating Procedures

Jan	Mgr	Management Report	
		Board Annual Audit	
Mar	Mgr	Shareholders' Report	
		Board Board of Directors	
Apr	Mgr	Shareholders' Meeting	
May	Mgr	Staff Performance Review	
Jun	Mgr	Board of Directors	
Aug		Board Strategic Plan update	
Sep		Board Board of Directors	
Nov	Mgr	Annual Budget	
Dec		Board Board of Directors	

Author's biographical sketch

Rustam Lalkaka is president of Business & Technology Development Strategies LLC. He has been director of the United Nations Fund for Science & Technology (1984-89), UNIDO industrial development advisor in Turkey (1976-79) and regional advisor on technology transfer for Asia and the Pacific in Bangkok (1972-76). After graduate studies in metallurgical engineering at Stanford University, California, he helped establish a major steel plant engineering corporation and managed its international affiliate out of Dusseldorf.

Mr Lalkaka has published over 90 papers and is the co-author of several books. Over the last four decades he has advised on technology strategies and venture creation in some 30 industrializing countries and is credited as the father of the technology incubator program in China. He has been awarded honors for pioneering work on strengthening technological capabilities including the World Association of Industrial & Technological Research Organization's Twentieth Anniversary Award of Honor. As member of the U.S. National Business Incubation Association's committee on education and publications and its task force on international affairs, Lalkaka has been active on establishing incubation systems in developing countries and assessing their effectiveness. Email: inqubator@aol.com