CHAPTER 1

INTRODUCTION

Entrepreneurship is the dynamic process of creating incremental wealth. This wealth is created by individuals who assume the majors risks in terms of equity, time, and/or career commitment by providing value for some product or service. Entrepreneurship is critical to the development of the economy of a country by creating jobs, developing new products and processes through innovation, identifying new markets and increasing the productivity through new competition.

1.1 IMPORTANCE OF ENTREPRENEURSHIP

Entrepreneurship is central in this process and the entrepreneurs will increase the chances of raising resources if they are able to establish both their research credibility and their understanding of the potential market opportunities.

The four major dimensions – individual, environment, organisation and process – aided by collaborative networks with government, education, and institutions create this wealth through innovation and new-ventures.

In the first dimension, the individual – entrepreneur, who is the catalyst for the new-venture creation, assumes the major risks – finance, career, family and social in the process of creating the new venture. Apart from these risks, the success of an entrepreneur depends on the need for achievement, locus of control, education, age and work experience.
In the second dimension, the environment should be favourable for the entrepreneur in making the venture a success. The variables that influence the environment are the availability of fund, labour, facilities, supporting services, accessibility of suppliers and customers, governmental influences and living conditions.

In the third dimension – organisation includes the type of firm, entrepreneurial environment, partners and the product.

In the fourth dimension - process involves identifying a business opportunity, accumulating the resources, building an organisation, producing the product and marketing the products / service.

It is apparent that the success or failure of a new venture depends on these variables that influence the four dimensions – individual, environment, organisation and the process.

The growth of ICT had led to the growth of knowledge intensive technology based start-ups globally and has contributed to the growth of the economy of developing countries. A technology start-up may be defined as the high growth, technology oriented companies with limited operating history and are in the phase of development and research for markets.

The growth of knowledge has resulted in the development of innovations and this led to the creation of technology start-ups to take these innovations to the market. The life cycle of the technology start-up is very short because of the faster growth of technological innovations which led to the faster rate of obsolescence of technology innovations.
These start-ups need support and handholding during their initial phase of their establishment which is critical to ensure their survival and acceleration of growth of the venture.

The dynamics of technology start-ups includes a small team of experienced professionals with higher aspirations for growth, focus on converting an idea into product for new commercial applications, usually bootstrapped and will scout for innovative financing. These dynamics are evidence enough that technology start-ups face challenges for their survival and growth and hence, are highly vulnerable for early failures for many reasons.

The typical high growth firm operates in an environment characterized by new technology and an emerging market. This implies extreme levels of uncertainty and may explain the greater difficulties these firms experience in financing, especially in the early stages of development. Firms in the technology forefront experience greater problems in fundraising as compared to firms of lesser technological sophistication. The technology start-ups apart from early stage funding also face challenges in terms of developing an early product concept into market-viable applications and finding the niche market for their products. The competencies and the leadership ability of the founding team of the start-up is more important to overcome these challenges which is also a crucial factor for the success of the start-ups.

Opportunity Recognition, Entrepreneurial Commitment, Threshold of Credibility, and Threshold of Sustainability are the four critical junctions with increasing complexity that a technology entrepreneur must pass through to make the start-up more successful. The technology start-up should identify the business opportunity based on the research and knowledge and mobilize the required resources to pursue the identified opportunity and to develop a process to turn the start-up into a successful venture.
Success of the Start-up may not be attributed to one single success factor. It is a combination of factors which is responsible for the success of the start-up. A success factor in one phase might very well be a failure in another phase. Also, some variables may be more important in one phase and less important in another phase. Moreover, growth of a company also depends on factors affecting the ability to grow, willingness to grow and opportunity to grow.

The Figure 1.1 shows the stages a technology start-up should undergo to introduce a new product into the market (Booz et al 1982).

![Figure 1.1 New Product Development Process](image)

The entrepreneur is exposed to different kinds of risks at each stage of the new product development process. The activities to be performed by the entrepreneur at each stage of the product development are diversified and require multifaceted skills to perform these activities.

The conceptual stage of product development is the period during which a concept is to be proven scientifically valid or is shown to be potentially valid by a model. The objective of this stage is to demonstrate the implementation potential of a concept. An entrepreneur should focus on describing the innovation, identifying its potential utility and demonstrating its potential for achieving performance and implementation. The entrepreneur
should be able to articulate the concept, explain that the critical assumptions upon which the performance is founded are reasonable and should identify and assess critical manufacturing and marketing barriers for the product.

The technical feasibility stage of engineering development is the period during which it is proven that it is possible within the technological state of the art to produce a new product from the concept. The objective of this stage is to confirm the target performance of the new product through experimentation and/or accepted engineering analysis and to ascertain that there are no technical or economic barriers to implementation that cannot be overcome by development. The entrepreneur should focus on developing a lab or bench scale model at this stage. The entrepreneur should also be able to prove the technical feasibility, examine the operation requirements and provide preliminary production feasibility assessments.

The development stage of engineering development is the period during which the needed improvements in materials, processes, and design are made and during which the product is tested and proven to be commercially produced. The objective of this stage is to make the needed improvements in materials, designs, and processes and to confirm that the product will perform as specified by constructing and testing engineering prototypes or pilot processes. The product of this stage is a tested or proven engineering prototype or pilot process. During the developmental stage, the entrepreneur should focus on identifying critical materials and develop components, process steps to the extent required to meet technical performance and economic objectives, conduct the tests of critical materials, components and process steps, design and fabricate a pilot process or engineering prototype suitable for scaling up in a later stage, optimize the product through design iterations using computer models or other acceptable analyses and tests and conduct final tests after engineering optimization and modifications.
The commercial validation and production preparation stage of engineering development is the period during which a product or process is prepared for introducing the product to the market. The objective of this stage is to develop the manufacturing techniques and establish test market validity of the new product. The product of this stage is the preproduction prototype or process.

During the commercial validation and production preparation stage, the entrepreneur has to perform multiple tasks to ensure that the products reach the commercialization stage. The tasks to be carried during the validation stage includes in-house product tests, user or field trials of the product, trial or pilot production, pretest market, test market, or trial sell, revised financial analysis. (Cooper 1990). The validation and production preparation stage will help the entrepreneur to finalize the design and performance parameters of the product, installation and start-up plans for the manufacturing process, selection of production tools and technology, selection of materials and components, vendors and logistics, testing of product or process market acceptance and design a field support system.

The idea testing and product development are the two main key factors of technology startups. Apart from the ICT start-ups, the start-ups in the other technology areas require laboratory facilities to test their idea and for product development and these facilities are capital intensive and need a much greater investment. These stages extend the time-frame of the developed product to reach the market. These factors add up to a significant level of risk to be taken by the entrepreneur. Technology startups will need more resources and infrastructure at the early stage of development.

The start-ups face a set of challenges during the initial days of venturing and to complete the phases from new product development to commercialization.
The type of management structure of the firm combined with the personal characteristics of management is important for the success of the start-ups. The main reasons for the failure of the management team are improper business plan and reluctance to look for advice and mentoring from external sources. The technology start-ups are either market pull or technology push. Hence for the survival and growth of the start-ups the management team should be a mix with technology and market skills.

As the technology start-ups face higher risks of failure due to innovative product and volatile market hiring, retaining and development of manpower is a key problem in the technology start-ups. According to (Rauch et al 2005) human capital, mostly conceptualized as education, experiences and skills are known for being an important factor affecting productivity and growth. The individuals prefer to join established firms than the start-ups due to various reasons. Schnabel et al (2008) state that individuals' employment stability was higher in incumbent than in newly founded firms while their risk of becoming unemployed was lower. High-tech business demands a pool of technically skilled people, people who understand both the technology and the markets. To ensure success, the start-up should continue the development of its human capital to keep pace with the market needs and expectations.

Credibility is the general problem of any start-up and this leads to the challenge selecting employees, building teams, attracting investors, establishing partnerships, and convincing clients.

Lack of focus of the team is another general problem of any start-ups. The team will have different views and expectations about the product and application of the product in different fields. The team will be unclear about potential applications that can be derived out of the developed technology and these results in establishing wrong priorities. Due to lack of
focus, the enterprise fails to develop a formal organizational structure necessary to sustain growth while maintaining the firm’s entrepreneurial drive.

The start-ups lack in understanding the characteristics of the investors and their expectations from the start-ups. This leads the technology start-ups to face the problem of mobilizing cost effective funds for establishing the venture and hence, mostly result in bootstrapping the company or mobilize funds from family and friends. Sooner they need money to develop the product, to manufacture a prototype or to conduct market research.

The time to market is a key problem of the start-ups. The start-ups usually underestimate the workforce required, the capacity of the equipment, the intricacies in the product development and testing and this collectively results in underestimating the time to market.

The inability to create new markets during the initial days is a problem for the start-ups. The start-ups would always try for a pie in the existing markets rather than creating new markets with the developed product or technology.

Apart from the above problems, the entrepreneurs involved in establishing the knowledge based ventures come across various constraints and problems in the following aspects:

- Infrastructure at the initial stage – access to Technology, Facilities
- Manpower availability with respect to the stages - from idea to commercialisation
- Lack of Networking – Funding Agencies, Government Agencies, Other Institutions
- Non-availability of expert advices to the new ventures – in finance, market, technology, strategy, and legal
- Lack of community support for new technology ventures
- Establishing the identity of both individual and organisation in the business community
- Overheads on office facilities – conference room, furniture, office equipment at initial stage. It consumes both time and money of the entrepreneur.
- Lack of understanding of procedures and regulations in establishing the venture
- Insufficient expertise in business management

The high tech, high growth start-ups should possess specific characteristics to be successful. The characteristics that decide the success of the technology ventures shall be classified into five components. These five components include management of the start-up, financial aspects, target market, intellectual property position, and strategic partnership for high growth.

The management of the start-up should be strong enough to build a strong business model and strategic planning for the growth of the venture. These can be achieved by a management team which possesses a strong commercial track record by the founders and with complementary skills.
The second component is the financial aspects which include the capital raised by the management team and cost of the capital. The cost of the capital plays a critical role in deciding the profit of the venture.

The third component is the target market and the market size for the product which decide the growth pattern of the venture. The technology push and the market pull will play a critical role in defining the market size for the product.

The fourth component is the intellectual property position of the venture. The success rate of the technology venture will be higher if the venture possesses an Intellectual Property which has a stronger commercial value.

The fifth component strategic partnership is the critical and challenging component for a technology start-up. The rate of growth is governed by the partnerships established by the venture to develop the technology, commercialize and to penetrate the market.

1.2 EVOLUTION OF BUSINESS INCUBATORS

To minimise the risks faced and to maximise the success of the individuals who are involved in enterprise creation, the concept of Business Incubator has evolved in the last 40 years. The business incubator plays a vital role as a common platform, which brings together the four major dimensions – individual, organisation, environment, and process.

Business incubation is a business support process that accelerates the successful development of start-up and fledgling companies by providing entrepreneurs with an array of targeted resources and services. The National Business Incubators Association (NBIA) defines that “Business incubation
catalyzes the process of starting and growing companies, providing entrepreneurs with the expertise, networks and tools they need to make their ventures successful. Incubation programs diversify economies, commercialize technologies, create jobs, and build wealth.

The most common goals of Business Incubators are creating jobs in a community, enhancing a community’s entrepreneurial climate, retaining businesses in a community, building or accelerating growth in a local industry, and diversifying local economies.

Two principles characterize effective business incubation:

1. The incubator aspires to have a positive impact on its community's economic health by maximizing the success of emerging companies.

2. The incubator itself is a dynamic model of a sustainable, efficient business operation.

The “first generation” incubators in 1980s were essentially offering affordable space and shared facilities to the entrepreneurs. The “second generation” business incubators, which evolved during 1990s, supplemented the space and shared facilities with counselling, skills enhancement, and networking services to access professional support and seed capital.

The process of globalisation, scientific and technological advancements, newer development in Information and Communication Technology (ICT) and emergence of knowledge based industries led to the development of “third generation” model-Technology Business Incubators (TBI) since 1998.
Technology Business Incubators (TBIs) are a specific type of business incubator - a property-based venture which provides tangible and intangible services to new technology-based firms, entrepreneurs, and spin-offs of universities and large firms, all with the aim of helping them increase their chances of survival and generate wealth and jobs and diffuse technology.

The primary mission of a TBI is not only to create jobs or to develop a region but to facilitate the commercialization of research results as well as the acquisition and use of state-of-the-art technologies, which would promote domestic resource exploitation and improve the international competitiveness of national industry. Therefore, TBIs constitute an explicit instrument for the transfer of technology.

TBIs aim explicitly at incubating enterprises with high or advanced technology content. A typical TBI provides its clients with a comprehensive range of services, not only the rental space at an affordable price but also a full range of business and specialized services aimed at intensifying technology utilization.

TBIs generally have admission and exit criteria and the set of business support services is designed to include those that facilitate technology transfer and commercialization of new technologies. TBIs have usually close ties with a research base and will focus on commercializing new technologies through innovative entrepreneurial ventures.

TBI is a unique model in promoting enterprises in the knowledge based economy. TBI is an economic development tool designed to accelerate the growth and success of entrepreneurial companies through an array of business support resources and services. TBI is a place where new knowledge based ideas, methods, processes or products are inspired, developed and commercialized.
1.3 TYPES OF INCUBATORS

Even though the basic function of an incubator is to provide work space, shared office facilities, counselling, information and training, no unique incubator model prevails. The major classifications of the incubators are based on the following:

- **Objectives**: Technology commercialisation, Job creation, Create enterprises etc
- **Location**: Urban, Rural and Virtual
- **Sector**: Technology, Service
- **Promoters**: Government, Private, Institutions
- **Mode of Operation**: Profit, Non-profit
- **Size**: from mini to mega

1.4 SERVICES OFFERED BY TECHNOLOGY BUSINESS INCUBATORS

Technology Business Incubators (TBIs) offer the following services to the entrepreneurs:

- **Space** – flexible and scalable sizes and flexible terms
- **Specialized Services** – specialized equipments, lab spaces, testing facilities
- **Shared Facilities** – office facilities, equipments
- **Seed Funding** – early stage funding, innovation funding
• Support to entrepreneurs – networking, information providers, group participation

• Soft Skill Services – skill development, mentoring, counselling, training

• Synergy among clients through exchange of knowledge, Intellectual Property and experiences

• Services on legal, security and Intellectual Property issues

1.5 CHARACTERISTICS OF TBIs

The characteristics of the TBI are similar among the various types of incubators. The basic characteristics of the TBIs are:

i. Linked to Educational Institutions

Generally, the TBIs are associated with an educational institution and this association helps the entrepreneurs to access the technology information, research, resource persons – internal and external, shared facilities, technology development and student manpower easily.

ii. Board of Management

The TBI is registered as a legal entity for the effective functioning of TBI. The board comprises representatives from parent organisations promoting the TBI, Government Agencies, Funding Agencies, Entrepreneurs, Trade and Industry Bodies.

iii. Incubation Policy

A well defined incubation policy covers the procedure in identifying and selecting the entrepreneur and the technology for incubation,
incubation program to provide services to the start-ups and in similar manner, a flexible pre-determined procedure for the exit of the entrepreneur after the success / failure.

iv. Bouquet of services – fee and free

The expectations of an incubatee from the incubator will vary according to their product or their stages in the product development. The incubators should provide tailor made services and should meet the needs of incubatees individually. These services may be free or fee based which may also be converted, fully or partially, as a stake in the venture.

v. Incubator Management Team – for providing information, counselling, training and networking

An incubator will be functioning with a small team to provide the services to the incubatees. This team should be capable of providing the information on various functional areas to the incubatees, provide necessary counselling in business management, should be able provide tailor made training in technology and management and most importantly should be able to create network with professionals in diverse fields, financial institutions, government agencies, universities, R&D institutions, and venture capitalists for the benefit of the incubatees.

vi. Facility Providers – Work space, Shared office facilities and other Resources

The TBIs provide work space which is affordable to the incubatees. The TBIs provide flexible work space facilitating incubatees to increase or downsize their operations whenever required. The facilities in the TBI help to produce products of higher value rather than conventional and
traditional products. The incubatees can utilize the facilities that are available in the TBI and incubatees who use those facilities will share the cost involved.

vii. Self-sustaining

The TBIs will plan for their sources of income from their incubatees through fees and other payments for the services rendered by the incubator. The TBI will ensure that it will be self-sustaining with the income generated through their services after a particular period of their inception. Normally, 5 years since inception will be the period for TBI to be self-sustaining.

1.6 BENEFITS OF TBIs

TBIs are helpful to various sectors of the community that are associated with the TBIs. The TBI creates an entrepreneurial climate in the region where it is in operation and is beneficial in number of ways.

i. The TBI provides the following advantages to the Incubatees:

1. Reduces the time from idea to marketing the product.

2. Provides easy access to resources, shared facilities, flexible work space, tailor made services increases the rate of success of the incubatee.

3. Facilitates easy access to the seed capital and other funding.

4. Helps in receiving mentoring, information and training counselling and business management.

5. Gives the incubatees an identity for themselves and for their organisation in the business community. The brand of TBI is associated with the incubatee in marketing their products.
6. Reduces the gestation period of establishing the venture.

7. Reduces the pain of failure to large extent.

8. Provides access to information related to technology, product, process, funding, market, etc.

ii. The TBI provides the following advantages to the Government:

1. TBI is an economic development tool.

2. Generates jobs, promotes income and taxes.

3. Provides guidance to the Government in making policy decision


5. Reach out to the large pool of potential innovators / entrepreneurs

iii. The TBI provides the following advantages to the Educational Institutions:

1. Facilitates Industry-Institute Interaction.

2. Promotes commercialisation of new products.


4. Utilization of laboratories, equipment and facilities.

5. Gets first hand information about the change in the industry scenario and about the best practices.

6. Enhances the capabilities of the students to the requirement of the industry.
iv. The TBI provides the following advantages to the Corporate:

1. Provides chances for the larger organisations for acquisition of new idea.
2. Identifies suitable partners without any hassle.
3. Provides support to the incubatees for new product development and acquires the same.
4. Facilitates outsourcing.
5. Has an edge over the competitors

v. The TBI provides the following advantages to the Society:

1. Creates entrepreneurial culture in the region.
2. Inculcates social responsibility in the incubatees.
3. Makes the business to stay in the region.
4. Invites new businesses and allied businesses to the region.
5. Leads to development of infrastructure of the region.

1.7 CHALLENGES AND OPPORTUNITIES FOR TBIs

Incubating an Incubator is a challenging task and it is similar to converting an idea into a marketable product. The incubator should be operated with an entrepreneurial mindset to make the incubator survive and achieve its objective. The incubator management team should be enterprising and should be able to adapt to the changes in the business environment. TBIs face lots of challenges and it should attempt to convert these challenges into opportunities.
The challenges faced by the TBIs are:

i. Incubating the Incubator

The incubator should go through a process of incubation starting from analysing the business environment in the region, deciding its objective, creating the required infrastructure, finalizing the array of services, establishing the incubator management team and marketing the incubator in the region.

ii. Creating a brand

Creating a brand in the region for the incubator is a challenge. This provides the incubatee and the organization to get an identity in the business community at an early stage. The incubatees can Ancash the brand equity established by the incubators.

iii. Seed Funding

Mobilizing funds for seed capital and for further development is another challenging task for the incubators.

iv. Establishing Network

The network created by the incubator should be wide and strong. This network should cover all the entities which have a key role in the development of the economy. The incubator should establish a network with the Government Agencies, Financial Institutions, Angel/Venture Capitalists, Regulatory Authorities, Policymakers, Professionals, Experts, Industry and Trade Bodies, and Industrialists. Successful establishment of this network results in the increase of success rates of the incubatees.
v. Self-sustaining

The major challenge for an incubator is to generate revenue for making it a self-sustainable. The incubator should identify the various income generating sources without increasing the burden on the incubatees.

1.8 NEED FOR STUDY

The incubators are mostly established at the academic institutions with the support from the Government agencies with the core objective of promoting technology entrepreneurship. The incubators have been established with different technologies as thrust areas. This has led to different operational models to meet the objectives of the incubator. The very little exposure on the functioning of the incubators has led the incubation managers to face the challenges in identifying the basis on which the performance of an incubator is ascertained, the key factors that lead to the good practices of the incubator, the factors that influence the performance of the incubator and the strategies to be adopted for the growth of the incubator.

The success of the incubator depends on the larger role to be played by the institutions apart from the space, building and equipments and the strategies to be adopted by the incubator to create an conducive environment by helping the start-ups to overcome the obstacles and challenges faced in transforming themselves into an enterprise. Most of the worldwide studies had revealed that various factors influence the success of the incubators and very little research has been carried out on the performance of the incubator and the factors influencing the same. The earlier studies had explained the relationship between the factors influencing the performance through the theoretical models.
A model that attempts to establish the relationship between various factors of incubator operations would help the incubators and stakeholders to achieve their goals and objectives with the limited resources available.

1.9 OBJECTIVES OF THE STUDY

The objectives of the study are:

- To identify the key parameters for evaluating an incubator.
- To identify the factors influencing the performance of the incubators.
- To identify the key elements of the success factors influencing the performance of incubators.
- To evaluate the importance of the elements listed in achieving the performance level of the incubator.
- To analyze the relationship between the factors that lead to the performance of the incubators.