

# A review on Technology business incubation in India

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## ABSTRACT

*Technology Business Incubators (TBIs) play a pivotal role in fostering tech start up growth within the global entrepreneurial ecosystem. However, their characteristics have evolved across typologies, sponsors, stakeholders and services offered. This scholarly article delves into the existing literature on TBIs, aiming to construct a framework explaining their contribution to new venture formation. A comprehensive analysis of current literature explores varied aspects of TBIs, including: Typologies: Categorization based on focus, funding, and structure. Goals and Objectives: Examining diverse motivations driving TBI operations. Roles and Services: Unpacking the spectrum of support provided to start-ups. Incubation Process and Supply: Analysing the structured approach to nurturing ventures. Outcomes and Accomplishments: Evaluating the impact of TBIs on start-up success. Critically reviewing multiple theoretical constructs, the article proposes a conceptual framework encompassing the pre-incubation, incubation, and post-incubation stages of TBIs. Drawing upon literature and key theoretical constructs, the framework for start-up formation and graduation traverses the pre-incubation, incubation, and post-incubation phases. The article highlights potential areas for further exploration: (1) Investigating pre-incubation and post-incubation processes for deeper understanding (2) Focusing on micro-aspects within each stage across various dimensions (3) Employing the developed framework for further inquiry and analysis. This article contributes to the existing scholarship by systematically reviewing the literature on TBIs and offering a robust conceptual framework. This framework can guide future research, ultimately enhancing the effectiveness of TBIs in nurturing successful tech start-ups within the global entrepreneurial ecosystem.*

**Keywords:** Start-ups, Business Incubation, TBIs, Incubation Management, University based TBIs

## 1. INTRODUCTION

With the nation's economic liberalization beginning in the 1990s, India's commercial sector underwent a considerable transformation. Kadam et al. (2019) mention, in the Union Budget speech in the Lok Sabha in 1991, the then Finance Minister of India, Dr. Manmohan Singh, quoted Victor Hugo, "No force on the earth can resist an idea whose time has come." The economic reforms thereon gradually turned the growth trajectory of India. Today, it has become one of the fastest-moving economies in the world. Over the years, more and more young Indians have begun to overcome their fear of failure and enter the dangerous world of startups. Starting your own business is now much easier, thanks to India's ICT boom.

To encourage young business owners in 2016, India's Finance Ministry provided incentives and allocated 100 crore rupees for startup funds. The initiative has spawned 500 startups, 118 incubators, 257 tinkering labs, and

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more than 170 incubation and financial start-ups based on ICT (Nair, 2017). The central government allocates funds to support new entrepreneurial efforts and startups in the annual budget every year. The Global Entrepreneurship Summit 2017 held in Hyderabad identified the following as some of the critical initiatives of the Government of India to promote entrepreneurship:

#### **A. *Start-up India***

The goal of this government program is to encourage entrepreneurship by guiding, promoting, and supporting new businesses. Since its debut in January 2016, many aspiring entrepreneurs have used it to launch their startups. This innovative program offers thorough, free online education through partnerships between universities and businesses and it has created research and startup centers across the nation.

#### **B. *Make in India***

This is the new initiative of the Government of India that they adopted in 2014. Through this initiative, the central government has targeted to position India as a major hub of the world for design and production in every field, including IT, electrical and electronic devices. MNCs can use the user-friendly solutions of this project to conduct business in India. The objective is to construct a manufacturing infrastructure in India, attract investment, foster innovation, advance skill development, protect intellectual property and support Indian companies' global success.

#### **C. *Atal Innovation Mission (AIM)***

The NITI Aayog (Government of India) launched the Atal Innovation Mission (AIM) in 2016 as its flagship initiative to promote an innovative and entrepreneurial culture throughout the country. To achieve this, AIM has established a comprehensive approach to ensure the growth of an entrepreneurial ecosystem in universities, research institutes, the corporate sector, and the MSME sector. It also aims to ensure the development of a problem-solving, imaginative approach in schools. All of AIM's activities are currently carefully tracked and managed using real-time MIS systems and dynamic dashboards. AIM actively seeks other organizations to evaluate its programs to ensure continuous development.

#### **D. *Support to Training & Employment Program for Women (STEP)***

STEP is the new initiative of the Government of India. The Ministry of Women and Child Development has initiated this program for women, especially rural women. STEP aims to train women to be skilled in agricultural activities, computer-related services, food processing, travel and tourism, handloom, embroidery, and horticulture.

#### **E. *National Skill Development Mission***

On July 1, 2015, the Federal Cabinet (Government of India) approved the National Skill Development Mission. On July 15, 2015, World Youth Skills Day, the Honourable Prime Minister officially launched this scheme. The mission was designed to bring together states and regions regarding skill training initiatives. In addition to consolidating and coordinating skill initiatives, the National Skill Development Mission will support sector-wide efforts to achieve skills at scale at the pace and standards to realize the 'Skilled India' goals. To speed up the skill development program was introduced under the following seven categories (i) Institutional Training, (ii) Infrastructure, (iii) Convergence, (iv) Trainers (v) Employment abroad (vi) Sustainable living (vii) Use of public infrastructure.

### **1.2 University-based Entrepreneurship Ecosystem**

In an academic context, we refer to "entrepreneurial ecosystems" if academic programs focus on developing entrepreneurship and commercialization of technologies or intellectual property developed at the university level. "Business cluster" is a localized collection of linked firms, suppliers and related organizations. Governments regularly use clusters with the collaboration of universities / educational institutions to promote regional innovation and entrepreneurship. While utilizing clusters for entrepreneurship development, experts advise governments to support current clusters through financing, mentoring and administrative support.

The global economy and labor market depend on more business startups, business successions and better assistance for young entrepreneurs (European Commission 2004; Schauer et al., 2005). Numerous studies have found a substantial correlation between entrepreneurial talent, mainly implicit entrepreneurial knowledge and the success of startups (Dogan, 2015). Large-scale governmental investments have expanded the infrastructure for support and increased access to training, coaching, information and funding for startups and entrepreneurs.

Entrepreneurship education (EE) is a rapidly growing field. University graduates are especially expected to start creating growth-oriented firms. Due to this, EE was significantly increased at universities. According to surveys, the number of entrepreneurial chairs in the United States and the European Union has dramatically increased (Kailer, 2009). Due to the high expenses of awareness campaigns and assistance programs for startup founders and successors among students and postgraduates, evidence of the efficacy and efficiency of the techniques used for EE is becoming increasingly very important (Kailer, 2009). Kailer (2007) found that most participants in EE programs have launched a firm / new business. The effects of crowdsourcing must also be taken into account. The lack of data has led to an increase in EE and growing opposition to the effects of these policies. This study examines the impact of university entrepreneurship programs on students' entrepreneurial motivation.

Since universities are the source of information, resources, and today's innovation-driven centers, universities and E-cells/business incubators (BIs) must collaborate. A BI program linked with or sponsored by a university is very beneficial for entrepreneurs since these organizations can connect them to the business sector, the general public, and the government. To strengthen their public accountability and actively contribute to local, regional, and global economic development, universities have been urged to engage in various "third purpose" endeavors in the past twenty years. These initiatives include entrepreneurship education, knowledge commercialization, knowledge transfer partnerships, and startup business incubators.

Universities must create frameworks that foster an entrepreneurial culture and help start new businesses if they want to advance in entrepreneurship. Today, the focus on entrepreneurship, research, and economic growth has displaced education as it was one of the main goals of institutions (Hassan, 2020). By promoting innovation, creativity, access to knowledge, information sharing, and adequate infrastructure, scientific research has assisted emerging economies that struggle with various economic challenges like unemployment and slow economic growth in their transition to knowledge-based economies. As a result, many universities and educational institutions employ BIs to speed up economic growth. Incubators facilitate the commercialization of academic research (Mian, Lamine & Fayolle, 2016). Universities can boost the impact of BIs on business growth by collaborating with internal researchers.

The burgeoning emphasis on knowledge-based societies in recent decades underscores the imperative role of universities in shaping future generations of innovators and entrepreneurs (Vanevenhoven, 2013). As Joseph Schumpeter famously declared, entrepreneurs are the catalysts of societal change, driving innovation and acting as crucial engines of economic growth (Schumpeter, 1934). Recognizing this pivotal role, entrepreneurship education has risen to prominence within university curricula, particularly among science, technology, and business students (Gilbert et al., 2006; Shih et al., 2017). This trend is fueled by the belief that entrepreneurial skills can be cultivated, making universities fertile ground for fostering national competitiveness through entrepreneurial spirit (Bell, 2022; Etzkowitz et al., 2008).

Entrepreneurship education (EE) has seen a global surge, recognized as a potent tool for cultivating future generations of entrepreneurial talents (Din et al., 2016). By promoting an entrepreneurial mindset, career awareness, and practical business skills (Olawejaju, 2019), EE promises to revolutionize the traditional academic landscape, akin to a "second academic revolution" (Shahsavari et al., 2020). Consequently, universities and local governments are prioritizing academic entrepreneurship (Potter & Storey, 2007). The potential benefits are compelling: reduced unemployment, increased job creation, innovation, and enhanced

competitiveness across economic and social spheres (Rotger et al., 2012). This fuels government efforts to nurture fertile entrepreneurial ecosystems within universities, drawing inspiration from success stories like Stanford and MIT. However, a crucial question lingers: why do some universities excel in fostering young entrepreneurs while others struggle despite seemingly favorable conditions?

**Understanding this disparity requires dissecting the factors beyond simply creating a positive climate:**

1. Nuanced Approach to EE: A "one-size-fits-all" approach does not work. Effective programs cater to diverse student populations, offering specialized tracks, mentorship programs, and industry partnerships tailored to specific needs and ambitions.
2. Beyond Courses: While knowledge is crucial, practical application is key. Universities must go beyond classroom instruction, offering real-world projects, startup competitions, and incubator access to bridge the theory-practice gap.
3. Cultivating a Supportive Ecosystem: A vibrant environment requires more than just resources. Fostering a culture of collaboration, risk-taking, and peer support through student clubs, workshops, and networking events is essential.
4. Measuring Impact and Adapting: Regularly evaluating program effectiveness through graduate surveys, venture success rates, and job placement data allows for continuous improvement and adaptation to evolving needs.
5. Faculty Development: Equipping faculty with entrepreneurial skillsets and pedagogical expertise ensures effective delivery of EE programs, inspiring and guiding students on their entrepreneurial journeys.

The current academic landscape is witnessing a transformative shift, with entrepreneurship education (EE) emerging as a powerful catalyst for cultivating future generations of innovators and entrepreneurs. Studies show that EE fosters enhanced self-efficacy and entrepreneurial intentions among students, compared to their non-EE counterparts (Jansen et al., 2015). This presents a unique opportunity for universities to not only empower individuals but also drive economic growth and societal progress. Here's how universities can leverage EE to unleash its full potential: First, fueling the engine of innovation: Start-ups founded by student entrepreneurs serve as vibrant testbeds for translating academic research into tangible realities. These ventures bridge the gap between theoretical knowledge and practical application, ultimately enriching the university's value proposition and contributing to a more innovation-driven economy. Second, shaping early career choices: Influencing students towards entrepreneurial pursuits becomes particularly impactful at the cusp of their career journeys. By exposing them to the excitement and potential of entrepreneurship early on, universities can steer a significant portion of their highly educated talent pool towards creating value and generating employment opportunities outside traditional academic paths (Jansen et al., 2015). Third, fostering a thriving ecosystem: Universities, with their unique concentration of talent and knowledge, have the potential to become hubs for budding entrepreneurs. By promoting EE with the same zeal as research and teaching, universities can cultivate a dynamic ecosystem that supports, connects, and empowers student ventures. This ecosystem can encompass mentorship programs, incubator spaces, access to funding, and industry partnerships, providing an invaluable launchpad for young entrepreneurial dreams. Fourth, aligning with research and teaching: Rather than viewing EE as a separate entity, universities can strategically integrate it within existing curricula and research activities. This synergistic approach fosters a culture of innovation within the academic framework, while simultaneously equipping students with the requisite skills and knowledge to translate their research and ideas into successful ventures (Miranda et al., 2017).

Across the world, universities are becoming more and more entrepreneurial to generate income through contract research or licensing, stay competitive and adhere to policy guidelines from the government (Jansen et al., 2015). This can be achieved by stimulating students to start entrepreneurial activities but there needs to be a straightforward theory to encourage students to be entrepreneurs (Jansen et al., 2015). Students' general awareness and interests play a vital role in entrepreneurial initiatives. As such, students play an essential part in startup projects at the university level. There are very few studies to explore academic entrepreneurship in India, especially concerning students' perceptions.

### 1.3 Entrepreneurship cells (E-cells) / Business incubators at universities

Universities can also play a more significant role in encouraging an entrepreneurial society through their new missions if they implement a fully integrated incubation system. Universities, corporate sponsors, governments and society can all benefit from a win-win collaboration made possible by university e-cells and business incubators (BIs), which offer a better environment for generating revenues. Universities are assumed to be the sources of knowledge and skill for the younger generations. Universities are engines of growth for any economy. Their contributions to the economy of a nation are undeniable. Academic research over the past 30 to 40 years shows that spinoffs are an increasing proportion of academics involved in entrepreneurial activities (Thursby & Thursby, 2007; Miranda et al., 2017). Since the 1980s, there has been a significant increase in university research output related to patenting, licensing, and spinoffs (Algieri, Aquino & Succurro, 2013). Technology transfer, patenting, and commercial achievements are seen as the third role of universities along with research and teaching, in what is called a paradigm shift towards entrepreneurial universities (Ranga and Etkowitz, 2015).

Entrepreneurship and startups in universities are gaining importance among developing countries as well. The government of India's direction to universities to promote the startup ecosystem has further stimulated interest. Recent success stories of startups have strengthened the startup initiatives among students and the informal startup ecosystem in Indian cities has further made it convenient to create a startup. The Indian government has initiated startup promotion and funding programs to improve the entrepreneurial and startup culture. Universities take various steps to attain their entrepreneurial goals, such as research collaborations with industry, patent applications, concept spinoffs into new businesses, educating highly qualified personnel in entrepreneurial skills, and company incubators (Siegel & Wright, 2015; Somsuk & Laosirihongthong, 2014).

### 1.4 Entrepreneurial Ecosystems

Isenberg et al. (2011) have stated that an ecosystem with entrepreneurial features is often present with traits like proper availability of monetary resources, the right kind of accessibility to the market, a conducive culture, the right kind of workforce and a set of progressive rules and regulations coupled with a broad spectrum of institutional support. The classroom is where students are initially introduced to entrepreneurship, but more than just classroom training is required to successfully commercialize entrepreneurship and technology (Johnson et al., 2015; Nelson & Monsen, 2014). It necessitates a tight cooperation between the educational process and technological commercialization, as well as close coordination among engineering, scientific, business, legal, and other organizations; this is the full ecosystem of university-based entrepreneurship development. According to Martin et al. (2013), the study discovered a favourable relationship between entrepreneurial education and entrepreneurial results. Furthermore, the training phase is intended to reawaken dormant entrepreneurs (Jansen et al., 2015). According to Tiemann, Fichter & Geier (2018), four areas can influence the evolution of university support systems for entrepreneurship:

- A. the institutional framework of the university, consisting of its structure, culture, and strategy
- B. education activities, e.g., teaching activities
- C. Critical human resources of the university in various fields of activity such as research, education, entrepreneurship support
- D. Interaction and technology transfer with external parties. Such as companies, sponsors, and business development organizations.

According to Jansen et al. (2015), university ecosystem should cover specific stages with specific needs and activities. For example, raising awareness about entrepreneurial opportunities can be implemented in an exciting phase with the help of faculty members interested in entrepreneurship by providing examples of success stories and role models along with introductory entrepreneurship courses. During the training phase, interested students are facilitated with skills training and exposure to entrepreneurship as an experience and career option. Finally, young startup teams are supported in the incubation phase through mentoring, office

space, and networking with other entrepreneurs. The university also conducts business concept competitions, provides business consulting, and provides essential tools (Kaufman Foundation, 2008).

## 2. The Impact of Technology Business Incubators on Early-Stage Start-ups

Business incubation has emerged as a critical support system for fledgling companies, providing tailored resources and services to accelerate their successful development. This research focuses specifically on **Technology Business Incubators (TBIs)**, exploring their distinct value proposition within the broader incubation landscape.

### Key Functions and Services of TBIs:

- **Nurturing Innovation:** TBIs target knowledge-intensive ventures, fostering close collaboration with universities and research institutions to drive research and development (Achtenhagen et al., 2013).
- **Mentorship and Guidance:** Experienced entrepreneurs and industry experts provide valuable guidance and support to navigate the challenges of launching and scaling a start-up (Phan et al., 2015).
- **Network & Resource Access:** TBIs connect start-ups with investors, potential partners, and key industry players, facilitating access to critical resources (Bruhn et al., 2020).
- **Financial Assistance:** While not directly providing funding, TBIs assist start-ups in securing financing through connections with investors and grant opportunities (Wright et al., 2013).
- **Infrastructure and Workspace:** TBIs offer affordable office space, shared facilities, and technology infrastructure to support bootstrapping ventures (Bruhn et al., 2020).

### Stakeholder Engagement and Ecosystem Building:

- **Universities and Research Institutions:** Collaboration fosters knowledge exchange, technology transfer, and talent pipelines for start-ups (Phan et al., 2015).
- **Investors:** Angel investors and venture capitalists connect with promising ventures within the TBI ecosystem (Bruhn et al., 2020).
- **Government Agencies:** Policy initiatives, funding programs, and infrastructure development support the sustainability of TBIs and their graduates (Wright et al., 2013).

### Impact on Venture Success and Regional Development:

- **Accelerated Growth:** TBIs provide comprehensive support, leading to faster growth and higher survival rates for incubated start-ups compared to non-incubated peers (Phan et al., 2015).
- **Increased Innovation:** Collaboration with research institutions stimulates innovation within start-ups, fostering the development of novel technologies and solutions (Achtenhagen et al., 2013).
- **Job Creation and Economic Impact:** Successful TBI graduates create jobs, attract investment, and contribute to the overall economic prosperity of the region (Bruhn et al., 2020).

TBIs play a vital role in supporting early-stage start-ups, fostering innovation, and driving regional economic development. Their collaborative approach, targeted services, and diverse stakeholder engagement make them powerful engines for building a thriving entrepreneurial ecosystem.

## 3. E-cells and Incubation cells at universities

The most common definition of entrepreneurship in higher education is the dissemination of research results to the public through commercialization or applied efforts. Technology transfer, patenting, business formation, incubation, research park creation and regional development are just a few of these activities (Libecap, 2005; Rothaermel et al., 2007;

Shane, 2004). In most cases, intellectual property or knowledge-based property is created as a result of commercialization or use of technology transfer and research. This asset may be in the form of a patent or a contract and can be transferred to a license, partnership or business venture (de Coster and Butler, 2005, Wright et al., 2004). Table 2.4 is a list of research papers used in this study.

Table 2.4: Studies related to incubation cells at universities

Year	Author(s)	Title	Content / Findings relevant to this study
2020	"Sukoco et al"	"The Role of Higher Education Institutions in Developing Sustainable Business: A Phenomenological Approach of College Students' Start-up"	Data collected from Indonesian entrepreneurial students showed that universities should improve variables such as social and cultural attitudes, access to finance, management structures and entrepreneurship education.
2015	"TIDE Impact Assessment Report"	"Report on TIDE Impact Assessment Report, Ministry of Electronics & IT, Government of India"	Support provided by Indian educational institutions / universities to start-ups through incubation centres.
2009	"Patton et al."	"Elements that underpin high- tech business incubation processes"	Key elements in the incubation systems.
2007	"Rothaermel et al."	"University entrepreneurship: a taxonomy of the literature"	Activities of the incubation centres at the university.
2006	"McAdam et al."	"The networked incubator: The role and operation of entrepreneurial networking with the university science park incubator (USI)"	Role of university based business incubators.
2005	"Libecap"	"University entrepreneurship and technology transfer: process, design, and intellectual property"	Functions of technology parks.
2005	"De Coster and Butler"	"Assessment of proposals for new technology ventures in the UK: characteristics of university spin-off companies"	Technology transfer by the university incubation centres.
2005	"Chan & Lau"	"Assessing technology incubator programs in the science park: the good, the bad and the ugly"	Benefits of technology incubators to technology founders.

In general, academic incubators seek to foster the development of research-based ideas and cutting-edge technologies emanating from universities (Hackett and Dilts, 2004; McAdam et al., 2006). They coordinate research, technology, funding, and entrepreneurship for industrial partners or clients during the commercialization phase. As a result, university business incubators assist in the creation of new businesses by offering access to markets, services, support networks, and money (Grimaldi & Grundy, 2005; McAdam & McAdam, 2006). However, the broad benefits that incubators claim to provide to technology companies are debatable because technology founders' priorities vary at various stages of growth (Chan and Lau, 2005). University entrepreneurship is generally accepted to include all research-related commercialization and development activities. There are 4 sub-streams. environment that includes new business establishment, technology transfer office productivity, entrepreneurial universities and innovation networks (Rothaermel et al., 2007). Rothaermel et al. (2007) to encourage entrepreneurial processes in institutions. provide a conceptual framework (Figure 3) that shows the interaction and integration of the four sub-sectors. An "enterprise university" is a university that has transformed from a traditional teaching and research institution into a commercial actor in society (Partha and David, 1994; Lambert, 2003). In the conceptual framework proposed by Rothaermel et al. (2007) (see Figure 2.5) specifically fails to address a number of socio-cultural factors related to "environmental contexts involving innovation networks". Therefore, it is important to draw attention to some characteristic factors related to current domestic laws that affect the experimental environment at the community level.

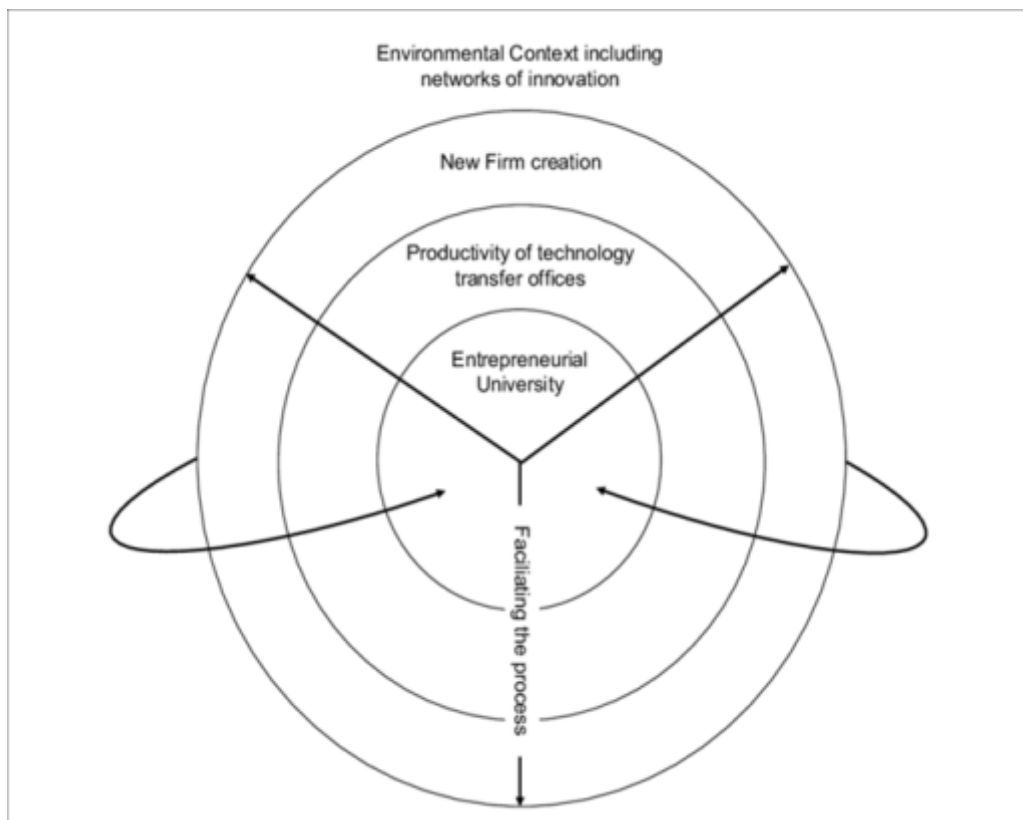


Figure 2.5 Rothaermel et al. (2007) provide networks of invention in the environmental setting



Colombo and Delmastro (2002) argue that university-affiliated firms in Italian research parks are expanding faster than similar firms outside the parks. The main advantage mentioned here is the expansion of research and development facilities and especially cooperation with universities. Ferguson and Olofsson (2004) conducted a similar study comparing in-park and out-of-park companies in a Swedish university science park. They concluded that in terms of survival, firms inside the park fared better than their competitors outside the park. Patton et al. (2009), key factors include a steady supply of new ideas, empathy with founders, building and maintaining internal and external networks and a successful exit strategy for companies exiting the incubator.

Traces has been found of incubation system at some Indian universities like The National Science and Technology Entrepreneurship Development Board (NSTEDB) (2009) launched the Science and Technology Entrepreneurs Parks (STEP) and Technology Business Incubators (TBI) programmes in the early 1980s and early 2000s, respectively, to promote entrepreneurship support in Indian educational institutions (Centre for Internet and Society, 2015). Expertise is a key component of the success of small business incubators, as it encourages entrepreneurs to share their knowledge and attract talent that can better help them. The success of an incubator depends on tenant performance, and the candidate screening process helps develop a community of aspiring entrepreneurs in the incubator.

Technology Business Incubators (TBIs) play a crucial role in fostering early-stage start-ups by providing targeted resources and support. Evaluating their effectiveness is essential to ensure they achieve their intended goals and maximize their impact on the entrepreneurial ecosystem. This research review examines key metrics employed by scholars and industry practitioners to assess the performance of TBIs.

#### **A. TENANT SELECTION CRITERIA:**

- Management Team Expertise: As identified by Lumpkin and Ireland (1988), assessing the capabilities and experience of the founding team is crucial for predicting venture success. Strong leadership and industry knowledge are critical for navigating challenges and achieving growth.
- Financial Strength: Financial viability is essential for a start-up's sustainability. Examining financial projections, funding sources, and initial capital helps gauge the venture's potential for long-term success.
- Business Concept: Evaluating the novelty, market potential, and competitive advantage of the business idea is crucial. Assessing the feasibility of the proposed solution and its fit within the target market is essential for determining the venture's viability.

#### **B. PERFORMANCE MEASURES:**

- Utilization Rates: High occupancy rates within the incubator facility indicate strong demand for its services and suggest that start-ups are finding value in the provided resources.
- Job Creation: The number of jobs generated by incubated companies directly contributes to regional economic development and demonstrates the incubator's impact on employment opportunities.
- Graduation Rates: The percentage of start-ups successfully graduating from the program and transitioning to independent operations signifies the incubator's effectiveness in nurturing ventures towards self-sufficiency.
- Health of Graduate Firms: Tracking the growth, survival rates, and financial performance of graduated companies provides insights into the long-term impact of the incubator's support.

#### **C. ADDITIONAL CONSIDERATIONS:**

- Alumni Success: O'Neal (2005) emphasizes the importance of alumni engagement and their achievements as a key performance indicator. Active and successful alumni networks showcase the lasting impact of the incubator and serve as valuable resources for current tenants.
- Tenant Intellectual Capital: Evaluating the development and utilization of intangible assets like patents, trademarks, and proprietary knowledge within incubated companies reflects the incubator's contribution to building valuable intellectual property.

- Impact on Incubator Staff: Assessing the professional development and skill acquisition of incubator staff members highlights the program's contribution to the broader entrepreneurial ecosystem beyond direct tenant support.

#### D. SURVIVAL AND GROWTH RATES:

Ferguson and Olofson (2004) studied the long-term performance of incubated ventures, highlighting the importance of tracking survival rates and growth metrics like employee count and total sales over extended periods. Demonstrating superior performance compared to non-incubated counterparts strengthens the case for the positive impact of TBIs.

Evaluating the effectiveness of TBIs requires a multi-faceted approach considering various metrics across different stages of the incubation process. By employing the tenant selection criteria and performance measures discussed above, stakeholders can gain valuable insights into the contribution of TBIs to nurturing successful start-ups and fostering vibrant entrepreneurial ecosystems.

#### 4. DEVELOPMENT OF CONCEPTUAL FRAMEWORK FOR ACADEMIA BASED BIS

In India, higher education institutions focusing on engineering and management have set up electronic cells and incubation centres to promote student entrepreneurship and encourage entrepreneurship. Access to financial resources/start-up financing, administrative and regulatory frameworks, grants and business support are some of the key variables responsible for the smooth development of start-ups (Sukoco et al, 2020). The incubation centres located in educational institutions providing mentoring, financial and administrative and marketing support (TIDE Impact Assessment Report, 2015) as depicted in Figure 4.1.

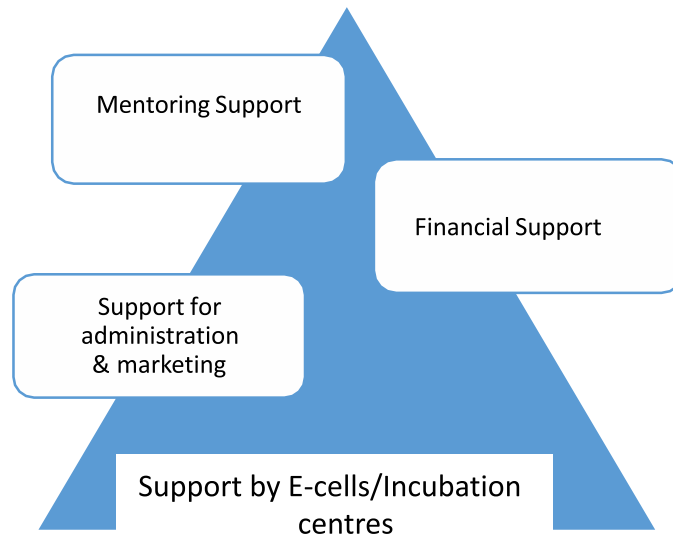


Figure 4.1 Support by E-cells/Incubation centres (TIDE Impact Assessment Report, 2015)

On the basis of literature review and understanding the present goals of various academia supported incubation schemes we propose the following framework (Figure. 4.2) for the effective utilization of university intervention for the development of successful and sustainable start-ups.

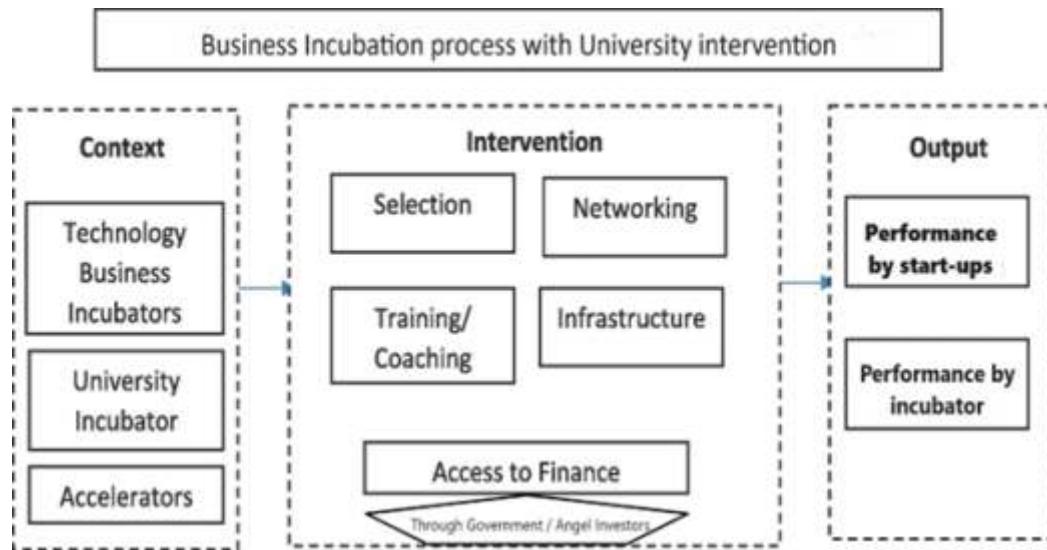


Figure. 4.2. Framework for business incubation process

The abovementioned framework may be utilized by the governments, universities, policy makers etc. while establishment and operationalization of university based incubators for the successful and sustainable start-ups development.

## 5. FUTURE RESEARCH AGENDA

Future research can apply this model to other developing countries to compare and contrast the factors that influence entrepreneurship development through universities. Second, the variables selected in this study may include only some of the variables that affect entrepreneurship development. Using other variables derived from the other theories of entrepreneurship or the intention development model(s), researchers can observe behavioral intentions in the development of entrepreneurship. Further, this study accounts the university (academia) based business incubation process, the similar study can be undertaken for non-university based incubation systems.

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