

1. SYNERGISING TECHNICAL EDUCATION AND INCUBATED ENTREPRENEURSHIP IN INDIA : A STRATEGIC APPROACH

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ABSTRACT

Education is the most important resource in any country. It has multiplying effects on all facets of development in a society and among various educational resources; engineering education holds the key to economic viability of a nation. In an age of quality, the vitality of engineering education is facing considerable uncertainty. There is a major concern about just where the future of engineering education is heading. New education policy of India has resulted in a mushroom growth of engineering institutes, leading to lakhs of engineering graduates passing out every year. But there is a dismal gap in employment demand corresponding to this enormous supply. Our educational planners must develop new strategies to optimally utilize this vast pool of talent and expertise by exploring new avenues in technopreneurship as engineering education has an indomitable role in entrepreneurship development. Engineering graduates in India have abundance of entrepreneurial aptitude and capability, though they lack proper stimulation and direction. Rich resources, vast markets on account of dense population and government's favourable policies have made India a country of opportunities. In this turbulent economic scenario, business incubation is recently emerging as a strategic tool to propagate entrepreneurship in a big way among engineering graduates. The paper dwells on future role of technical education in assimilating entrepreneurial passion of engineering graduates into incubated business. A conceptual model has been proposed for technical institutions to help in downsizing technology directly to masses to improve entrepreneurial culture in the country.

Key Words: TBI, RBH, Technopreneurship, Business Incubation, Rural Entrepreneurship.

1. INTRODUCTION

The term education is derived from the two Greek terms: 'E' means 'out of' and 'Duco' means 'to lead'. Since we cannot lead or draw anything out of nothing, education means leading or drawing out something which is already there. With the explosion of knowledge, student population and their aspirations the problems of higher education in general and engineering education in particular have acquired complexity and magnitude. The concept of teaching has

undergone a great change with the advent of time. Teaching is no more considered as feeding with information or giving knowledge. It is stimulating and directing learning by students. The role of teachers is changing, as the authoritative delivery of knowledge is being supplemented by spending more time on diagnosing the learners' needs, motivating and encouraging study and checking the knowledge acquired. The major outcomes expected from

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universities are research, results and graduates. Basic prerequisite for usability of these outcomes is a good interaction between industry and university. The interaction must be able to cope with dynamics of industrial and technological changes, which is often very difficult in a rigid university planning. Development of new industrial organizations requires engineers with entrepreneurial skills, with significant communication and persuasion skills, the ability to lead and work effectively in a multidisciplinary team, and an understanding of the non-technical factors that profoundly affect engineering decisions. In fast changing environment, wherein the technology is changing at a fast rate and product lifetime cycle is shrinking, technical entrepreneurship has assumed a central place for economic growth of a nation. Technical entrepreneurship can play a pivotal role in the process of industrialization through innovations, product development, and improvement in unit level productivity. Therefore, technical education synchronized with the systematically planned entrepreneurship development programmes can be useful in molding engineers to entrepreneurial fold. Engineering education plays an important role in developing the technical manpower required for industrial sector for its sustainable growth. In this context many have observed that the engineering education today does not adequately prepare graduates for engineering practice. Employers argue that graduates are academically experts but lack job skills such as teamwork, leadership and operation management (Wani & Sharma, 2000). Sparks (1993) feels that engineering graduates need to be sensitive towards economic, social, political, cultural and ethical dimensions of their work. Entrepreneurship is perceived to bring benefits at both the macro level of economic development and micro level of personnel development. Entrepreneurial vision is one of the important forces for driving innovations, increasing market efficiencies and responding to challenges and opportunities. In this scenario, small and medium sized entrepreneurs have a vital role in the social and economic development of the

country by improving the efficiency of resources utilization, reducing risks and hazards, minimizing wastage and safeguarding environmental qualities.

Changing needs of employers, away from specialization and towards flexibility and life long learning make a case for change in engineering education. Change needs to be built on sound understanding of factors that affect student learning. One approach, which inculcates student to take responsibilities for learning and thus ensures deep and active involvement, is problem-based learning (Ditcher, 2001). In recent years fostering entrepreneurship has become a topic of highest priority in public policy. This trend is due to the widespread recognition that business start-ups are a driving force of economic growth and significant job creation.

2. EDUCATION DRIVEN ENTREPRENEURSHIP: WORLD SCENARIO

Education as the most important resource in any country has multiplying effects on all facets of development in a society and among various educational resources; engineering education holds the key to economic viability of a nation. All over the world, entrepreneurial education has been intensified in universities during the past four decades. In recent years, entrepreneurship education has been developing steadily but unevenly in most countries. In the sixties, less than ten universities in the USA were teaching in this field, in 1990 there were already 400 universities actively involved in entrepreneurship education and estimates today exceed 700 universities. According to Solomon *et al.* (2002), entrepreneurial education has become one of the hottest topics at U.S. business and engineering schools, where number of schools teaching entrepreneurial courses has grown from a few as two dozen 20 years ago to more than 1600 at this time. As a result, United States has achieved its highest economic performance during the last ten years

by fostering and promoting entrepreneurial activity. In U.S.A, researchers are continuously striving to learn more about the entire entrepreneurial process to better understand the driving forces within entrepreneurs. According to Bygrave & Hofer (1991), publications (research-based as well as popular), direct observation of practicing entrepreneurs and speeches and presentations (including seminars) by practicing entrepreneurs are the three major information sources, which supply the data related to the entrepreneurial process or perspective.

The entrepreneurship education in Germany too has been intensified in recent years. While only 21 chairs for entrepreneurship had been founded in 1998, this number swelled to 42 chairs in 2001. In France, entrepreneurship education has spread considerably over the last few years, and is currently in a structural phase. As per Sparks (1993), a training program has been introduced into the engineering curriculum, in Singapore, to foster entrepreneurship in students through hands-on experience at creating innovative products and services, and developing the business plans to market them. Several other Asian countries like Korea, Japan and China have stepped up their initiatives towards improving curriculum as a platform to generate entrepreneurship.

As we continue to study and teach in the field of entrepreneurship, it is important to note the research and educational developments that have occurred over the past few years. The entrepreneurial and managerial domains are not mutually exclusive but overlap to a certain extent. The former is more opportunity-driven, and the latter is more resource driven. Venture financing; including both venture capital and angel capital financing as well as other innovative financing techniques, emerged in the 1990s with unprecedented strength, fueling another decade of entrepreneurship (Shepherd & Zacharakis, 2001 & 2002). Entrepreneurial strategies have been identified that show some important common denominators, issues, and trade-offs

between entrepreneurship and strategy. The great variety among types of entrepreneurs and the methods they have used to achieve success have motivated research on the psychological aspects that can predict future success (Kickul & Gundry, 2002). Women and minority entrepreneurs have emerged in unprecedented numbers. They appear to face obstacles and difficulties different from those that other entrepreneurs face (Gundry & Welsch, 2001). The entrepreneurial spirit is universal, judging by the enormous growth of interest in entrepreneurship around the world in the past few years (Peng, 2001).

3. TECHNICAL EDUCATION IN INDIA: A PROFILE

Education is the most important resource in any country. It has multiplying effects on all facets of development in a society and among various educational resources; engineering education holds the key to economic viability of a nation. India has formally recognized the importance of higher education on science and technology and committed itself to the development of science and technology manpower. Over the past fifty years the country has provided full policy support (Govt. of India 1968; 1986) and substantial public funds to create one of the world's largest network systems of higher education. This network includes –

- 1) Seven Indian Institutes of Technology (these institutes are globally acknowledged for quality education).
- 2) Some front ranking Universities /Institutes for engineering and applied sciences education (e.g., Anna University, Jadavpur University, Indian Institute of Science Bangalore, B.H.U. Varanasi, Nirma Institutes, Ahmedabad etc.).
- 3) Eighteen National Institutes of Technology (Almost one Institute for every state).
- 4) National Institutes for Technical Teachers

Training and Research.

- 5) Well established state engineering colleges in all states.
- 6) Around five hundred engineering colleges managed by private sector.
- 7) Around eleven hundred polytechnics managed by both government and private sector.

This vast network of institutions should have brought unparalleled technological dominance to India. But this could not happen on account of certain faults, fallacies and failures of our educational planners. So a re-engineering of the education system is needed to improve quality of education. This will directly improve the entrepreneurial capability of the engineering graduates with more focus on project-based learning, practical skills and problem solving. In India, more than 50,000 engineering graduates are passing out every year and only twenty five percent of them get immediate employment in public/private sectors. Government must perceive this vast unemployment as an alarming waste of talent, knowledge, skills and "youthful" passion. The development of entrepreneurship can be a viable solution to many economic evils in India. Entrepreneurship development in India is urgently needed for solving problems related to:

- 1) National production and low productivity levels.
- 2) Uniform regional development
- 3) Unemployment
- 4) Dispersal of national wealth
- 5) Exploitation of national resources

Schumpeter (1912) was an early pioneer to assert entrepreneurship as an important factor to initiate economic growth. Without contributions from the entrepreneurial individuals; economic growth can be limited. Tandon (1975) finds an entrepreneur as one who, (a) conceives

an industrial enterprise for a purpose, (b) displays considerable initiatives, grit and determination in bringing the project in to function and (c) performs different operations to set up a unit from conceptualization to operational stage.

4. BUSINESS INCUBATION FOR SUSTAINABLE ENTREPRENEURSHIP

The importance of business incubation is twofold. Firstly, it favors the setting up of new companies and secondly, it provides them appropriate business support needed to increase the chances of their survival and growth. A business incubator is a tool to facilitate enterprise creation and development (Alistair, 2003). Since technology-driven and knowledge-based developments not only exhibit tremendous business potential but also offer a range of innovative applications beneficial to various sectors of the society. Business incubators help in tackling the obstacles faced by the entrepreneurs and thus facilitate the venture creation and development process (Lalkaka, 2003). Business incubators, over the world, work on four different models: Local Economic Development Incubators; Academic and Scientific Incubators; Corporate Incubators and Private Investors' Incubators. All these business incubators work on certain basic principles like:

- 1) Focus on Wealth Creation: The emphasis should be on return-on-investment and not the economic development.
- 2) Encourage Entrepreneurship: The emphasis should be on building a business and not the technology.
- 3) Provide Value to Tenants and Stakeholders: The value in many forms must be bench marked to achieve satisfaction among tenants.
- 4) Manage the Incubator more like a business, rather than a non-profit service: Result versus activities must be evaluated.

The benchmarks for these incubators are: mission and strategic aims; partnership and legal forms; premises and location; financing; management; business planning; target market and promotion; incubator space and services; quality standards; start-up and survival rates; employment effects and performance of firms (Lalkaka, 2003). These benchmarks are accepted worldwide by all the nations and serve as guiding principles for establishing new incubators.

5. BUSINESS INCUBATION: PERSPECTIVES

With "Incubated Business" getting focused to attract public and private sector support, strategic partnerships and alliances have become compelling for the business enterprises. A climate for stimulating innovation and facilitating meaningful technology transfer can be created through change in cultural attitudes and by a systematic approach to build linkages between education, research, enterprises, finance and the government. To foster entrepreneurship and development; education, training and research have geared together to relevance, competence and excellence by establishing "Technology Business Incubators" (TBIs) all over the country. With economic turbulence sweeping the world, business also must define new roles for itself in India where growth is linked to strengthening of her rural masses. So it is being felt that a rural industrial revolution, adhering to rural economy, ecology and societal structure, is also urgently needed to ensure rapid growth in India, which is a vast country with rich and varying resource potential over different regions. So in this context, for boosting nation's economy, the concept of "Rural Business Hubs"(RBHs) is vigorously catching up which is based on the Chinese model of "Town and Villages Enterprises"(Debroy, 2004), the Thai model of "One Tambon, One Product"(Raghunandan, 2005) and the Italian model of "Industrial Districts"(Third Italy, 2005). These business hubs, representing a holistic

version, are expected to create an additional income in the farm sector, besides jobs for unskilled and semi skilled rural youth, thus encouraging agro-entrepreneurship in a big way. This will lead to opportunities for the countrymen in rural areas to log onto a virtuous growth cycle. Among the developing countries, China has set up almost 400 incubators, most of them linked to higher education institutes. Chinese models have been very successful in accelerating the growth of economy and have influenced the incubation process in the neighboring nations. Korea too, is reported to have about 30 incubators while; Japan, Malaysia and Singapore are also catching up.

6. ACADEMIC INCUBATORS FOR ENTREPRENEURSHIP: A CONCEPTUAL MODEL

An "entrepreneurial perspective" can be developed in individuals. This perspective can be exhibited inside or outside an organization, in profit or not-for-profit enterprises, and in business or non-business activities for the purpose of bringing forth creative ideas. Thus, entrepreneurship is an integrated concept that permeates an individual's business in an innovative manner.

A recent McKinsey & Company-Nasscom report estimates that India needs at least 8,000 new businesses to achieve its target of building a \$ 87 billion IT sector by early 2008. Similarly, in the next 10 years, 110-130 million Indian citizens will be searching for jobs, including 80-100 million looking for their first job. This does not include disguised unemployment of over 50% among the 230 million employed in rural India. Since traditional large employers, including the government and the old economy players, may find it difficult to sustain this level of employment in the future, it is entrepreneurs who will create these new jobs and opportunities. Keeping these research findings and emerging perspectives in mind, a strategic planning can be evolved to develop an entrepreneurial culture in the society by utilizing the existing

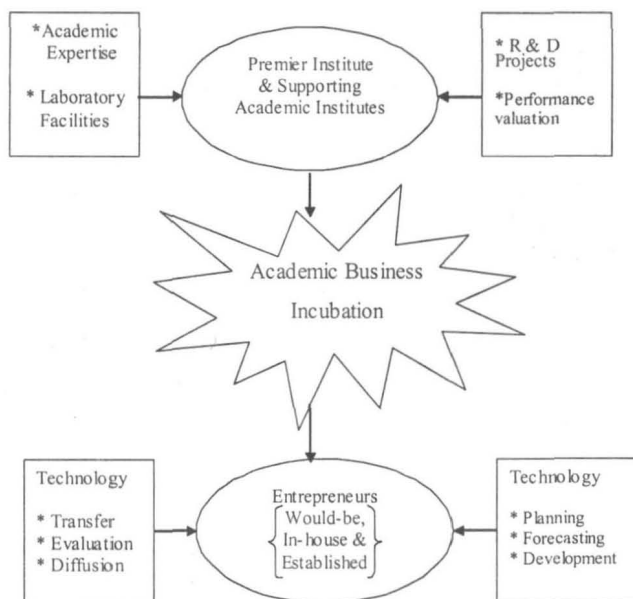


Figure 1: "Academic Business Incubation": A Conceptual Model

abundance of talent, skills and resources. India has 1346 engineering institutes, 1225 polytechnics and 10150 industrial training institutes; thus producing around 4.5 lakh graduate engineers, around 1.9 lakh diploma engineers and 5.2 lakh trained and skilled workers annually. For their gainful employment in Indian context, a conceptual model of an "Academic Business Incubator" can be formulated as in figure 1.

A premier engineering institute can be selected to act as a nodal agency (or a guiding institute) which is supported by other neighboring institutes in all areas of technology management like planning, transfer, development, evaluation and absorption. In the premier institute, expertise on different areas can be assimilated at the nodal center acting as "Academic Business Incubator". All small scale units as well as neighboring cluster industries can be attached with this incubator for getting continuous support right from inception to progressive growth stage on a mutually supportive and profitable basis. Small units need

special care, as these industries are the backbone of Indian economy, contributing around 40 percent of gross national production, 35 percent of the total national exports and providing employment to over 18.6 million people (Prasad, 2001). Some key aspects of this model of TBI include inputs into the center and related outputs by the center. These are:

Inputs:

- Disciplinary expertise of all supporting institutes at the nodal center;
- Laboratory facilities, inspection, testing, using special purpose machines and equipments at the nodal center;
- On going R&D projects, specially designed for customers (entrepreneurs);
- Performance evaluation, process planning, scheduling, material planning etc. by the experts at the nodal center;

Outputs:

- Technology planning especially suited to specific cases;
- Technology forecasting for better productivity, future expansion and diversification;
- Technology development for achieving optimum technology utilization;
- Technology transfer on an economic basis to foster rapid industrial development;
- Evaluation of productivity measures adopted as a result of above technology management measures

These academic incubators will enhance the sustainability of business enterprises in today's highly volatile market. Technical manpower can be optimally utilized in business environment driven by successful business incubators and this should be the mission for next twenty years. In the small-scale engineering industry, the entrepreneurial successes and failures depend not only on what entrepreneurs know, but also on what they can do with what they know. Since they often deal with uncertainty and change, their comfort and insight with intuitive judgments and action are as important as their deliberative decisions and implementations. This model has been proposed with the sole objective of finding new avenues to encourage skilled persons to go for entrepreneurship as these enterprises serve the purpose of economic development for nation building. The model adheres to the prevailing objectives, constraints and the acceptable perceptions of the education system like:

- 1) Subscribe to the Fundamental Principles
- 2) Structure the Incubator to Provide Value to Tenants and Stakeholders
- 3) Recruit Tenant Firms With the Highest Growth Potential

- 4) Recruit Top Private Sector Leadership to the Board
- 5) Facilitate Access to Capital
- 6) Become the Focal Point for Technology in the Region
- 7) Be "Customer Service Focused" With Both Tenants and Stakeholders
- 8) Provide for Adequate Operating Funds
- 9) Every Tenant Must Be Held Accountable to Progress Against a Pre-Agreed Upon Business Plan

7. CONCLUSION

"Technology Business Incubators" and "Rural Business Hubs" are excellent forums for incubation of small enterprises, which is so essential for economic empowerment of India in today's highly volatile market. These forums also help in exploring some key issues like: equitable development of the country, social awakening of rural & poor urban masses, optimal utilization of natural endowments and downsizing of technology directly to common people. India has a vast network of technical institutions producing more than one million technically skilled persons but only twenty five percent of them get immediate employment in public/private sectors. This vast unemployment is an alarming waste of talent, knowledge, skills and "youthful" passion and in this context, entrepreneurship, specifically rural entrepreneurship, through business hubs and incubators offers plenty of opportunities to engineering students to earn, learn and serve the nation. Economists and academicians need to give a serious thought on this critical issue involving nation's future.

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