Role of Engineering Graduates: Job Seekers to Job Creators

Mr. Sambajirao,
Research Scholar,
Dept. of Humanities & Social Science,
IIT Kharagpur-721302.
Assistant. Professor,
Kshatriya College of Engineering, Armoor.
Nizamabad (Dist). 503224. Telangana

Mrs. Padma Patil,
Assistant. Professor,
Kshatriya College of Engineering, Armoor.
Nizamabad (Dist). 503224. Telangana

Abstract:

India is a nation which has inherent advantage because of its large youth population. However, because of rising unemployment the standard of people is not improving as expected and is considered as one of the factor behind poverty. It is high time for the nation to provide not only sufficient employment opportunities but also most suitable employment opportunities to its citizens. As an effort towards this, India is witnessing a large number of engineering educational institutions being established in the country in the recent past and expected to continue in the future. Believing such engineering graduates would contribute to the development of the nation substantially.

The new generation of engineer is geared up to take leadership position, where they have opportunity to take up the role as entrepreneur. In the present scenario, there is a need for an entrepreneurial environment in the country which can facilitate budding engineers to start their own ventures to improve micro economy of the country. The paper highlights the importance of entrepreneurship in engineering education as it can help in job creation, innovation and economic mobility. The paper also throws light on the reforms made by various statutory bodies in India, as engineering graduates are really struggling to get placed in an extremely challenging market conditions at suitable positions.

Keywords: skilled engineer, engineering education, entrepreneurship, enterprise, Human Resource, start-ups

Introduction

In the largest democratic country like India where a common man has a highly mistaken view of what engineers do. In the 21st Century, as there is an ever increasing demand for a holistic breed of engineer, India is witnessing a growing number of

engineering institutions. Most of these colleges face quality issues but a few of them do deliver good education. A quality man power comes from a quality education process. For the past few decades numerous journals, articles, reports, and studies across the world prepared by various countries and their national boards are discussing the critical need for change in the present engineering education.

A carefully designed and well planned education system is vital in developing human capital. Inculcating soft skills into the lives of next generation is aimed at developing their knowledge, understanding, moral values and other skills which are the essence of education for sustainable growth. If one observes keenly the engineering job market in 21st Century is changing, and to get and keep jobs future graduates will need skills beyond those that used to be sufficient. This message is very clear from two recent books—Thomas Friedman's ***The World is Flat*** and Daniel Pink's ***A Whole New Mind***—that is believed to be required reading for every engineering professor and administrator. These books come from different perspectives—the first economic, the second cognitive—but make almost one and the same points about current global trends that have profound implications for education.

An implication for engineering education is that we're teaching off the beam stuff. Since the 1960s, we have concentrated almost exclusively on equipping students with analytical (left-brain) problem-solving skills. Both Friedman and Pink are of the opinion that most jobs calling for those skills can now be done better and/or cheaper by either computers or skilled workers in developing countries—and if they can be, they will be. Both these authors also predict that engineers with following different (right-brain) skills will continue to find jobs in the new economy:

- creative researchers, developers, and entrepreneurs who can help their companies stay ahead of the technology development curve;
- holistic, multidisciplinary thinkers who can recognize complex patterns and opportunities in the global economy and formulate strategies to capitalize on them;
- people with strong interpersonal skills that equip them to establish and maintain good relationships

with current and potential customers and commercial partners;

- people with the language skills and cultural awareness needed to build bridges between companies and workers in developing nations (where many manufacturing facilities and jobs are migrating) and developed nations (where many customers and consumers will continue to be located).

Above are few of the attributes our engineering students will need to be employable in the next generation engineering job market.

Nowhere in most engineering curricula do our universities provide systematic training in the abilities that most graduates will need to get jobs—the skills to think innovatively and holistically and entrepreneurially. The reason for this is most of the faculty don't want to leave their comfort zones. The faculty is comfortable in teaching well structured traditional subjects but most of the professors are not sure of teaching creative thinking or entrepreneurship. The engineering colleges that respond by shifting towards more multidisciplinary problem- and project-based instruction will survive. The institutions that try to stick with business as usual may not as they have to think innovatively.

Increasing unemployment in most of the developing countries like India has become main hindrance behind decreasing livelihood standards and poverty. Day by day, the per capita income has been decreasing rapidly and the poor are becoming poorer, the rich are becoming richer. In the 21st Century engineers are geared to excel to the position of leadership where they can take up the role of entrepreneurship. It doesn't mean one has to be a boss or manager; here leadership refers to help, organize, create vision, and facilitate work to others. Here, it means senior engineers who most often lead from the front. Entrepreneurship in this context refers to the specific activity of creating and leading a new enterprise. Many, but not all, new enterprises are built around a product or technology, and involve entrepreneurial engineers. In the present scenario, there is a need for an entrepreneurial environment which can facilitate entrepreneurs to start their own ventures and develop micro economy. Skill based special trainings and awareness about entrepreneurship among students can be the solution. In an effort in this direction some of the Indian Universities have introduced "entrepreneur"

as a compulsory course to foster these skills among engineering graduates. Entrepreneurship attitude among this enormous pool of unemployed young engineering youth literates can increase the trade activities and job creation in the local market. Thus an efficient education system pertaining to the industry demands and focused towards empowering the literate youths is need of the hour.

Importance of Entrepreneurship

Entrepreneurship means different things to different people. Conceptually and in practice, the term hints of no stereotypical model. Yet its very etymology – derived from the French 'entreprendre' which literally means, 'to undertake' – indicates the minimum characteristics of an entrepreneur. An Entrepreneur is the person who actively initiates to start a business or who is the owner of the company. An entrepreneur has many faces and many roles. Entrepreneurship is the soul of enterprise and the driving force behind all economic activities. Its pillars support the economic health of all societies. Entrepreneurship is about a strong determination and the power to see and believe, and visualizing things others don't see or believe in. Entrepreneurship is a major driver of innovation, competitiveness and growth (Action Plan: The European Agenda for Entrepreneurship, 2004). Entrepreneurship is a multi-faceted phenomenon, which includes both the start-up companies and bringing initiatives in the business.

Entrepreneurship can be a driver of job creation, innovation, economic mobility, and a sense of independence and personal accomplishment. Academic disciplines such as business, economics, sociology and psychology are all making significant contributions to our understanding of entrepreneurship. Entrepreneurship is often cited as the key to a country's growth and economic improvement. A person who has no business or fails in entrepreneurship could also have entrepreneurship. The first significant writer to make frequent use of the term was Richard Cantillon, an 18th Century businessman and the financier. According to ***National Knowledge Commission*** 'Entrepreneurship is the professional application of knowledge, skills and competencies and/or of monetizing a new idea, by an individual or a set of people by launching an enterprise de novo or diversifying from an existing one (distinct from seeking self employment as in a profession or trade), thus to pursue growth

while generating wealth, employment and social good'.

Entrepreneurship and Engineering Education in India

India being one of the most populous countries in the world with huge quantum of Human Resource faces the problem of unemployment. Though people are able to get the jobs these days most of them are not employed in suitable positions. Today, the Government of India (GOI) practices the public private partnership model, where more number of industries employ well qualified candidates with appropriate degree in entrepreneurial skills. But number of people who are coming forward for promoting an industry is very low. This is due to the lack of entrepreneurial skills that are needed for the establishment of industries.

Again as the global economy is suffering from increasing unemployment, poverty and other economic crisis, the recognition of entrepreneurship development has been increasingly significant as a source of job creation, empowerment and economic dynamism.

As we are living in a society that is increasingly demanding entrepreneurial behaviors of all kinds, so entrepreneurship in the education system is becoming more important

Entrepreneurship has been rooted in the Indian system and is a part of its tradition. To quote the renowned economist, T.N. Srinivasan, "India has been an entrepreneurial society...we had the entrepreneurial skill but suppressed it for too long a time...and now it is thriving". If we look into the history of successful story Indian entrepreneurs the spirit of entrepreneurial is one of the key attributes for the success which can be seen in many communities engaged in various business. The importance of Entrepreneurship in India has been strengthened in recent times, particularly with the rise in knowledge-based services. New entrepreneurs who do not belong to traditional business communities have begun to emerge in large numbers. Entrepreneurship has grown rapidly, visibly so, creating wealth and generating employment, especially in the past two decades. Crucial efforts initiated after economic liberalization — including systematic attempts to reduce the 'licence-raj', greater efforts to make finance more easily accessible to entrepreneurs and other institutional support to 'techno-preneurs' — have helped improve the climate for Entrepreneurship. The opportunities created

by today's world knowledge economy coupled with the 'local enterprise', have contributed to making India a 'fruitful ground' for Entrepreneurship.

In India Entrepreneurship is rarely considered as a career option, but now Indian Universities should launch more number of courses on Entrepreneurial Development in engineering and other academic institutions. The academic environment in India needs to be more practical and entrepreneurial. Today's qualified engineer instead of searching a job, he should create a job and use his skills to setup his own venture, which helps him not only in creating a job but also gives him rewards in the form of economic betterment. This would also help us to make our economy stronger and contribute in nation building. Instead of producing job seekers, engineering institutions, governments should come forward to make these engineering graduates as job creators. Through the use of business incubators in the engineering institutions, institutions can also enhance their salability of the young students in the market.

Innovation and Entrepreneurship

The process of developing a product and building a business out of innovative idea is termed as 'entrepreneurship'. India's entrepreneurs attach the utmost importance to innovation. They are good at identifying and seizing new opportunities. A techno-preneur is one who innovates on the basis of science and technology to build something valuable to society. As mentioned earlier that entrepreneurship is not a job but a spirit of creativity, excitement, excitement, challenge and achievement. Compared to olden days, where the economy was run by 5ms-money, manpower, machine, materials and methods, the 21st century economy is largely run by mind power. With the availability of ready to invest funding institutions, entrepreneurship is gaining momentum. For students to become globally competitive and productive in the 21st century, they need to be taught how to solve problems they will encounter. Higher educational institutions in India should act as a bridge in the innovative process and promote entrepreneurial instruments. Recognition is given to the decisive role of India's entrepreneurs in realizing their success in the IT–software industry, and also to the primary role of entrepreneurs—rather than the government—in the industry's success of (a view held by many Indian scholars). Thus, Entrepreneurial Skill Development (ESD) has to be recognized

as one of the important academic and training activity in Indian higher educational institutions and the curriculum should be designed to foster and nurture entrepreneurship including Science & Technology (S&T) based Enterprises.

Recognizing the key role of entrepreneurs in our country's economic growth, the concept of science and technology parks, incubation centers originated in India since 1980s. At present, India has 13 Science and Technology Entrepreneurship Parks, and 50 incubator centers which have been funded by the National Science and Technology Entrepreneurship Development Board of the Department of Science and Technology, Government of India (GOI). More recently, Ministry of Information and Technology and Ministry of Human Resource Development (HRD), have taken an interest in sponsoring similar platforms for entrepreneurship in similar or specialised areas. In India, IIT Kharagpur manages an area of 100acres Science and Technology Entrepreneurship Park. Thus, with a few exceptions, over 2000 engineering colleges, technical universities and departments under various universities across India have not yet started an entrepreneurship programs seriously.

Despite the efforts made by Ministry of Science and Technology, IITs and some premier engineering colleges, Entrepreneurial activities in India are still in the early stage.

Role of Academic Institutions and Engineering Colleges

Over a decade though there has been a growing argument about how well educational systems prepares our youth for adult life in general and 'enterprise' in the world of work in particular but little has been implemented. During the last decade promotion of 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. In the United States over the last decade the Partnership for 21st Century Skills organisation has developed the Framework for 21st Century Learning (Partnership for 21st Century Skills, 2009) to meet the educational needs and support systems required to radically refocus the education system. This framework identifies the wide range of considerations necessary to meet the new demands. This framework includes:

- 21st century themes–global awareness; financial, economic, business, an entrepreneurial literacy; civic literacy; health literacy and environmental literacy.

At present, in India a million engineering graduates are struggling to get placed in an extremely challenging market. Andhra Pradesh and newly formed Telangana are the two states where there are more than 650 engineering colleges which are producing approximately 1.5 lacks of engineering graduates every year. To convert these engineering graduates into entrepreneurs a considerable attention has to be paid to formal entrepreneurship education at the university level to develop entrepreneurial thought among these graduates. Public authorities and economic experts should stress the importance of promoting aspirations for entrepreneurship among young and highly-educated people. If the business birth rate in any nation can be enhanced by supporting students and graduates in their entrepreneurial activities, it is worthwhile to examine the current status of entrepreneurship education. Entrepreneurship education has to be intensified in universities and engineering college immediately. Entrepreneurship centers have to be found to coordinate the broad array of activities, programs and resources within universities. Very seldom, academic institutions stepped back out of entrepreneurship once they had entered.

Most of the surveys across the world show that *entrepreneurship* education encourages graduates to start their own business. In an early study of a medium-sized American university, Clark found that almost 80% of the students were considering to setup their own business. These plans were often turned into reality. Three out of four students who reported concrete plans for founding a company in fact started a new venture. Furthermore, 76% of the respondents stated that the entrepreneurship course had a large or very large effect upon their founding decision (Clark, Davis and Harnish 1984)

Literature Review

The literature on academic entrepreneurship is huge. Now, it is very much clear that the literature of entrepreneurship is rich with variety of theories and aspects. Many authors have under taken a research in this area and it is identified that entrepreneurial education should be part of a strategic design of University curricula in order to provide engineers with entrepreneurial and

management skills that will help them to modify their profile in accordance with the new requirements of the knowledge-based economy. Unless a graduate has a new talent or some extraordinary skills it is very difficult for anyone to survive or lead a comfortable life in this competitive world with just a mere degree. This has led to the concept of entrepreneur. In this connection Jonathan weaver (2011) stressed that, the engineering students when they are in undergraduate course lot of emphasis has to be given to teach the student to gain specific knowledge to become good entrepreneurs.

Looking ahead- Challenges and Recommendations

The positive feedback of success and attention will naturally encourage innovative entrants, driving more and more start-ups. Following are Some of the major areas of promoting entrepreneurship, governments and educational institution should concern in the process of building economic prosperity.

1. Lack of Entrepreneurial Education: Tony Wagner, the Harvard education specialist, says "Knowledge today is a commodity. It's free. It's like air. It's like water. You know the quality of education people can receive (on internet) if they are willing to take initiatives." In India entrepreneurship is still overloaded by the traditional educational system of the country. This has to be integrated with curriculum focused on entrepreneurship which can play an important role in creating a productive work force. In Indian educational system, entrepreneurship is still a 'new cup of tea' which is limited to B-Schools and management institutes. Entrepreneur Skills Development (ESD) workshops and seminar by experts in business management on a regular basis, knowledge about how to make business plans, financials & marketing skills, resources management, time management, sales skills, debt recovery techniques, stock control techniques, and marketing etc. would definitely produce a value.

2. Lack of Financial Assistance: In developing countries like India this is another major threat for a young entrepreneur. The reason behind this is the bank's avoidance to provide loan facilities for entrepreneurs as there are various social complications attached with them. This forces young entrepreneurs to take a more difficult path of approaching venture capitalist and philanthropic institutions. Hence Micro Financial Institutions should come forward to provide need based

financial assistance for start-up enterprises or small entrepreneurs. Thus governments and Micro financing institutions should keenly work together to satisfy financial demand of potential and viable projects.

3. **Lack of Skilled Manpower:** Newly established ventures should get well qualified and competent manpower from various sources like professional bodies and academic institutions. In any kind of enterprise, the success of a production network depends on its ability to transfer technology and skills to other firms, to invent new products, and to improve production process. To participate and succeed in such a network, local firms are required to possess adequate human resources to fulfill their mission in a holistic manner. Today, education in most of the classes should shift from providing knowledge and information to nurture and motivate students to be more curious and ignite their imagination. Schemes like "Earn while you learn" should also include the entrepreneurial spirit besides teaching the basics of managerial skills and soft skills, like team building and negotiation skills. Thus, this generates self confidence, which is a key attribute for a young entrepreneur's success.

4. Lack of support from Government: This is another major hindrance for many small entrepreneurs in India. At present, the governments both at state and central are not providing any kind of assistance for promoting start-ups. It takes 35 days to start a business in India, compared with 6 days in Singapore, this shows that government's policies and regulations for entrepreneurs are strict and complicated with no tax benefits and subsidies being provided for start-ups, this is acting as a major impediment to the growth of an entrepreneur in India. Statutory bodies like AICTE, UGC and MHRD should provide special funds to those institutions that introduce 'entrepreneur' as a compulsory subject at graduate level.

5. Ready-made Information: Proper knowledge about various policies and programmes for entrepreneurs' development is very important. Government should come forward to initiate collaboration between industry-academia, professional institutions and engineering colleges to develop a database on a common website to provide information and to highlight the scope and achievements of starting various ventures. Wide spread of information through pamphlets, creating awareness by organising workshops, advertisement of different policy

information and conducting road-shows will help the youth to come forward and avail the services.

Recommendations

The National Knowledge Commission (NKC) of India in its recommendation to the Nation has suggested major reforms and made following recommendations for adaptation by the Indian Universities and Institutions. Some of the major reforms suggested by NKC of India are:

1. **Curriculum reforms** to make engineering and technology curriculum more industry relevant turned to current and future needs having necessary mechanisms and structures for periodic review and up-gradation. Major involvement of industry in formulation of curriculum and greater flexibility in approach is recommended by the NKC.
2. The NKC has further recommended that the curriculum design **should promote interdisciplinary engineering** and facilitate movement from one department to another, as per the interest and capabilities of the students. The credit transfer facility should also be provided for students to complete a course of study in more than one university.
3. The NKC has also recommended that **synergy between education and research** should be created in the educational institutions to promote culture of research and innovations.
4. The NKC has also recommended a greater **focus on PG and research** in engineering and technology institutions.
5. Another major recommendation of NKC is that the large affiliating Universities system should be replaced by **Smaller Universities** and giving **academic and administrative autonomy to the institutions.**
6. NKC has recommended **differential pay packages to reward performance** of the faculty.

The NKC has recommended that foreign Universities should be allowed entry in to India and Indian Institutions and Universities should mark the education abroad on a level play field.

When compared to India, policies of the US government and academic institutions as well as the knowledge industries and

Science and Technology Parks periodically turn to offer very attractive research ecologies to attract and retain some of the best talents from the rest of the world. Thus, if India wants its best graduates to do post graduate studies and research in its premier institutions, it has to provide high paying fellowships, world class research facilities, and competitive, challenging research environment by competing with western countries.

Conclusion

The paper throws light on the perceived importance of entrepreneurship courses, opportunity of specialized studies in the area, and entrepreneurship centers in engineering and management curricula in Indian Colleges and Universities. In future, Educational institutions and Governments will have to play a major role in introducing new rules and regulations pertaining to the promotion of entrepreneurship at the UG and PG level. Now the major responsibility is of the educational institutions in implementing the suggestions made by NKC to strengthen entrepreneurial attitude among the graduates. Besides this, academic institutions should strengthen the academic-industry relations in order to get exposure to the latest developments. Most of these institutions can achieve 100% of employment by encouraging entrepreneurship among the students. There are other key benefits like rapid growth in economy, increase in employment opportunities, job creation, reduction in poverty, increase in literacy, etc,

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