



Academic Entrepreneurship: Linking Skills to Higher Education

Deepika Bhaskar

Research Council and Centre for Science Education and Communication

University of Delhi, Delhi 110007

biodeepika@gmail.com

ABSTRACT

Higher education institutions have started to move beyond traditional teaching, learning and research to embrace innovation, skills, commercialization, entrepreneurship and creation of economic value. This has become important in present context as the employment prospects of the university graduates are changing and job opportunities are diminishing. Graduates, in the present scenario, are expected to be not just job seekers but job creators. An increase in unemployment rate among the talented and well educated youth has directed the thinking towards an overhaul of the education system and drive it towards creating a system of job generation. There has recently been an emergence and upsurge of Academic Entrepreneurship that focusses on market-driven research for closer cooperation between research institutions and industry leading to commercialization of research outcomes for the ultimate benefit of the society. The study on the topic suggests ways to make Academic Entrepreneurship viable and sustainable.

INTRODUCTION

Undoubtedly, institutions of higher education have a significant role to play in inculcating a creative bent of mind amongst learners and fostering an innovation driven learning. There is greater emphasis in the curriculum as well as in regulatory bodies and government initiatives towards outside classroom learning and real-world experiences shaping the future of younger generation. The focus of research has also shifted towards application-driven research as funding bodies are under pressure to bringing the research outcomes and innovations to market in an attempt to show the worth of expenditure on university research. It is a matter of great concern that university research, even with huge grants received through research projects that promise to deliver significant findings of societal relevance, does not result into outcomes expected. Creating faculty entrepreneurs is a big challenge against the backdrop of situations like laidback mind set, focus on basic research, lack of incentivization of outcome based research, lack of motivation/efforts towards meeting societal challenges and lack of drive to create an impact through innovation driven approaches. Unlearning, re-learning and developing an entrepreneurial mindset requires exposure and training in skill sets that not only equip the learner with required knowledge but also focusses on soft skills that develop the required temperament for the change. Specific programmes and courses in innovation creation and commercialization are becoming extremely popular and are a necessity for channelling energies in this area. Inculcating culture of innovation and entrepreneurship will also prevent wastage of public money in repetitive unproductive research and offer alternatives for focussed research that has the capacity to find solutions for the challenges of the society.

The realization of moving beyond theoretical knowledge towards practical skills and application based approach has finally surfaced. The fundamental changes in the tertiary education sector and attitude of funding agencies towards providing enhanced funding for innovation and outcome driven research has led to the current urge of incorporating entrepreneurship skills in the higher education curricula. Universities are recognizing their responsibility of providing a useful and relevant educational experience that prepares and motivates the youth towards a creative and entrepreneurial mind set. Universities have broadened their mission and have moved beyond education and research to include outreach activities like public-private partnerships, industry collaboration, community service, knowledge transfer, business incubation, encouraging entrepreneurial trends and imparting specific skills etc. In order to equip students to realise their dreams of creating the next Facebook, Twitter or Google, the universities have started to realise the pedagogical value of entrepreneurship education as a set of skills to be applied across professional environments. Efforts are being made to start formal programs as well as channel students' interest in solving global problems through innovation and entrepreneurship. The programs being introduced include skill trainings, degrees, diplomas, certificate programs, business plan contests, entrepreneurship clubs, start up internships etc. for students, researchers, faculty, business professionals and entrepreneurs.

Higher Education and Innovation

Innovation has penetrated every facet of human life and has impacted thinking, living and working in every sphere of life. There are endless examples of breakthroughs in almost every area like drug discovery, personalised medicine, green technologies, alternate energy, environment management, social media, educational technologies, rural sector, communication etc. Innovation commercialization is driving universities to compete and improve their ability to develop products, processes and services of market relevance and economic value. Boosting of the university research towards innovation and the real world application of that innovation is a step towards creation of entrepreneurial outcomes and a driver of the economic growth of the nation.

Academic Entrepreneurship

Entrepreneurship results from creation of new businesses, the ideas for which are often driven by research conducted on university campuses [3]. Academic Entrepreneurship refers to the efforts and activities that the universities and their industry partners undertake for commercializing the outcomes of faculty and student research. The research work taken up by the universities has the capacity to transform society, escalate economic growth and generate revenues. Hence, ensuring that the faculty and students have the required knowledge and skills for furthering innovation and developing entrepreneurial capabilities has become the need of the hour. Universities have now recognized the need to prepare a student to succeed in real life situations beyond the requirement of an employment. Modern universities are no longer detached from socio-economic conditions. They educate students as knowledge-based economies that contribute to the emergence of innovation and establishment of new ventures for economic growth of the nation.

Academic entrepreneurship is becoming increasingly relevant for faculty and students who are motivated to undertake research for converting the outcomes into innovations with commercial potential. Academic Entrepreneurship is necessarily not about giving up the academic life to

become CEO of a start-up company. For academicians, academic entrepreneurship may be about learning the innovation development process, problems of market-driven research and its solutions, marketability, collaborative idea sharing, entrepreneurial dynamics, profit-driven economics, and successful technology transfer.

In United States of America, the growth of academic entrepreneurship can be traced back to 1980 with the passage of Bayh-Dole Act that provided a mechanism of making the Intellectual Property generated through federal grants a property of the University rather than the funding agency, allowing universities to quickly transfer their Intellectual Property to the society. This has led to increase in cases of technology transfer from the University to the industry with favourable returns to the University. However, the process of Academic Entrepreneurship still appears to be opaque as activities, stakeholders and success factors are not very well articulated and sometimes unpredictable. Success in Academic Entrepreneurship may mean different things to different people, ranging from revenue generation to sustainable business generation to developing the required entrepreneurial mindset and so on.

In India, Academic Entrepreneurship has been passive, concentrating largely in technology-driven areas and institutions where the translation of University research to marketable innovations is comparatively easier and more visible. The present education system in India is not geared towards motivating students into creative and analytical thinking, problem solving, finding new solutions to existing problems of the society. The realization has set in that a review of present education system has become mandatory and inescapable. The need to incorporate an innovation-driven approach to learning has been realised and the government is working towards promoting a culture of innovation and entrepreneurship through promising schemes like Start-up India, Atal Innovation Mission, and Make-in-India etc. Funding agencies and private businesses in the form of angel investors and venture capitalists are also investing heavily into promoting a culture of innovation and encouraging those who show promise towards commercializing new ideas, ventures and products that meet rural, environmental, cultural, national and global needs. The entrepreneurial wave across the nation has geared people towards taking advantage of the ease of setting innovative ventures for which the universities have also started responding by setting up incubators and accelerators and incorporating the curriculum with provision for providing training in skills required to start a successful venture. Such trainings encourage developing the right mindset for innovation and entrepreneurship, thinking of and narrowing down the right idea, converting the idea into a successful venture through the right financial, administrative, technical skills and marketing skills, industry understanding, market understanding and finding finances.

Entrepreneurship Education at the University Level

The emergence of entrepreneurial mission of universities was necessitated in the developed countries by the need to generate additional external financial resources. This led to enhanced interest in furthering the concept of academic entrepreneurship. In developing countries, the need has been felt to intensify industry-university cooperation and focus on novelties and innovation in an attempt to promote self-employment and create jobs.

An attempt to include entrepreneurship education at the university level will require the study of entrepreneurship trends, the basics of starting a commercial venture, inculcating and transferring the necessary skills, attitude and behaviour of the students, thus enabling them to function effectively in today's competitive world and preparing them to become potential entrepreneurs. A pedagogical change at the curriculum level will be important with necessary

involvement of faculty members beyond subject boundaries so that the change is sustainable in the University environment. Educators need to strengthen and develop the conceptual link between theoretical knowledge, commercial knowledge and making of successful entrepreneurs and this has to be embedded in their teaching, learning and research. A recent paper on entrepreneurial education describes its impact on entry of university graduates into self-employment in Tunisia [2]. Curriculum reforms leading to creating an entrepreneurial mind set, providing training and coaching to help university students prepare a business plan. The study reveals that such an initiative led to marginal increase in self-employment though the employment rates remained unchanged. The business skills were found to improve whereas entrepreneurial traits were mixed. However, most of the students reported to have increased aspiration towards their future growth in this area.

Time to Rethink Academic Entrepreneurship

Academic Entrepreneurship is efforts undertaken by the universities to promote the commercialization on campus emphasizing on emergence of entrepreneurial ventures in a non-conventional set-up having traditional educational objectives. The current focus of the universities is on patent licensing deals which still continues to be one of the parameters of ranking a university as a top university. There are still very few entrepreneurship courses and programs in the universities and the stronghold continues to be imparting education and knowledge transfer in traditional sense. Most of the research being carried out is basic in nature with not many initiatives targeted at direct impact to the challenges of the society. The Universities have come up with Technology Transfer Offices for the transfer of technologies developed in the Universities to the industries and market but their effect on promoting Academic Entrepreneurship has been inconclusive. Though the government impetus of instituting Intellectual Property Rights Chairs in every University and institution of importance has been helpful and significant, the analysis of their effectivity and their impact on promotion of Academic Entrepreneurship is yet to be done. In some cases, such efforts have been highly effective but mostly they have been either neutral or only marginally effective [2].

Table 1: Traditional and emerging aspects of Academic Entrepreneurship [4]

Theme	Traditional Perspective	Emerging Perspective
Why	To generate direct financial returns	To provide a wider social and economic benefit to the university ecosystem
What	Academic Spin-offs; licensing, patents	Student and Alumni start-ups, Entrepreneurially equipped students, job creation in local region
Who	Academic faculty and postdoctoral students	Students, Alumni, on-campus industry collaborations, outside entrepreneurs
How	Technology Transfer Offices, Science Parks	Accelerators, Entrepreneurship garages, student business plan competitions, collaborative networks with industry and alumni, employee mobility, public-private partnerships, incubators, entrepreneurship development cells

Universities in the west have only recently integrated Academic Entrepreneurship in their economic development mission. The sudden spurt of interest in this aspect is owing to reasons like competitive pressure from rival institutions, increasing pressure to generate money and increasing interest of government and similar agencies towards this initiative [16].

More stakeholders have to become involved in the academic entrepreneurial net like students, post-doctoral fellows and younger generation of faculty as this genre is more open to moving beyond the comfort zone and working with the industry. There is also encouragement from the top administration towards promoting and facilitating these efforts. This promotion and facilitation will depend on the needs of the individual universities based on whether the ventures being promoted are social, urban, technological, scientific, economic, or any other type. The rise in academic entrepreneurship in social science sector has also been remarkable in the recent past. Social entrepreneurship has surfaced recently as the most economically driven alternative for uplifting and upgradation of rural sector.

The social and economic benefits of Academic Entrepreneurship on the University system have only recently been realised. The universities are gearing up for the efforts by setting up facilities like generalised and specific business incubators and research parks, starting entrepreneurship courses and programs, establishing entrepreneurship centres and forming collaborative networks with industry . This shift focuses on the need for transfer of knowledge from universities to make wider contribution to society.

Multi-level framework is needed for rethinking Academic Entrepreneurship for the Universities including a) analysing reasons for not adopting Academic Entrepreneurship b) examining issues related to emerging form of academic entrepreneurship c) exploring questions how Academic Entrepreneurship can be facilitated.

Strategic decisions need to be taken by the universities in promoting Academic Entrepreneurship and establishing priorities in choices related to it. Resource allocation has to be strategic with decision on whether direct funding of start-ups, sponsored research etc. should be done or more indirect allocation should be prioritized like setting up incubators, Tech parks etc. There is also a substantial variation in research quality between departments and colleges of the same University. Those departments/colleges that lack research excellence may be motivated to establish research collaborations and find government partners. This may result in divided benefits but the benefits will still be there along with inculcating such a culture for future benefits.

Universities also need to formulate robust IP and patent strategies. The IP and technology transfer offices must ensure well defined IP protection and help with the decision on licensing being exclusive or non-exclusive. The need to integrate technology and knowledge transfer into the curriculum has its own benefits and long-term impact as this may indirectly lead to start-ups later based on acquired wisdom. Supporting entrepreneurial skill development and industry interaction for faculty and students adds another dimension of university knowledge transfer including social academic entrepreneurship.

Internationalization of science and Academic Entrepreneurship

A survey of researchers at Max Planck Society in Germany found that mobile scientists are more likely to become nascent entrepreneurs. It was found that citizenship and foreign education are important determinants of early stages of academic entrepreneurship [20]. Studies have also found that opportunity recognition and entrepreneurial commitment are also key determinants. This helps scientists to be able to cope with uncertainty, to think commercially and to progress their innovative ideas to market more actively. Thus,

internationalization of science is beneficial for the host countries as multinational composition of the research teams gives a boost to entrepreneurial activity.

Effect of research behaviour on Academic Entrepreneurship

Research behaviour includes publications, patents, networking in conferences etc. It is important to see whether such factors promote general Academic Entrepreneurship or is a hindrance to commercialization of research. It is also important to see if some academic disciplines are more likely to yield Academic Entrepreneurship. A survey of more than 1000 German researchers has shown that academic accomplishments are not always a driver of Academic Entrepreneurship [21]. It was seen that patenting activity by researchers, research leadership, consultation, conference participation and engineering sciences showed greater propensity to yield research-driven entrepreneurial activity. However, academic publications and university employment did not seem to have appreciable impact on entrepreneurial activity. It was concluded that academic entrepreneurs are not necessarily emerging because of research accomplishments.

Indian Perspective- Government view

India is one of the youngest nations of the world with more than 62% of population in the working age group (15-59 years) and more than 54% below 25 years of age[1]. The country faces the dual challenge of severe paucity of highly trained people plus non-employability of large sections of educated workforce. Focus on advancement of skills is relevant to the emerging economic environment. However, skill development cannot be viewed in isolation as it is fundamental to but not sufficient to gain decent jobs. With new jobs becoming fewer, employment generation through entrepreneurship is becoming exceedingly relevant.

Knowledge and skills are the driving forces of the economic growth and social development of any country. Countries with higher standards of skills adjust more effectively to local and global challenges and opportunities. It is a big challenge that only 2.3% of total workforce in India has formal skill training in comparison to 68% in UK, 75% in Germany, 52% in USA, 80% in Japan and 96% in South Korea.

One of the major challenges faced by the country today is public perception that views skilling to be the last resort meant for those who have not been able to progress in the formal academic system. The traditional perception is inversely proportional to working with one's hands. Vocational trainings that are being offered are neither employment linked nor in sync with current requirements. A deeper look into the future requirements and the offered skills needs to be done to be in sync with enhancing skills of uneducated, less educated and highly educated youth. The skills required at the Higher Education level are significantly different from those offered presently but are equally important for the future of national prosperity.

It is most important to align the skills with the required competencies in order to empower the individual, enable him to realize his full potential and facilitate his growth to play more rewarding and productive role for the society and nation.

Suggested Strategy for furthering Academic Entrepreneurship with national perspective

With the universities being the main source of innovation, targeted entrepreneurial education and greater ties with the local industry is the need of the hour. This will also result in training the local workforce and forcing a push for cultural change. Three main pillars of innovation and entrepreneurship are suggested:

- 1. Developing Fertile Innovation Ecosystem, Innovation Hubs*
- 2. Creating an Entrepreneurial Culture*
- 3. Providing Sustained Finances for New Initiatives*

It is important to recognize the areas where innovations are concentrated and develop them further into fertile ecosystems or Innovation Hubs that facilitate the culture and ease the process of converting an innovation to an entrepreneurial venture. Efforts have to be made to promote an entrepreneurial culture by introducing mandatory programmes for faculty as well as the students to promote the entrepreneurial mindset and equipping with required skill set for fostering such a culture. For promotion of University based innovation and entrepreneurship, there should be dedicated funds for research that drives innovation and for sustaining innovation and entrepreneurship. Early stage and sustained financing is exceedingly important to give impetus to an entrepreneurial culture.

The following steps are suggested for developing and furthering a culture of innovation and entrepreneurship that can significantly contribute towards economic growth and global presence of the country:

- 1. Promoting Student Innovation and Entrepreneurship*
This can be achieved through pedagogical change in curricula, introduction of certificate and degree programs cut across disciplines.
- 2. Encouraging Faculty Innovation and Entrepreneurship*
This can be done by providing world class research infrastructure, making research relevant to real life problems, promoting faculty entrepreneurship through educational opportunities, acknowledging technology development, facilitating collaborative efforts, easing transfer and commercialization steps. Faculty orientation and seminars towards this mindset should be made an integral part of the system. Incentives should be provided for efforts to engage in Research and Development leading to innovation and transfer of technology as a business startup for the societal good. It is also important to hire faculty not only interested in advancing in academic areas but also pursuing commercial applications. It is also important to encourage faculty members to move from narrowly focused scientific research tradition to more forward looking comprehensive, innovative process that incorporates technology development and commercialization efforts.
- 3. Actively Supporting Technology Transfer*
Universities are the most important source of a nation's Research and Development output. Streamlining the process of technology transfer must be the highest priority. This can be done by expanding technology transfer facility, hiring skilled staff, improving technological support to researchers, increased access to capital for researches with commercialization potential, increasing licensing and startup activity and reducing barriers.

4. *Facilitating University-Industry Collaboration*

Collaboration between university and industry is important for furthering ideas and technology derived from University research. It is crucial for direct investment towards commercially promised research. It is also important for bridging the gap between technology development and marketing stages. While the industry benefits by having early access to scientific expertise, intellectual property and commercialization opportunity, the University benefits by enhanced education, revenues, local and regional development. The industry also gets exposed to latest research trends and ability to assess business models and economic implications of the latest research. Industrial presence on campus can be enhanced through web portals, networking events, round table discussions, faculty and student internships, business competitions, entrepreneurial clubs etc.

5. *Engaging with the regional and local economic development efforts*

Universities should be considered as regional assets for improving relations with local government, businesses and workers for increased access to university based resources. Universities should be made active partners in economic planning and revitalization. It is very important to encourage direct university participation in local businesses, collaborating with local industries for regional innovation and economic development, linking local communities with support networks that include government, industry etc. Working directly with local businesses and communities will help recognize areas where innovation and economic development is required and universities can help.

6. *Recognition of exemplary economic engagement by Universities*

Efforts should be made to recognize those universities that are truly breaking ground by supporting innovation and entrepreneurship in the realm of economic development.

A revision of education and training policies at the University and governmental level is required for making the best use of University resources and facilitating transferring innovations that are an university research to the market for making a societal impact.

REFERENCES

1. Draft National Policy for Skill Development and Entrepreneurship, 2015, Ministry of Skill Development and Entrepreneurship, Government of India 2015
2. Premand, P., Brodmann, S., Almeida, R., Grun, R. and Barouni, M., 2016. Entrepreneurship Education and Entry into Self-Employment among University Graduates. *World Development*. 77: 311-327
3. Wood, M.S. 2011 A process model of academic entrepreneurship. *Business Horizons*. 54: 153-161
4. Siegel, D.S. and Wright, M. 2015 Academic Entrepreneurship: time for a rethink? ERC Research Paper No. 32, 1-22.
5. Jakubiak, M and Agnieszka, S., 2014. Academic Entrepreneurship without Borders. *Proceedings of International Conference on Human Capital Without Borders*. 25-27 June 2014: 553-560
6. Baporikar, N. 2013 Critical Review of Academic Entrepreneurship in India. IGI Global Chapter 2, 29-52
7. <http://blogs.lse.ac.uk/impactofsocialsciences/the-tough-life-of-an-academic-entrepreneur/>
8. The Changing Face of Innovation in India, 29 October 2015. *The Economic Times*, Bengaluru.
9. Kant, Amitabh 2016. We'll create the best ecosystem for our young entrepreneurs. *The Economic Times*, Feb 16, 2016, Bangalore.
10. The Uphill task for Skill India mission 24 September 2015, *The Hindu*
11. Clarysse, B, Tartari, V., Salter, A. 2011. The impact of entrepreneurial capacity, experience and organizational support on academic entrepreneurship. <http://www.sciencedirect.com/science/article/pii/S004873331100091>
12. Frank, A 2005. Developing Entrepreneurship Skills in the Context of Higher Education. *Built Environment Education Symposium* 1-8

13. Stanwick, J. 2011 Innovation: Its links with productivity and skill development. NCVET, Government of Australia
14. Academic Entrepreneurship- the Business of Academic Commercialization, a course for faculty and graduate students, University of Pittsburgh, USA
15. Pisano, G.P. 2006 Can Science be a business: Lessons from Biotech. Harvard Business Review 114-126
16. Paz, A.I.L., Morales, M.A. and Alonso, N.C 2006 Academic Entrepreneurship in developing countries: the case of an Entrepreneurial Department, 8th Triple Helix International Conference 1-13.
17. Franzoni, A and Lissoni, F. Academic Entrepreneurs: critical issues and lessons for Europe. Knowledge transfer mechanisms Chapter 8, 163-190
18. D'Este, P., Mahdi, S. and Neely, A. 2009 Academic Entrepreneurship: What are the factors shaping the capacity of Academic Researchers to identify and exploit entrepreneurial opportunities? Danish Research Unit for Industrial Dynamics 1-36
19. Krabel, S., Siegel, D.S. and Slavtchev, V. 2009 The Internationalization of Science and its Influence on Academic Entrepreneurship. Jena Economic Research Papers 1-3
20. Goel, R.K and Grimpe, C. 2010. Are all Academic Entrepreneurs alike? Evidence from Germany.<http://www.tandfonline.com/doi/abs/10.1080/10438599.2011.576506?journalCode=gein20>