

Creating Entrepreneurs through Entrepreneurial Universities

Rajesh N. Pahurkar

Department of Management Sciences (PUMBA), University of Pune, Pune, India

Abstract Traditional universities are more engaged into academics and research activities with less focus on entrepreneurship development. We might find some of the universities have taken initiative for industrial tie ups and commercialization of in-house research outputs; but these efforts are not comprehensive to support full entrepreneurship development in traditional culture of university. Hence an attempt is made to understand and develop the criteria's or guidelines for creating entrepreneurial universities. There could be many barriers for traditional universities at various levels (Barriers for university management, students, faculties and staff) to become entrepreneurial and lack of proper vision and mission. This paper explains possible entrepreneurial options, barriers need to handle, qualities need to develop, motivations to follow, case as a role model to understand, and the strategies to develop entrepreneurship in university system. A conceptual model is proposed by considering available researches. A practical application of this theoretical concept can be tasted in various country specific environments.

Keywords Universities, Education, Entrepreneurship Development

1. Introduction

The core activities of traditional universities include imparting education (more academics) and carrying out basic research without direct focus on entrepreneurship development (Etzkowitz H. et al. 2000). Traditional universities are not having pure entrepreneurial culture and support system to promote entrepreneurship. Universities need to create favorable environment for entrepreneurship development, which will contribute in real economic and social development of the surrounding region and nation as whole (Kirby 2006). The traditional university's activities might support social development by producing qualified human resource, but may not be fitting exactly to the need of industries and government organization. Hence university qualified students may be requiring further refinement in their skill sets to make them better usable. This gap of offered educational programmes by universities and actually needed demand of knowledge, skillets and qualities can be bridged by creating entrepreneurial universities. Converting traditional universities into entrepreneurial universities may require efforts from different sections of society. It basically requires efforts from universities (management of university, faculty, students and staff), governments and industries (Leydesdorff & Meyer 2003, Etzkowitz & Leydesdorff

2000, Philpott, Dooley, Caroline O'Reilly, & Lupton 2011). It also requires undertaking many strategic actions and policy decision favoring entrepreneurial culture in the university. Entrepreneurial universities can develop the system to identify various barriers to be resolved, motivation and qualities need to develop entrepreneurship; and also by offering varied entrepreneurial options. Having role model of entrepreneurial university and following it as benchmark might be helpful. The various initiatives and activities undertaken by Stanford University are explained in the form of case to depict entrepreneurial university.

This paper has six sections to explaining the development of entrepreneurship through entrepreneurial universities. Section one introduces about theme of paper. Section two explains the concept of entrepreneurial universities and the various entrepreneurial options available to initiate. Third section uncovers the various barriers to entrepreneurship developments, entrepreneurial qualities and entrepreneurial motivations. Forth part of the paper talk about the additional boost up to push entrepreneurial universities. Section five illustrates the case on entrepreneurial profile of the Stanford University. Sixth section is on conclusions of the paper along with the diagrammatic presentation on roles of entrepreneurial university.

2. Entrepreneurial University

Universities need to be more innovative and entrepreneurial as against traditional way of teaching and research. Traditional universities focus on transfer of

* Corresponding author:

pahurkarrajesh@gmail.com (Rajesh N. Pahurkar)

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knowledge through education and advancement of knowledge through basic research. This traditional approach is leading to produce graduates with no any special inclination towards entrepreneurship. The output of university should not be measured only on the basis of the number of students enrolled and passed out with degree. The social and economical contribution of universities must be considered for its evaluation. Universities must emphasize on those activities which will leads to economic and social development, while doing so there must be synchronization among university–industry–government; such university can be called as an ‘entrepreneurial university’ (Etzkowitz & Leydesdorff 2000, Leydesdorff & Meyer 2003). The university should undertake entrepreneurial activities with an objective of economic and regional development along with its own financial gain. Beside these two major activities of education and research, universities have potential to directly act in economic development of the region by creating and supporting new ventures and entrepreneurs.

Entrepreneurial universities have primary role in developing the human capitals of the nation along with this it plays vital role in transfer of technology from academics to industry. The research work development may results into spinoff ventures. Universities may also supports to existing business operations by offering its innovative research solutions to industrial problems. Entrepreneurial universities can undertake various entrepreneurial activities as listed below. Each of these activities has the potential to contribute (directly or indirectly) to regional and national economic growth, as well as the financial wellbeing of the university (Philpott et al. 2011).

Following could be the various entrepreneurial activities university may embark on (Philpott et al. 2011, Klofsten & Jones-Evans 2000, Louis et al. 1989)–

Establishing Technology Park – The place where industry and researchers from university can jointly work on industrial problems. Also university can share its innovative researches having market potential. University can provide infrastructural facilities along with industrial partnership or government aid. This will provide platform for development of multiple new ventures contributing to economic growth and social balance of region. This initiative will lead to research and educational opportunities for university in collaboration with industry. The main thing is that, university can generate revenue from licensing and technology transfer.

New venture start ups – New firm as an offshoot of university research can be started. The research having market potential can be converted into viable business with the help of industry or venture capitalist. This will provide the employability to others in newly started firms and economic development along with social value creation. University may have partnership or part ownership and can generate the revenue from the business operations.

Protecting intellectual property rights (IPR) through patents – The output of research activities having market demand can be used for business purposes. The unauthorized

use of these research output can be avoided through patent as legal protection of intellectual property of university. University can have control on sharing and transferring the research knowledge through licensing of these patents to respective industry. Having various patents with different industrial applications can attract industries for purchasing theses IPR’s for business purposes. This will generate revenue and partnership with the industry.

Contract research – Researchers in the university can undertake research works to solve the industrial problems and to develop innovative products and processes. This kind of research activity can bring university and industries more closely to solve the social problems and act entrepreneurially. This will strengthen the university research by developing advanced labs to undertake specialized research projects in collaboration and financial help from industry partners.

Executive Education/Industry training courses – University should design the training programmes and courses to upgrade the skills of industry and government employees. Management development programmes and technical courses based on current trends and new technologies to various staff level should be designed. These courses can be designed as per the current requirements of particular industry. There is lot of scope in this activity because of the demand and available skill sets in the labour market. This will bust up industry interaction and participation in academics. It will also generate substantial revenue through training fees.

Consulting assignments – Through this university can undertake various projects to share its expertise in any particular subject. An individual researcher can also undertake consultancies from industry and government organizations on revenue sharing basis along with the university. An academic knowledge, personal experience, expertise and mentoring may be helpful to improve the product, process and performance.

Research funding and grants – Industries, government and international organizations should be targeted to avail the funding to carryout major researches. This is real form of academic entrepreneurship. The research output so developed can be patented and commercialize through patent licensing and spin-off venture activities (Powers 2004, Di Gregorio & Shane 2003, Van Looy et al. 2004).

Publications and documentations of research activities – University can showcase and archive the research outputs, innovative inventions and discoveries in the form of research papers, articles, books and data bases. This activity can develop the university brand as research institute at national and international level. It will promote the research capabilities of university and can develop confidence of industry for collaboration and partnership (Powers 2004, Di Gregorio & Shane 2003, Van Looy et al. 2004).

Arranging and participation in international research exhibitions, conferences – The researchers will get platform to showcase their inventions having market potential. This is marketing strategy to expose and advertise the researches having industry applications. It will attract commercial

organizations to bid for the research outputs.

Collaborations and networking with other research institution – This will help to share the resources and expertise of other research organizations. It will add the more value through additional dimension of research which is not available with the university. It will also helpful to get access to more advance technologies and laboratories. University may get new clients for commercializing its research.

Creating skilled and qualified graduates – University should design the graduation courses in collaboration with industry and government as per their requirements. It is important to incorporate the entrepreneurial knowledge and skills in the traditional courses to develop entrepreneurship among student community.

All above mentioned entrepreneurial options have different level of proximity to entrepreneurship and academic scale. The activities which are close to entrepreneurship are called hard activities and those which are close to academics are called soft activities. Based on this categorizations hard activities such as patenting, licensing and spin-off venture formation are generally perceived to be the more substantial outputs of mature entrepreneurial universities (Klofsten & Jones-Evans, 2000, Rasmussen et al., 2006). Hard activities are supposed to be more entrepreneurial in nature as they not in line with the traditional academic's role (Louis et al., 1989). The softer activities; such as academic publishing, research funding, grants, contract research, publications, conferences etc. are more in line with traditional academic culture (Klofsten and Jones-Evans, 2000; Louis et al., 1989) and in some cases it may not be supposed as entrepreneurial activities by the academicians.

Though technology commercialization and spin-off venture formation seems more entrepreneurial compare to all other options, each option have its own marketability and profitability like any of the enterprise's products and services. Most of the European and US universities have augmented efforts on the commercialization of research and measurement of patents, licenses, research collaborations, joint ventures and spin-off venture (Lockett et al.2005).

There could be a bias in categorizations of soft and hard activities among academicians and entrepreneurial universities, but all above mentioned initiatives have fund raising capabilities like any of the entrepreneurial/business activity. Hence universities may design its own mix of entrepreneurial activities eventually leading to economic and social development of nations, like any of the business venture.

3. Understanding Barriers for Entrepreneurship Developments, Entrepreneurial Qualities and Entrepreneurial Motivations

Barriers for entrepreneurship developments – Barriers for entrepreneurship developments could be at university

level as well as at student level. It's necessary to study theses both types of barriers to promote entrepreneurial culture.

University is comparatively large organization with so many operational complexities and doesn't have entrepreneurship as core function. Being large organization for academic purpose it might have some inherent characteristics acting as barriers, as detailed below (Kirby 2006) –

- Rigid and complex organizational structure having many levels of approvals.
- The impersonal nature of relationships.
- Many controls, rules & regulations, protocols and adherence with standard procedures.
- Bureaucracy, red-tapeism, corruption and lengthy formalities.
- Absence of corporate culture.
- Lack of entrepreneurial culture and talent.
- Inappropriate compensation plans.

At student level, following could be the barriers (Klapper et al., 2004, Suhir & Kovach 2003, Holt 2006, Desai 2007, Liao & Sohmen 2001, Krasniqi 2007) to accept entrepreneurship as career option –

- Bad experience of others in a business and fear of failure.
- Difficulty in coping with risk involved in business.
- Ease and comfort in salaried job may avoid to start own venture.
- Economic problems to start a business.
- Family resistance to start a business.
- Family Responsibilities to earn constant source of income.
- Inability to bear mental pressure of business.
- Lack of information about business operations.
- No risk taking ability.
- Owns previous bad experience about a business.
- To earn social status by getting good salaried job.
- Culture, Caste, Tradition etc.
- Bureaucracy, red-tapeism, corruption and lengthy procedures and tax structure.

There could be many more other barriers at student and university level which are not listed above. The variability of barriers is uncontrollable but it is necessary to understand them to cultivate entrepreneurial culture. The impression about the university is, as an academic organization having intellectual integrity, critical inquiry and commitment to learning and understanding (Williams 2002) and if it starts being entrepreneurial, this may drive away its attention from core academics. Most of the academicians views research and teaching as primary duties instead of being entrepreneurial. There is also fear of conflict of interest in academics and entrepreneurship, a negative impact on institution's research performance if the leading academics started involving in entrepreneurial activity (Kirby 2006, Etzkowitz 2003). But this fear is proved unreal by many universities by becoming more entrepreneurial along with strong research outputs e.g.

- University of Surrey, Stanford, MIT, University of California, Columbia, Cambridge, Chalmers and K.U. Leuven, Twente etc. (O'Shea et al. 2007, Clark 1998, Debackere, 2000, Kirby 2006, Philpott 2011)

Entrepreneurial qualities – There could be again N-number of entrepreneurial characteristics and qualities (Gürol & Atsan 2006, Gibb & Hannon 2005, Isobel van der Kuip & Verheul 2003, Herron & Robinson 1993, Cromie & Johns 1983, Chell 1985) one needs to have, to become successful entrepreneur, some of them are mentioned below which could be required to become an entrepreneur -

- Creativity and innovativeness – to develop different products and services giving more value to the customers, compares to existing products in the market.
- Dignity for labor – to respect team members and colleagues working together.
- Flexibility – to accommodate change whenever necessary.
- High self esteem – to respect own work.
- Initiative taking ability – to grab opportunity before others.
- Knowledge for commercial and legal aspect of business
- Need for achievement – to be achievement oriented.
- Need for influencing other – to lead the team and business.
- Need for power – to control the team and business operations.
- Optimism – to face the failures.
- Problem solving attitude – to develop the innovative solutions.
- Risk taking ability – to bear the calculated business risk.
- Strong willpower – to withstand the pressure.
- Time management – to achieve the deadlines, to reach the market at right time.

Entrepreneurial Motivations – There could be lots of motivation for university and researchers to act entrepreneurial, some of the motivations are mentioned below (D'Este & Perkmann 2011, Gibb & Hannon 2005, Gibb & Hannon 2005) -

Motivations for researchers in the entrepreneurial university –

- Global exposure and reorganization.
- Research grants from industry and government.
- Encouraging Feedback from industry about the research work and its application in real life.
- Enthusiasm about industry problem and learning from it.
- Expertise and advance Information on specific industry.
- Access to industrial equipments and materials.
- Becoming part of a network
- Access to research expertise.
- Source of personal income.
- Seeking IPR and licensing
- Commercialization and spin-off ventures
- Number of joint publications and collaborations.

- Previous experience or association with same or similar line of business activity.
- Favorable government policies and schemes.
- More career advancement.
- To implement own business idea.
- To utilize better opportunity in the market.
- Seeking challenge.

Motivations for entrepreneurial university could be (D'Este & Perkmann 2011, Gibb & Hannon 2005, O'Shea et al. 2007) –

- Revenue from patents and licensing.
- International exposure and funding.
- Commercialization of research outputs and starting spin-off ventures.
- Number of IPR, licensing, Publications and collaborations with industry.
- Global exposure and reorganization.
- Research grants from industry and government.
- Encouraging Feedback from industry about the research work and its application in real life.
- Learning opportunity.
- Expertise and advance Information on specific industry.
- Access to industrial equipments and materials.
- Becoming part of a global research network.

4. Additional Boost up to Push Entrepreneurial Universities

The very prime push to create entrepreneurial university is the funding initiatives, should be taken by government and industries. Funding can be utilize for following activities -

- Innovation in higher education intended to connect industries, form partnership and collaborations to develop innovation centers. These kinds of centers will be undertaking various innovative researches having real life application.
- Science and engineering students should be given teaching and training in entrepreneurship.
- Also other academic faculties/streams should be oriented towards entrepreneurship.
- Various funding (Venture capitalist) agencies should be connected with university staff to make seed funds available. This will be helpful to transform good research into viable business.

The availability of funding and its equal distribution constantly is big challenge. It might be possible that the funding benefits would not be passing to all universities having intention to become entrepreneurial. These universities need to learn how to promote entrepreneurial behavior (Ajzen 1991)? Individuals will activate their entrepreneurial potential when they realize they have the capabilities, environmental possibilities and social support. A favorable attitude to entrepreneurship need be created by universities and society (all the people around). It will develop the confidence among researchers and academicians

that they have the entrepreneurial ability and this could be very rewarding to them. Universities must have business and entrepreneurship as strategic goal. To achieve those goals universities should develop the programmes to equip students and staff on commercialization of their intellectual property through spin-off startups (Brooksbank & Thomas 2001). Policies should be developed to protect the ownership of IPR and appropriate rewards (Both Monetary and Nonmonetary). Along with this following measures could be helpful to promote entrepreneurial universities –

- Serious participation and support from management and governors of university.
- The development of an Intrapreneurial culture.
- Reward and recognition for innovative work (Intrapreneurial activities).
- Promote interdisciplinary research.
- Reduce the risk of failure.

5. Case – Entrepreneurial University

Stanford University (Source <http://facts.stanford.edu/research.html>) -

Stanford University uses appropriate blend of teaching and research to be more entrepreneurial. Scholarly research activities are carried out jointly by faculty members in association with graduate students or advanced undergraduates. The multidisciplinary research within its independent laboratories centers and institutes and among departments in its seven schools is the key factor of success. Stanford is having almost 2000 postdoctoral research scholars.

The university had 5,100 externally sponsored projects with the total budget of \$1.27 billion for the year 2013-14. Out of these projects the federal government sponsors approximately 84 percent including SLAC National Accelerator Laboratory (SLAC). In addition to this non-federal funding is of \$193 million.

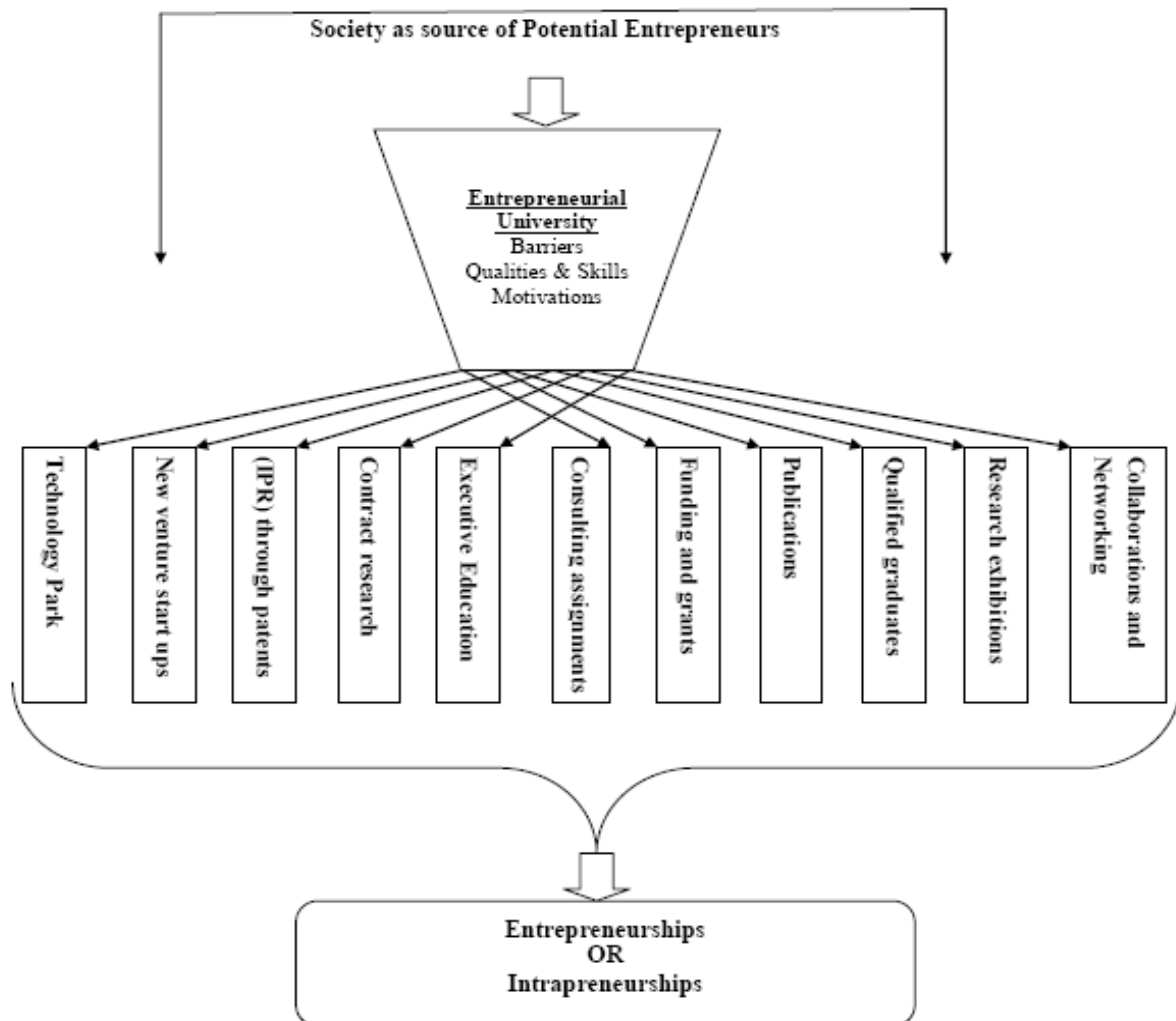


Figure 1. The Roles of Entrepreneurial University

Research Centers and Institutes – SLAC National Accelerator Center – it is a ‘National Accelerator Laboratory’ of U.S. Department of Energy national laboratory operated by Stanford. SLAC carryout researches in the field of materials and energy science, biology, chemistry, particle physics, astrophysics, cosmology, advanced accelerator development and other fields. This facility is used by almost 3,400 scientists worldwide every year and more than 1,000 scientific papers are published yearly through the researches at SLAC, which has earned Nobel prizes for six scientists.

Independent Laboratories, Centers and Institutes – There are various Independent Laboratories, Centers and Institutes in the area of Physical Sciences, Environmental Sciences, Humanities and Social Sciences, Biological and Life Sciences etc.

Hoover Institution on War, Revolution and Peace – To study of domestic and international affairs. It is one of the largest archives and libraries in the world on political, economic and social change. The first “think tanks” in the United States, having more than 100 resident scholars/specialists.

There are many Other Special Stanford Research Facilities available.

Stanford Inventions – Stanford’s Office of Technology Licensing (OTL) – This office is devoted to bring technology created at Stanford to market place. During the year 2011–12, Stanford received more than \$76.7 million in gross royalty revenue from 660 technologies. Thirty-six of the inventions generated \$100,000 or more in royalties. Five inventions generated \$1 million or more. In 2011–12, OTL concluded 115 new licenses.

Among the Inventions Licensed by OTL – The list includes Antibody therapies, Digital music, Disease management, Diagnosing infections, DSL, Glowing mice, Google, Optical fiber amplifier, Recombinant DNA, Refocus Photography etc.

Stanford’s entrepreneurial spirit - The result of its California location and the legacy of Leland and Jane Stanford. A study during 2012, estimated that companies formed by Stanford entrepreneurs generate world revenues of \$2.7 trillion annually and have created 5.4 million jobs since the 1930s. the Stanford alumni and faculty have created 39,900 companies since the 1930s, which, if gathered collectively into an independent nation, it would constitute the world’s 10th largest economy. Stanford developed high-technology region known as Silicon Valley through university-industry partnerships promoting high tech companies

Some of the world famous companies helped create by Stanford faculty and alumnus – eBay, Nike, NVIDIA, Orbitz, Google, IDEO, Kiva, Linked In, Logitech, Yahoo!, Cisco Systems, Dolby Laboratories etc. the list is not exhaustive and there are many more companies.

6. Conclusions

Students, academicians, industries (potential entrepreneurs) and government can get associated with entrepreneurial university to undertake various entrepreneurial activities. There can be various entrepreneurial options available with the university. All potential entrepreneurs might not be suitable to all the available entrepreneurial options. The matching of individual to each of the entrepreneurial option may be depends on the type of perceived barriers, qualities & skill sets possessed and personal motivation to particular work. Hence the universities job should be to find out appropriate match of the individual and available entrepreneurial option.

Thus university should identify the barriers having or faced by potential entrepreneurs and should take actions to nullify its effects. Also university should design entrepreneurial programme (awareness & knowledge) to develop desired qualities and skill sets require for becoming entrepreneur or intrapreneur. This way university can motivate the potential entrepreneurs to choose any of the best suitable entrepreneurial option, after recognizing all barriers, qualities and skill sets of entrepreneurship.

7. Limitations and Further Research

Through this paper a conceptual model is proposed by considering various available researches. A practical application of this theoretical concept can be tested in various country specific environments as a part of further research.

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