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University Incubators: A Gateway to an Entrepreneurial Society

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Abstract
The paper argues that universities would enhance their participation through an effective and well-integrated incubation system for the development of sustainable entrepreneurial society. This study reviews the shifting trend of universities in society from teaching to research and development, innovation, entrepreneurship, and recently to facilitate an entrepreneurial society by promoting entrepreneurial culture and institutional development. It is categorically accepted by researchers that the 21st century will rely on knowledge, innovation, entrepreneurship, and business incubators. However, universities are lacking to contribute with full strength in research commercialization, entrepreneurship and economic growth. In this study, the strengths and weaknesses of university incubators are highlighted to enhance their efficacy for a better economic output. University incubators provide a facilitative environment for revenue generation by ensuring a cloud with financial, legal and technical support for a win-win interaction between universities, business tycoons, government and community. The ideas of human capital, knowledge and, research and development have evolved the economies towards knowledge based economies by having creativity, innovation, knowledge transfer, information access and supportive infrastructure. In an entrepreneurial society, universities move one step ahead by structuring the mechanisms to facilitate entrepreneurial culture and, creating institutes and leaders. Finally, the study presents some future directions for university incubators with policy recommendations.
Keywords: University incubator; Entrepreneurial society; Knowledge transfer; University industry linkages; Commercialization; Entrepreneurship; Spinoffs; Institutional Development.

1. Introduction

Global and dynamic competitiveness, eminence of human capital, high standards of quality research, creativity, innovation and entrepreneurship with cost and productivity efficiency have emerged as the revitalization of the higher education system (Mok, 2005). In a recent study, Olivares and Wetzel (2014) analyze the universities' efficiency with relevant to economies of scale and scope, it is observed that globalization and competitive environment has induced the public institutes of higher education to utilize their resources more efficiently by expanding their operations and activities to broader fields.

The universities' role has evolved over time. One aspect of this transformation is the social oriented perspective in which; teaching for all, education as a public good and every individual has a social right to access education are foresight (Vryonides and Lamprianou, 2013). Later on a second phase arrived; the promotion of research culture becomes the direction of education hub by focusing on research oriented institutes for enhancing the research and development (Casu and Thanassoulis, 2006; Worthington and Lee, 2005).

However, in recent facet universities have also moved away from basic research as a public good towards a profit generating organizations having targeted customers with the sales price of products (Audretsch, 2014). The initiative to walk from a non-profit based organization towards a revenue generating machine has induced the competitiveness among the universities. In order to increase the sale price of the product, now universities have to be conscious about the product quality with continuous improvement mechanism. The competitive environment, profit maximization, quality education and research, linkages with industries and making entrepreneurs instead of job seekers have changed the meaning of the universities as a whole (Gul and Ahmad, 2012). Industries and business communities are now the target of universities to help them in addressing their problems by providing feasible solutions. In order to transfer knowledge to industries, fostering innovation and entrepreneurship; universities have taken several initiatives including establishing university incubators (Amezcua, 2010).

While establishing incubators, universities require less financing, infrastructure and technical capabilities as compared to other knowledge transfer mechanisms such as science and technology parks. The

purpose of this reviewed study is to examine the changing trend of universities over time, understanding the entrepreneurial university and the role of knowledge transfer mechanism i.e. university incubators in encouraging an entrepreneurial society for socio economic growth. Audretsch (2014) also appraises the changing role of universities towards a more facilitative and entrepreneurial capital to thrive an entrepreneurial society.

2. Role of Universities in Knowledge Creation, Research and Development, and Economic Growth

Knowledge always remains an attractive area to explore for researchers with an extensive background. Marshall (1920) describes knowledge as a productivity enhancer whereas the transfer of knowledge is esteemed as incentives for competitiveness and resource acquisition for firms by working in close interaction. Nonetheless, knowledge produced does not becomes viable for economic development until transferred to firms with significant effort and cost (Arrow, 1962). Besides earlier studies, evolution of endogenous growth theory (EGT) captures the researchers' attention towards knowledge as economic growth. EGT support knowledge and human capital as a crucial production element due to its consideration of endogenous behavior. Economist (Lucas, 1988; Romer, 1986, 1990, 1994) introduced EGT in mid 1980s to argument the exogenous theory or neoclassical theory. EGT also support higher education and universities to enhance financial support for research and development (R&D) and human capital.

Earlier, universities' status was to produce knowledge. However, scholars agreed to support the interaction and collaboration of universities with industry to share knowledge for sustainable competitive goals (Bruneel, D'Este, and Salter, 2010; Hashmi and Shah, 2013; Wu, 2010). Many researchers have studies the relationship between knowledge and economic growth to convince the policy makers of the economies for opening budget pocket towards this dominant and crucial sector. A positive interaction is found between knowledge and economic development in developing countries by applying different methodologies (Afzal, Rehman, Farooq, and Sarwar, 2011; Jalil and Idrees, 2013; Kimenyi, 2011; Mercan and Sezer, 2014). They also suggest to improve the funding specially for the higher education sector to have significant improvements in economic growth.

History reveals Bologna University as the first ever university of the world, where a fee was charged to teach the Roman law. Hence, in early times demand for education has made it precious item. Earlier, the aim of higher education institutes was to maximize the student enrolment while ensuring equitable access (Berger and Kostal, 2002). The idea behind the equitable access was further extended by incorporating quality and standards of teaching, still it depends on its performance measurement (Jalaliyoon and Taherdoost, 2012).

Higher education institutes also perform the functions of R&D. R&D culture is the essence of higher education to get the fruits of economic and social trees. R&D as a chapter of economic growth also recognized by EGT and Knowledge based economy concept. Although developed countries are the main beneficiaries of R&D activities, developing countries are also in the journey though in a slow pace. For knowledge based economy, several indicators; including R&D, innovation and skilled human capital are essential (Raspe and Van Oort, 2006). The measurement of R&D status depends on publications, patents and licensing (Ahmad, 2012; Cavaller, 2011) and, citation and R&D expenditure (Abramo, Cicero, and D'Angelo, 2012; Akhmat et al., 2014). Yet, scholars still demands to proliferate the R&D level by focusing on knowledge creation and diffusion to society.

The diversion from basic research to innovative research is become fame recently. Creativity, new product or process to improve the quality and production by reducing the transaction cost is innovation. In order to participate in economic growth vigorously and vibrantly, the higher education sector also requires innovation. An innovation model comprises of innovative fundamentals is also presented to strengthen and upgrade HEIs and research universities by Kowang et al. (2013).

3. University and Entrepreneurial Development

According to EGT pioneer (Romer, 1986, 1994); human capital skills, innovation and knowledge are increasing marginal returns having different status in different countries due to technological change irrespective to the capital and labor perceived as the main economic pillars by Solow (1956).

The argument that firms have to compete for survival has challenged the EGT assumption of knowledge as the non-depreciable article (Acs et al., 2003). EGT another assumption that knowledge transfer bears no cost and generates by itself has also been well debated by researchers and evidence that geographical, financial and legislation are constraints one have to face while transferring knowledge (Canepa and Stoneman, 2005; Cohen et al., 2002; Singh and Marx, 2013). Acs et al. (2003) also confronted the EGT assumption that knowledge is a collective distribution to all by suggesting with a certain space for entrepreneurs.

In 1980s, a legislation regarding the knowledge transfer as a commercial commodity disapproves the idea of restrict less knowledge transfer (Grimaldi, Kenney, Siegel, and Wright, 2011). Bayh Dole Act brought significant changes by contributing in strengthening the commercialization activities and reducing the knowledge gap or filter (Audretsch, 2014).

The term 'knowledge filter' is used by researchers to highlight the gap between knowledge and economic knowledge being faced due to several constraints (Acs et al., 2003; Audretsch, 2014). According to Acs & Plummer (2005), knowledge filter creates hurdle for R&D activities and further its commercialization to society as ultimate beneficiaries. Another EGT supposition that R&D will itself transform without any further activities is counter down by the existence of knowledge filter (Audretsch, 2014). However universities are demanded to be more entrepreneurial by establishing long term facilitative relations with industry for the success of university commercialization.

EGT though supportive for knowledge as economic trigger, lacks to clarify and identify the knowledge transfer mechanisms. Entrepreneurship reduces the knowledge filter and creating the link between knowledge and economic knowledge (Braunerhjelm, Acs, Audretsch, and Carlsson, 2010; Qian and Acs, 2013). However, the notion 'entrepreneurial universities' has been introduced by Etzkowitz (1983) to elaborate the changing role of universities over the time and especially towards the vibrant transfer of the university research. Another famous phrase 'magic beanstalk vision' by Miner, Vaughn, Eesley and Rura, (2001) has induced the universities to involve in extensive entrepreneurial activities for industrial development.

In relation to above, universities role has been dramatically changed from teaching and research to a third mission i.e. knowledge transfer to society by linkages with industry. University becomes a revenue generation instrument and hence amended its mission from a non-profit entity towards a profitable unit. Bercovitz and Feldmann (2006) presented the economic, social and legal aspect for technology transfer mechanisms to promote an entrepreneurial university. According to Geuna and Muscio (2009), entrepreneurial development although contributes in economic development also becomes a source of revenue generation for university through university industry collaboration. Similarly in a developing country such as Pakistan, Gul and Ahmad (2012) reviewed the university industry collaboration as a dominant means of university strengthening.

While focusing on university industry collaboration, universities become an entrepreneurial development machine by initiating innovative idea, supporting and facilitating that idea to become reality and finally introducing the new ventures into the market. Thune and Gulbrandsen (2014) analyzed the dynamics of university industry amalgamation and explain how the relationship evolved over the period. In a recent conceptual study, Audretsch (2014) exemplify the idea of entrepreneurial university as to create new ventures, commercialize it to new markets and promote the knowledge transfer from university to revenue generation organizations and non-for profit units.

4. University Incubators

(National Business Incubation Association, 2014b) defines incubation as a mechanism to support entrepreneurs with the provision of resources and services that helps in creating new ventures. Incubators are also found as a resource for new entrepreneurs to address their crucial problems (Chen, 2009; Grimaldi and Grandi, 2005). Shahzad, Ali, Bajwa, and Zia, (2012) also analyzed incubators as vital for viable entrepreneurial growth.

Incubators deliver assistance to new entrepreneurs in several ways. Al-mubaraki and Busler (2010) describe the services and functions of incubators such as shared space with technical equipments, managerial support, networking, access to knowledge and financial capital, encouraging entrepreneurs through initial funding support. In addition, incubators also support in screening and selection program of incubates (Dee, Livesey, Gill, and Minshall, 2011), patenting and IP protection (Chandra, Alejandra, and Silva, 2012), establishing university industry linkages (Colombo, Piva, and Rentocchini, 2012; Schwartz and Hornych, 2010; Tang, Baskaran, Pancholi, and Lu, 2013), risk tolerance during entrepreneur's earlier stage (Özdemir and Şehitoğlu, 2013), an intermediary to rationalize transaction cost (Tang et al., 2013) and; networking and access to national and international markets (Chandra et al., 2012).

History reveals that the first ever incubator in the world is known as Batavia Industrial Center, New York at USA started operation in 1959 (Lewis, 2002). Until 1970s, the formation of new ventures falls in less priority list. In 1980s, only 12 incubators were in operation while the figure rise to 1,250 by 2012 only in USA and overall reaches beyond the mark of 7000 (National Business Incubation Association, 2014a). Hence, incubators become a growing phenomenon around the world.

Incubators can mainly be classified into two major categories; profit and non-profit incubators (Allen and McCluskey, 1990). Academic environment and other research institutes are considered as major contributors towards not for profit business incubators (Phillips, 2002). As mostly incubators in all countries, Chandra et al. (2012) identified non-profit incubators mainly funded by state with rental income from incubates as most of the incubators around the world.

Universities are a key player of economic team to win the match of growth through their active participation in managing incubators, research and development, innovation, commercialization and formation of entrepreneurs in both developed and developing countries (Miner et al., 2001). However, University incubators are entities adopted by states to promote the ecosystem by supporting spinoffs and, small and medium enterprises during the development and growth stage (Studdard, 2006). University incubators are considered as a

doable strategy for the development of new business ventures by provisioning the resources and ensuring feasible environment (Mian, 1996). Similarly, Palumbo and Dominici (2013) define university incubators as a university sponsored incubation system with space provision within the university and behaves to promote the development of university spinoffs.

Chandra et al. (2012) added in university incubators study that university backed incubators have strong historical perspective with the provision of location, human expertise, funding source, fostering innovation and commercialization while involvement of industry incubators is deficient. In another study, Somsuk, Laosirihongthong and McLean (2012) classified the requisite resources for university incubators to promote entrepreneurs in four main categories such as human, financial, organizational and technological resources. Similarly, Salem (2014) endorsed university incubators as the most influential type of incubators among all and student entrepreneurs are taking advantage from university incubators to create links with industry for establishing their own businesses.

Several dimensions providing the pillars and seems as successful factors of university incubators identified by researchers (Bøllingtoft & Ulhøi, 2005; Bruneel, Ratinho, Clarysse, & Groen, 2012; Culkin, 2013; Grimaldi & Grandi, 2005; Gstraunthaler, 2010; Lee & Osteryoung, 2004; McAdam & Marlow, 2011; Ratinho & Henriques, 2010; Somsuk, Laosirihongthong, et al., 2012; Todorovic & Suntornpithug, 2008) are mainly infrastructure, networking, human and technical support, faculty and staff, and institutional reputation.

5. Role of University Incubators in building Entrepreneurial Society

Many of the incubators around the world are backed by universities. The remainings are also taking initiatives to amalgamate with universities and higher education institutes to attain the benefits from their research and knowledge. Recently university incubators become a growing trend in the development of incubators (Todorovic and Suntornpithug, 2008) while (Culkin, 2013) found university incubators as more supportive for entrepreneurs than other type of incubator schemes.

Innovation, commercialization and entrepreneurship in society foster the economic development through significant contributions of incubators. Incubators have been acknowledged as a promotional instrument for an economic uplift (Al-mubaraki and Busler, 2010; Somsuk, Wonglimpiyarat, and Laosirihongthong, 2012), job creation (Abetti, 2004; Al-mubaraki and Busler, 2010; Ratinho and Henriques, 2010), establishing new entrepreneurs (Abetti, 2004; Bruneel, Ratinho, Clarysse, and Groen, 2012; Chen, 2009; Tang et al., 2013), enhance the entrepreneur's performance (Dee et al., 2011) and commercialization (Al-mubaraki and Busler, 2010; Chandra et al., 2012; Tamásy, 2007) both in developed and developing countries.

Similarly, university incubators are also analyzed as an instrument to promote commercialization by establishing spinoffs (Lee and Osteryoung, 2004; Mian, 1996; Palumbo and Dominici, 2013). Chindaprasert and Puapatanakul (2006) elaborate university incubators as a mechanism to promote research intensity, innovative ideas, commercialization activities and developing entrepreneurs. Somsuk et al. (2012) describe incubators as a mechanism to promote entrepreneurial culture for establishment of spinoffs to upgrade the survival ratio. Chandra et al. (2012) extended that university backed incubators have sound background in facilitating human expertise, funding source, location, innovation and commercialization enhancement whereas involvement of industry incubators is deficient.

Additionally, OECD (2010) encouraged the incubator owners to engage with universities to promote the commercialization for the optimum benefit of the society. Recently university incubators become a growing trend in the development of incubators (Todorovic and Suntornpithug, 2008) and also found as more supportive for entrepreneurs than other type of incubator schemes (Culkin, 2013). However, the role of university incubators is not restricted to provide services to newly established firms rather to perform with facilitative attitude towards leadership and institutional development through fostering entrepreneurial thinking and culture. Al-mubaraki, Busler, and Aruna (2013) has evidenced that incubators have shown similarities in enhancing the community's entrepreneurial environment. However, few researchers argued that incubators are not functionalizing at their utmost capacity to achieve their ultimate goal. Phillips (2002) pointed that incubators tendency as an objective of commercialization have not been fully materialized in US and demands to investigate the incubator's efficiency excel in knowledge transfer to society.

However in entrepreneurial society, universities would not only depend on educating students, promoting research or even transferring knowledge through patents, research contracts, licenses, and spinoffs rather build the mechanisms to facilitate innovation, entrepreneurial culture, developing institutes and entrepreneurial leaders, and ensure the upgraded living standard of people (Audretsch, 2014). University incubators would also help and facilitate to achieve the idea of entrepreneurial society by implement and functionalize it in a true spirit with a strong leadership commitment.

6. Conclusion

Several economies are facing several challenges such as financial and human constraints, are now also trying to

divert towards this phenomenon to promote economic growth and become knowledge based economy through entrepreneurial universities. It has been categorically accepted that the 21st century will rely on knowledge, innovation, entrepreneurship, and incubators (Al-mubaraki and Busler, 2013). Many economies are struggling to cope up with innovation, entrepreneurial environment and lack of incubators particularly through the university forum. Tang et al. (2013) during a study recommended university industry linkages as the way to promote entrepreneurship. However, the university incubator is a platform facilitating the university industry linkages. The establishment of strong, reliable and trustworthy association of university, industry, government and community becomes pre-requisite for the economic, social as well as financial development of a country. The advertisement and promotion of quadratic helix approach is necessary for uplifting the entrepreneurial environment through the station of university incubators. Hence, the overall higher education system demands extension and stability especially development and expansion of incubators to promote the strategic plans of innovation, creativity, globalization, commercialization and entrepreneurship. Moreover, the efficacy of existing incubators also needs to be amplified.

While focusing on the promotion of entrepreneurial development, the role of university incubators would not be overlooked. University incubators need to be emphasized by policy makers by inducing financial and legislative support along with providing incentives to private community for their active participation. In a competitive global environment, university incubator as a mechanism of knowledge transfer to industry, research commercialization and national innovation policy has become a requisite in an entrepreneurial society. The economies of both developed and developing countries while making policy frameworks, preparing annual development plans and financial budgets should consider establishing and upgrading the university incubators for a prosperous, stable and enduring entrepreneurial society and economic growth. Moreover, researchers and scholars should also focus on further analyzing the university incubators especially for the promotion of innovation, commercialization and entrepreneurial society. The empirical investigation of the contribution of university incubators in research commercialization especially in developing economies context needs to be further analyzed. Besides, the universities and economies have to face several constraints to implement the phenomena of university incubators and how it can be sustained with continuous efficiency over the long term are also required to be critically examined by scholars. To analyze the resource based view, institutional development and networking opportunities in reference to university incubators would also help to enhance the incubator's performance level.

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