A Review of Commercialization Tools: University Incubators and Technology Parks

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ABSTRACT

In recent years, commercialization has gained significant importance due to its active participation in knowledge transfer, economic growth, job creation and entrepreneurship. Whereas the role of university incubators and technology parks to excel commercialization has also much evidence. This study reviews the roles, practices, functions, factors and dimensions of the commercialization, university incubators and technology parks. During review, it come to surface that property development, networking with local and international markets, research and development, proximity to university, firm’s clustering, provision of advanced equipments, managerial support, faculty and students, and institutional reputation are the most important elements of university incubators and technology parks to promote commercialization. However, various challenges such as lack of human expertise and insufficient financial capital are still exists which requires to be further studied to upraise the commercialization efficacy.

Keywords: Commercialization, University Incubators, Technology Parks, Knowledge Transfer, Entrepreneurship

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1. INTRODUCTION

Recently, a rapid increase in establishment of incubators, technology parks and other property initiatives have become a source of revenue generation by most of the universities. Link and Siegel (2005) experienced this change in US and Europe. Many countries have supported these institutions as tool to commercialization in various ways; policies, funding and legislation. The motivation to review the university incubators and technology parks is their contribution in knowledge-based economies. Universities have taken several initiatives including excel in R and D investment to promote commercialization (Huggins and Kitagawa, 2012). However, the role of intermediary to facilitate the knowledge transfer is much desired. Recently, Costantini and Liberati (2014) also emphasized the importance of the identification of knowledge transfer approach.

In view of the above, Munkongsujarit (2013) analyzed technology parks and incubators as potential intermediaries between universities and industries to excel commercialization. Hence, the existence of several stakeholders such as government, university and industry to achieve the strategic goal of developing technology parks and incubators is essential (Sanni et al., 2010). Grimaldi and Grandi (2005); Audretsch (2014) supported the presence of university to promote the commercialization by having some knowledge transfer mechanism. Many of the researches tells the role, functioning, implications and contributions of technology parks and university incubators (Abetti, 2004; Bergek and Norrman, 2008; Chandra et al., 2012; Dahlstrand and Politis, 2013; Link and Scott, 2007; Link and Scott, 2006; Lundqvist, 2014; Phan et al., 2005; Sofouli and Vonortas, 2007; Squicciarini, 2008; Tamásy, 2007; Wonglimpiyarat, 2010).

However, the capabilities of universities are not fully capitalized and show less output in commercializing their products and services (Huggins, 2008a). Mueller (2005) brief the reasons of inefficiency in the commercialization process as; current
knowledge not being fully commercialized, universities and higher education institutions are not commercializing their research and knowledge at the utmost level and existing entrepreneurs also not willing to share new knowledge whereby suggests to involve intermediary channels to foster the knowledge transfer scheme.

2. COMMERCIALIZATION

Commercialization is a mechanism to transform the knowledge into products, services and institutes by having competitive advantage to achieve the regional economic growth (Mueller, 2005). Meanwhile, Audretsch et al. (2006) analyzed universities as the backbone of knowledge based economy. According to Bramwell and Wolfe (2008); Breznitz and Feldman (2010), commercialization got more popularity in its participation in economic growth through university platform. University has evolved as an “entrepreneurial university” to support commercialization of research and knowledge for a sustainable and progressive ecosystem (Audretsch, 2014). Whereas He further explained entrepreneurial university as a university focusing on establishment of new enterprises, promote entrepreneurial environment and commercialization to transfer knowledge from academicians to society. Moreover, Siegel et al. (2003) monitored sharp rise in university commercialization to businesses. Thus, commercialization and knowledge transfer to society becomes the third mission of universities apart from two previous of teaching and research (Baycan and Stough, 2012).

The success of commercialization depends on the involvement of multidimensional parties having different missions and objectives such as government, academicians, business and community (Markman et al., 2008). Hence, the commercialization has various implementations for academicians, industry, government, students and researchers. The major changes in commercialization framework brought by Bayh-Dole Act through legislative reforms (Ibata-Arens, 2008).

Siegel et al. (2003) explain a well integrated and complete process of commercialization. Accordign to Siegel et al. (2003), commercialization depends on research and development to take initiative and followed by disclosure, evaluation feedback, faculty input and patents, if required. After the patenting, marketing channels are located for licensing and spinoffs. Finally, products or services are commercialized that contribute in wealth generation.

Researches have identified various commercialization channels and measurements (Audretsch et al., 2006; Carlsson et al., 2007; Faria and Barbosa, 2014; Grimm and Jaenicke, 2012; Guerrero et al., 2014; Markman et al., 2008; Perkmann et al., 2013; Swamidass, 2013). These can mainly be classified into patents, licensing, research contracts and formation of new businesses.

3. UNIVERSITY INCUBATORS

Since the inception of first incubator on earth, Batavia at USA, incubators were not much popular till 1970s. However, a rapid increase in incubators happened after 1980s and cross the figure of 7000 incubators around the world (National Business Incubation Association, 2014a).

Incubators are seem as a mechanism to support and establish new businesses by providing resources and facilities (Chen, 2009; Grimaldi and Grandi, 2005; National Business Incubation Association, 2014b). Meanwhile, incubators deliver assistance to new entrepreneurs in several ways. The main services discussed by several scholars (Al-Mubaraki and Busler, 2010; Chandra et al., 2012; Colombo et al., 2012; Özdemir and Şehitoğlu, 2013; Schwartz and Hornych, 2010; Tang et al., 2013) are provision of shared space, advanced equipments, managerial support, networking and access to national and international markets, patenting and IP protection. An intermediary to rationalize transaction cost, establishing university industry linkages, access to knowledge and financial capital, encouraging entrepreneurship and support in screening and selection program of incubates.

There are mainly two types of incubators (Allen and McCluskey, 1990). One is for profit incubators, mostly operated by private sector. The second one is non-profit incubators; mainly funded by government with support from rental income (Chandra et al., 2012). Non-profit incubators are mostly academic based initiatives (Phillips, 2002).

The universities are at central position in economic growth of a country by playing an active role in research and development, innovation, incubators and technology park, and commercialization (Miner et al., 2001). Henceforth, many economies have established university incubators to promote the ecosystem and new ventures (Studdard, 2006). However, Palumbo and Dominici (2013) define university incubators simply as a university supported incubation system with shared space at campus and facilitate in formation of university spinoffs. University incubators have a successful history in provision of location, human and financial capital, innovation and commercialization (Chandra et al., 2012; Somsuk et al., 2012). Moreover, university incubators are also considered as the most powerful incubators (Salem, 2014). Several dimensions providing the pillars and seems as successful factors of university incubators are identified by researchers (Bollingtoft and Ulhøi, 2005; Bruneel et al., 2012; Culkin, 2013; Grimaldi and Grandi, 2005; Gstraunthaler, 2010; Lee and Osteryoung, 2004; McAdam and Marlow, 2011; Ratinho and Henriques, 2010; Somsuk et al., 2012; Todorovic and Sunthornpithug, 2008) are infrastructure, networking, human and technical support, faculty and institutional reputation.

Researchers have witnessed that commercialization is accelerated and influenced by incubators (Al-Mubaraki and Busler, 2010; Chandra et al., 2012; Tamásy, 2007) in the shape of spinoffs (Lee and Osteryoung, 2004; Mian, 1996; Palumbo and Dominici, 2013). OECD (2010) also supported the engagement of university and industry to excel commercialization from the platform of incubators. However, Phillips (2002) thinks it differently as not found a strong interaction between commercialization and incubators. He further suggested to examine the incubator’s efficacy in commercialization.
4. TECHNOLOGY PARK

Technology park is defined as an organization works to promote innovation, university industry linkages, developing knowledge institutes, commercialization of products and services, formation of new ventures and other facilities by having managerial, technical and physical capabilities (International Association of Science Parks, 2014). However, different terms have been used in different regions for technology parks. Research Park is more common in USA, Science Park in Europe and Technology Park in Asia (Link and Scott, 2011). According to Phan et al. (2005), the greatness of technology parks rely on the involvement of multiple stakeholders; academicians, government, industry and community. These multiple members contribute in the success of technology parks. Even so, the role of university is critical in technology parks framework (Malairaja and Zawdie, 2008).

History tells Stanford Technology Park, owned by Stanford University, established in 1950s at California, USA as the pioneer (Phan et al., 2005). The Stanford technology park later on becomes a well-known industry cluster called Silicon Valley. Other early days famous technology parks established in 1960s are Cornell business and technology park (Cornell University) and research triangle park (affiliated with Cambell, Duke and other Carolina Research Institutes) (Link and Scott, 2003). However, Silicon Valley acknowledged as role model for all other technology parks whether developed or in developing stage. The concept of technology parks has taken much popularity and spread across the world. There are around 365 technology parks only in Europe, creating jobs for more than 750,000 employees by having heavy investments.

The essence of technology parks identified by several researchers time by time are real estate development, technology park’s location, clustering nature, internationalization and promotion of R and D (Abetti, 2004; Appold, 2004; Durão et al., 2005; Fukugawa, 2006; Henneberry, 1984; Jongwanich et al., 2014; Link and Scott, 2003; Malairaja and Zawdie, 2008; Porter, 1998; Ratinho and Henriques, 2010; Salvador, 2011; Westhead and Batstone, 1999).

Researchers accepted technology parks as a tool to economic development, commercialization and social benefit to society. Abetti (2004); Durão et al. (2005); Sanni et al. (2010) agreed that technology parks take an active part in new ventures formation, creating jobs and economic growth. However, the development of technology parks requires a strong academic business association apart from technology and knowledge management (Wonglimpiyarat, 2010). The relation of technology parks and commercialization has been further illuminated by Link and Scott (2003), technology parks with university association magnify the patenting. Similarly, Huibing and Nengli (2005) also extended that technology parks having university affiliation becomes a source of revenue generation and job creation by commercializing the products and services. In another study, the formation of new ventures is substantial at technology parks in contrast to off parks. Moreover, Link and Scott (2011) also supported technology parks as a tool of commercialization for economic and social goals. However, researches are still lacking consensus on the measures of technology park’s performance (Fikirkoca and Saritas, 2012; Phan et al., 2005) and that empirical studies regarding technology parks are nascent (Link and Scott, 2011).

5. METHODOLOGY

The purpose of this study is to make a direction for analyzing the knowledge transfer from university to society especially through commercialization and its mechanisms such as incubators and technology parks. A systematic approach is adopted to review the previous literature. The purpose of systematic literature review (SLR) is to identify the areas having ambiguity or remained less focused by researchers and to further suggest the future prospects. A total of 197 articles or studies have been identified comprising of 85 articles from only three renowned journals (Technovation, Research Policy, and Journal of Technology Transfer). The answers of following research questions are located during the review; (1) What are the commercialization barriers and how universities can overcome them? (2) How universities collaborate with industry to promote commercialization? (3) What are the practices of incubators and technology parks? (4) How much incubators and technology parks are helpful in promoting commercialization? (5) Where are the missing links in previous studies?

The idea behind using SLR is to select the variables that can contribute in commercialization. The databases used to identify the study are mainly Emerald, ScienceDirect, Web of Science, Taylor and Francis, and Wiley Online Library that have mostly cited publications and consist of high ranked journals across the disciplines. Subsequently, a filter is placed to restrict the publications for a specific period of last 10 years from 2004 to 2014. The journals having more articles relevant to commercialization, incubators and technology parks are Journal of Technology Transfer, Technovation, Research Policy, Journal of Business Venture, Strategic Management Journal, Journal of Small Medium Enterprise, Procedia-Social Behavior Science.

6. RESULTS AND DISCUSSION

The trend of publications relevant to commercialization, incubators at university and technology parks over the last 10 years depicts a positive attitude of researchers. The publications especially in last 5 years show the emergence of commercialization, incubators and technology parks as a dynamic research area. Figure 1 elaborates the same.

Moreover, Figure 2 depicts that the publications are mostly by highly renowned impact factor journals such as Technovation, Research Policy and Journal of Technology Transfer. The publications by these highly ranked journals also reflect the importance of commercialization, university incubators and technology parks in current era and also in forthcoming.

As the objective of the study is to understand the importance of commercialization for local and regional socio economic development, job creation and new business formation; and how
university incubators and technology parks as knowledge transfer mechanisms can contribute to achieve the commercialization output. Moreover, researchers have highlighted the challenges; university incubators and technology parks have to face, are also discussed in this study.

The literature reveals that commercialization is an effective means of knowledge transfer from university to industry and to achieve the economic growth, sustainability, wealth generation, job creation and establishment of new businesses. Whereas, university incubators and technology parks are also used as the successful tools of commercialization and knowledge transfer to society. However, they have to face major challenges and constraints such as lack of human expertise and insufficient financial capital which needs to be addressed.

7. CONCLUSION

Commercialization participates significantly in local and regional economic growth and sustainability tough it has to face several challenges and barriers to achieve this goal. Commercialization would not be able to achieve the destination level until a well-defined mechanism is established. Whereas, technology parks and university incubators are proved by researchers as successful commercialization institutes. Therefore, technology parks and university incubators can be used as a valuable means of commercialization. However, these mechanisms are also struggling to fully support the commercialization due to several barriers. The human and financial constraints are the main hurdle in technology parks and university incubators functioning.

Although most developed economies have abundant supply of financial resources through various pipes, also struggling to tackle this problem. Financial constraints remain the big filter in narrow down the knowledge transfer process (Hsu, 2007; Huggins, 2008b). Additionally, ample financing along with other resources and capabilities is desired to magnify the commercialization output. A compatible financial model suitable for incubators and new business formation is much desired for economic and industrial sustainability. Henceforth, a complete set of funding mechanism oriented to commercialization needs to be explored. Moreover, a financial framework suitable for commercialization tools such as technology parks and university incubators needs to be institutionalized. The participation of various financial hubs should be recognized and triggered to enhance the efficacy of technology parks and university incubators for an expanded research commercialization.

REFERENCES


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