

Technology Based Entrepreneurship: Challenges and Opportunities to enhance a University Spinoff

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ABSTRACT

Technology based entrepreneurship is a key factor to foster economic development in a country. Universities are institutions where knowledge is shared and accumulated, however its mission also comprises serving society with that researches and inventions that arise. University students, especially the ones enrolled on a doctorate program, can be the young innovative force that joins high technology research and development with the creation of new ventures. The aim of this paper is to present the perceptions of the Ph.D students registered on a program created by ITESM in order to foster and promote entrepreneurship, called Doctorate Spinoff Program, in terms of the strengths and challenges they have encountered while following the entrepreneurial path. In addition recommendations to enhance this program are made by the pioneers of this model.

Keywords: Engineering, Entrepreneurship, Spinoff, Technology-Based, Doctorate

El emprendimiento de base tecnológica es un factor clave para el desarrollo de un país. Las universidades son instituciones donde el conocimiento es compartido y acumulado, sin embargo su misión a la vez comprende servir a la sociedad con las investigaciones e invenciones que sean creadas. Los estudiantes universitarios, en especial los que forman parte de un programa doctoral, pueden ser la fuerza joven de innovación que una la investigación tecnológica con el desarrollo mediante la creación de nuevas empresas. El objetivo de este artículo es presentar las percepciones de los estudiantes doctorales inscritos en un programa creado por el ITESM para impulsar y promover el emprendimiento, llamado Programa de Células de Incubación, en términos de las fortalezas y retos que se han encontrado al seguir el camino del emprendimiento. Además de presentar recomendaciones para mejorar el programa según los pioneros participantes en este modelo.

Palabras clave: Ingeniería, Emprendimiento, Spinoff, Basado en Tecnología, Doctorado

Introduction

University students often seek more than just knowledge, either to pursue successfully their “dream job” or to start a new business through entrepreneurial activities. To be able to apply the knowledge learned is possibly one of the main reasons why students enroll in a university. The set of skills needed to transcend on either path are different, but the university education and program focus are key to accomplish those goals. In the scope of this article, only the entrepreneurial path sought by students is acknowledged.

Entrepreneurship has been an ongoing topic due to the benefits that the creation of new ventures provides to a country's economic development and the personal realization that provides to the founder. Mexico, as a developing country, has been concerned with innovation, employment creation and economic growth, and it has been stated that "rapid economic catch-up depends on countries' entrepreneurs being able to absorb and creatively adapt technological knowledge" (Naudé et al., 2011). On this regard, entrepreneurs are a key component to drive successfully the economic development desired transforming the actual factor-driven stage of development of the country characterized as Acz and Szerb (2009) stated by high rates of unemployment and small business, to the innovation-driven stage of development where more than 30% of economic activity is based on innovation in entrepreneurship.

Adding innovations in science and technology, make the creation of ventures even more desirable to university students, who may seek to embark on the entrepreneurial path if the right motivation and skills needed are developed on them. As Schumpeter (1947) observed, an entrepreneur is distinguished from an inventor because an entrepreneur gets things done. Getting things done requires a special, rather than a specialist, set of skills, distinguished by its generalist and broad-based nature (Lazear, 2004; Michelacci, 2003). Entrepreneurs need to master not only their own technical specialization, but also a broad set of business management and leadership skills in order to access and mobilize the resources necessary for launching and growing the new venture. In other words, to successfully manage and orchestrate multiple domains of activity. In light of this, the education and the motivation received are key factors that can foster entrepreneurship in students.

The link between education and entrepreneurship has been previously discussed leading to the recognition that education is an important stimulus for entrepreneurship (Raposo & do Paço, 2011; Peterman & Kennedy, 2003; Kuratko, 2005). Traditional education can be argued that focuses on skills to embark on a "seek-a-job" approach leaving aside creativity and business formation as a career path. However the notion that entrepreneurship can be taught, has caused to emerge the notion of entrepreneurship education. Several authors have recognized its main characteristics as differentiation from business education addressing equivocal nature of business entry (Gartner, Bird, & Starr, 1992), courses that focus on changing attitudes and motives (Hansemark, 1998) including the topics of negotiation, leadership, new product development, creative thinking, and exposure to technological innovation (McMullan & Long, 1987).

Dyer (1994) proposed that according to the theory of career socialisation proposes that social characteristics influence one's decision, including the exposure to educational experiences. Therefore the education programs that provide entrepreneurial social experiences in form of significant responsibilities, practices to start one's own business and to observe role models (Peterman & Kennedy, 2003) may influence a person's desire to pursue a career congruent with his or her learning experiences (Kram, 1983; Shapero & Sokol, 1982). Hence, enterprise educational experiences could be expected to influence the perceived desirability of starting a business. It is evident then, that universities and the high level education that they provide play a key role in the entrepreneurial path that their students may undertake. In addition the literature abounds with work that emphasizes the importance of university research as one of the drivers of high-technology-based economic development and an essential ingredient of a successful innovation system.

New knowledge is characterized by greater uncertainty and asymmetry than other economic goods (Acs and Varga, 2005), therefore entrepreneurship plays an important role in facilitating the exploitation of knowledge spillovers which occur at universities. ITESM, as one of the most recognized universities in Latin America has incorporated to its mission for 2015: to drive the development of new businesses through an entrepreneurial culture. In junction of classes, there are programs that encourage students to pursue the entrepreneurial path like "Spheres of Innovation", "Accelerator and Venture Incubators" and the "Incubation Cells Program for the doctoral students". This last option, the Incubation Cells Program for the doctoral students draws special attention to us, since Ph.D students by means of their high level research following an entrepreneurial path can develop high-tech ventures that strengthen our regional economy. However communication and continuous involvement of students are not always present, "there is a lack of information to students about the services offered by the university to support entrepreneurship, many students do not know that there is a business incubator and others do not know exactly what services it offers. Therefore, in this paper, we aim to address an opportunity to bridge that

gap and further motivate students through the experiences of former participants, inquiring about the positive impact and the challenges these leaders have experienced. And at the same time, provide, useful guidelines about feelings and expectations of graduate students to embrace entrepreneurship as a way of living.

Doctorate Spinoff background

In Mexico, by 2013 there are registered more than 500 incubators with a presence in over 190 cities. However, only 21 are considered to foster high-tech innovations. The implications of this fact are huge, on one hand the opportunities for high-tech ventures to develop is undermined and reinforces the challenge that entrepreneurs have when choosing to build up a company from a newly discovered high technology invention. As well, this gives a distinctive feature to the few incubators that are dedicated to high-tech in a developing economy, as ours.

It is then relevant that one of those incubators is part of the program of Doctoral Spinoffs at ITESM in Monterrey, which currently gives the opportunity to 380 students from seven doctoral programs to create a new ventures (spinoffs) based on their research along their doctoral degree. A university spinoff is a new firm created to exploit commercially some knowledge, technology or research results developed within a university. The program was founded on 2006, to enhance the scientific work of Ph.D students and encourage projects that impact positively on solving urgent problems or market needs, as well as to fulfill the commitment to scientific and technological development of the university. As students enroll on the program, the traditional doctoral study evolves into a joint program where basic research, article publication and dissertation are one part. Whereas the complementary one is the definition of an incubation project followed by the incubation of a new venture based on the results of their Ph.D research. The Doctorate Spinoff program offers the participants the support of the university in terms of infrastructure as access to laboratories as office space; and human capital as courses and advice from experts on legal, fiscal administrative and patenting issues and a personalized business counselor.

Research about the doctorate spin off program opinions are fundamental to create a robust entrepreneurship ecosystem in which every student has the opportunity to start up a new venture and the set of skills and resources needed to succeed.

Methodology

The research questions

To gain insight about the Doctorate Spinoff Program and its role in fostering technology based ventures from the perspective of students, a series of interviews were conducted to the actual students enrolled in this program (26) to address the following research objectives: (1) To identify the strengths and weaknesses of the institutional effort to enhance technology-based entrepreneurship among Ph. D. students; and (2) to envision new means to take advantage of the market opportunities in Latin America and to shed new light on key issues of entrepreneurship development.

The survey

The design of the interview was focused on the student's perception of the program in order to understand the actual position of the spinoff, the challenges that the leaders have faced along the entrepreneurial path, the key factors that the program has offered and finally the recommendations that the students perceive could strengthen the program. The survey consisted of three main parts, each section with a specific goal. The first section was constituted by five questions, and intended to inquire about the history that has driven the incubated project to its actual position in terms of potential clients, the product costs, the high proposition value of the new venture and the strategic alliances. The second one comprised by three questions regarding the entrepreneurial ecosystem around their spinoff nurtured by the university program, including favorable conditions as well as difficulties and their opinion/knowledge of intellectual property policies. Finally in the last section it was asked about the contribution to the construction of university support future agendas and the recommendations to the institution.

The sample

At the moment, there are twenty six registered projects; three of those are already constituted as start-up companies. Every project was invited to participate, but the final sample consisted on half of the total projects involved in the program. It comprised students from all kinds of disciplines and with different time involved in the program, thus the study had a broad sample of students with different motivation and technical background.

The method

Each interview took about 40 minutes and all of them were made in February 2013 by the authors. They were recorded on audiotape and then listened carefully to extract the key elements to answer the research questions. In some cases, it was not allowed the audiotape, but we could manage to take rush notes of the main answers. Just one interview was made by email.

Results

The results of this research show the perceptions of the doctorate students regarding the strengths and weaknesses of the institutional effort to enhance technology-based entrepreneurship. The key internal factors of the Doctoral Spinoff Program are: (1) It is a institutional and declare program that has a meaningful space on the mission statement; (2) It is manage by a specific office that deals with all the technology transfer issues; (3) The institution is recognized among business men and can easily make networking; and (4) It concentrates the human and physical infrastructure needed to develop and exploit technology. All of this is especially important due to the possibility of the creative cycle to occur. A Ph. D. student, more than anyone else, is an academic driven individual, that has personal and professional characteristics oriented mostly through the technological development and not necessarily –and rarely- has o wish to have the business managing skills. Since frontiers of science are a very complex matter, and disruptive or incremental technology is an economic asset for our country, the ITESM should encourage this kind of research.

In the other hand, there are important weaknesses perceived of this program by the students: (1) There is an under designed system requirements that confuse the participants as they do not know the exact steps to take advantage of the program; (2) there is a lack of clarity to inventors about their commitment to the research university sponsoring the patents and the terms of intellectual property licensing; (3) there is a sense of detachment between scientists drivers and program managers objectives. These weaknesses are dangerous because they do not allow the growth of technological based companies and new stakeholders may feel discouraged because of the lack of clarity in the rules of the program.

The challenges encountered to provide new means to take advantage of the market opportunities in Latin America are shown in table 1.

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- Design grounded rules for the entrepreneurial Ph. D. approaches, focusing in two tracks: exploiting the commercial potential of an existing patent, and start-up a new venture.
 - Develop institutional arrangements to trigger entrepreneurial activity as ventures club, websites, funding sites, collaborative group builders, among others in a unique platform like an entrepreneurs clearing house.
 - Reinforce the promotion of this programs and their academic credit.
 - Guide the Ph. D. students to deal and understand the dynamics of their technical environment with no markets are well established
 - Create – or diffuse- the public–private partnerships to enhance entrepreneurial activities.
 - Arrange a team to transforms the results of research and technological innovations into competition advantages competitive business.
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Table 1. Recommendations to the Entrepreneurship Programs

Conclusion

Following the entrepreneurial path might not seem an easy path, the satisfaction along with the success and gained experience are valuable lessons that can be acquainted. This path has been increasingly been of interest by younger generations, statistics showing that "one third of new entrepreneurs are younger than age 30 and more than 60% of 18- to 29-year-olds say they want to own their own businesses"(Kuratko, 2005). University students then fall in and comprise this group, whose entrepreneurial activities and new ventures can foster the development of Mexico's economic development throughout the generation of innovations, stable markets and job positions. The motivation to pursue entrepreneurship as a career option can be based on many personal motives; nonetheless the creation of a new venture can fulfill one's personal debt to society and become the retribution from the opportunities that society in general has given university students.

In the present study leaders of technology based future ventures presented their insights of the Doctorate Spin off Program acknowledging that incubation programs are valuable in the sense that they provide infrastructural and counseling advice otherwise scarce resources apart from it. These foundations provide even a greater support to engineering doctorate students that commonly have great technical knowledge but less business and entrepreneurial education. Nonetheless the areas of opportunities are still broad, in terms of incentives, financial accessibility, networking, strategic team formation and communication. Addressing those opportunities will boost the entrepreneurial ecosystem that is needed for entrepreneurs to successfully impact on Mexico's economic development. We believe that students that have started on the entrepreneurship path have worth noticing experiences and ideas that can enhance the entrepreneurial activities carried out at universities. In addition, the answers to foster and enhance programs that move along entrepreneurship are likely to be found introspectively, inquiring staff, students, and organizations currently involved on them.

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