Abstract

The knowledge acquired through collaborative networks are fundamentals to explain the internationalization of firms. However, little is known about how the New Technology-Based Firms (NTBFs) access them in emerging economy contexts. A theoretical combination of the Triple Helix Model, the Networks and Knowledge perspectives and our understanding about early internationalization of firms allows us to develop a new framework for a better understanding about the knowledge acquisition processes though to collaborative networks of NTBFs. Our work, based in a case study of four Mexican NTBFs, show that the NTBFs in an emerging countries can lack of knowledge and networks useful for their internationalization and that a way to complement them is participating in collaboration programs with several agents of Triple Helix. Our study identifies a series of important implications to all Triple Helix Model stakeholders: NTBFs, Government and Universities.
EARLY INTERNATIONALIZATION AND THE TRIPLE HELIX MODEL: EVIDENCE FROM EMERGING ECONOMIES

ABSTRACT

The knowledge acquired through collaborative networks are fundamentals to explain the internationalisation of firms. However, little is known about how the New Technology-Based Firms (NTBFs) access them in emerging economy contexts. A theoretical combination of the Triple Helix Model, the Networks and Knowledge perspectives and our understanding about early internationalization of firms allows us to develop a new framework for a better understanding about the knowledge acquisition processes through collaborative networks of NTBFs. Our work, based in a case study of four Mexican NTBFs, show that the NTBFs in an emerging countries can lack of knowledge and networks useful for their internationalisation and that a way to complement them is participating in collaboration programs with several agents of Triple Helix. Our study identifies a series of important implications to all Triple Helix Model stakeholders: NTBFs, Government and Universities.

Keywords: International Entrepreneurship, NTBFs, Knowledge Types, Networks, Triple Helix, University Business Accelerator.

1. INTRODUCTION

In recent decades, the increase and universality of early internationalization firms has managed to capture the attention of media, researchers, international institutions and governments (Oviatt & McDougall, 1994; Zahra, 2005). Currently this phenomenon is considered as a fundamental factor not only for growth and survival of firms, but also for the economic development of different regions (Zahra & Mudambi, 2007).

According to some authors, the literature on early internationalization has been focused mainly on new technology-based firms (NTBFs) (see for example, Keupp & Gassmann, 2009), which have taken advantage of globalization, the technological progress and the reduction of trade barriers
between countries (Cavusgil & Knight, 2009). However, the NTBFs are susceptible of having limitations in competing in international markets (Cahen, Lahiri, & Borini, 2016). For example, authors like Lau & Bruton (Lau & Bruton, 2011) emphasize that these companies face greater barriers compared to others because they face higher disbursement in activities related with research and development. Furthermore, in the context of emerging economies, these companies face additional obstacles related with unfavorable institutional conditions and difficulties in accessing or acquiring certain types of resources such as networks and knowledge (Uner, Kocak, Cavusgil, & Cavusgil, 2013).

In relation to company responses to these barriers, a rich literature has established the importance of collaborative networks (Rubin, Aas, & Stead, 2015). Given the inexperience, the NTBFs need to acquire and integrate various types of knowledge and skills, so it is a necessity to keep abreast of knowledge in all relevant fields (Scillitoe & Chakrabarti, 2010). However, the process of finding and acquiring new knowledge based on these networks has not been studied in depth in the internationalization of smaller firms in emerging economies (Kiss, Danis, & Cavusgil, 2012).

Therefore, this paper aims to examine how NTBFs in emerging economies develop their collaborative networks and acquire the necessary knowledge to carry out the early internationalization.

To identify where and how this knowledge is obtained, we use and integrate Etzkowitz Triple Helix Model (Etzkowitz & Leydesdorff, 1995), since it provides important information on knowledge flows in the context of collaborative relationships among institutional actors, i.e. between universities, industry and government. Thus, our research also integrate the network and knowledge perspective because of its importance to explain the early internationalization of small and new companies (Burgers, Van Den Bosch, & Volberda, 2008a). Finally, to address this approach, we have conducted a multi-case analysis with some representative actors of the triple helix in the region of Nuevo Leon, Mexico.

This research recognized several key interactions between four Mexican NTBFs, a University Business Accelerator (UBA hereinafter) and some local government entities. According to the findings, interaction with Triple Helix agents enabled NTBFs to access new networks and acquire various types of knowledge necessary for internationalization. In the same period, the UBA facilitated contact with some companies and government agencies that served as an important source of funding.
and knowledge. Finally, the analysis of these interactions or collaborative relationships, allow us to present some propositions and thus contribute to the literature of both IE and the Triple Helix. Our study offers several contributions. First, we contribute to the IE literature, because the phenomenon of early internationalization as a result of a process involving the interaction and collaboration between several players in the environment is explained. This is interesting because, in the IE literature, the factors that influence international entrepreneurial activities are generally examined in a situational context each in isolation, rather than representing a holistic approach that examines a co-evolutionary relationship among factors. Therefore, the added value of our study is to show that in economically emerging contexts, the acquisition of knowledge prior to the internationalization can be the result of a collaborative process between the companies with several actors in their environment, particularly with the Triple Helix agents. Likewise, this work is a contribution to the Triple Helix Model literature. First because most empirical studies on the triple helix have studied only the relationships between the university and the industry and, therefore, they fail to study the synergistic effects of the university–industry–government relationships. And secondly, because while there have been studies that explain entrepreneurial activities based on the Triple Helix model (Guerrero & Urbano, 2016), its contribution to international entrepreneurship have been insufficient. In this sense, this paper is one of the first empirical studies that use the Triple Helix model to explain the early internationalization of NTBFs in emerging economies.

The structure of this article is as follows. In the next section we developed the theoretical framework, based on the integration of the Triple Helix Model, the perspective of networks and knowledge. Then, we present the methodology of case selection for this research. In the next section, we develop the results and discussions. Finally, we conclude with the implications of this study.

2. THEORETICAL FRAMEWORK

The early internationalization represent a major challenge for new firms, especially for companies in emerging economies with limited resources and operating in less favorable environments (Coeurderoy, Cowling, Licht, & Murray, 2012). However, although the empirical evidence of the early internationalization stems mainly from developed economies, it is clear that nowadays the
phenomenon has increased among new firms in emerging economies (Jones, Coviello, & Tang, 2011).

Thus, various empirical evidence have led researchers to promote the early internationalization strategy as a determining factor for the performance of small and new companies. Given this, the governments of many countries are adopting specific policies and programs to enhance the potential of these companies, based on the premise that their inclusion in global markets, will contribute to an increase in the trade balance and economic growth (Cumming, Fischer, & Peridis, 2015).

One type of entrepreneurial business that governments in emerging economies want to encourage is high technology entrepreneurial ventures (Lau & Bruton, 2011). These firms are formed and developed relying mainly on the strength of knowledge and learning ability of its founders, allowing them to exploit new opportunities, even in international markets (Yli-Renko, Autio, & Sapienza, 2001). However, different theories are converging towards the view that entrepreneurs are not the only participants in this process, because they are involved in a series of relationships with different actors in social and institutional levels (Cooper & Park, 2008; Johannisson, 1998). For some researchers, like Kim et al. (2012), it is important to understand that the birth, growth and death of firms is highly related to regional characteristics and entrepreneurial environments. Therefore, the creation of NTBFs will also depend on contextual factors that generate the necessary elements for their further development. This argument has led some authors to point out that the identification of technological opportunities and subsequent operation will vary according to the degree of development of the countries or regions in which the least developed will be less favorable for the formation of NTBFs (Fontes & Coombs, 1996). In addition there are internal characteristics of the entrepreneur like the social-cognitive properties, the international experience, the different types of knowledge, among others (Keupp & Gassmann, 2009), that could interact with the contextual ones. These interrelationships and interdependencies are a very interesting and we suggest that the Triple Helix approach could be an interesting framework for analyze these interrelationships.

2.1. The Triple Helix Model

The Triple Helix of the relationships between university-industry-government (Etzkowitz & Leydesdorff, 1995), is accepted as an important model for regional development (Leydesdorff & Meyer, 2006). The model's success has spread rapidly from academia to policy makers, who use it as
a reference when designing policies and support programs aimed at improving conditions for the favorable development of innovation (Etzkowitz & Leydesdorff, 2000).

The basic premise of the Triple Helix Model is the transition to a knowledge-based economy (Etzkowitz & Klofsten, 2005). In this model, the university that was before considered a minor player among institutions, takes a more important role, and it is currently considered – together with the government and industry – as a primary actor for the society development. In this sense, Etzkowitz and Klofsten (2005) note that the Triple Helix Model comprises three basic assumptions. First, that in a knowledge-based society, the university should have a more prominent role in innovation. Second, the new partnerships or interactions between institutional spheres should provoke new innovation policies rather than be prescribed exclusively by the government. And finally, it is expected that these institutional spheres, besides fulfill their traditional functions, operate "taking the role one of another" (Etzkowitz & Klofsten, 2005).

One of the important aspects of the interactions of the Triple Helix Model is the transfer of various resources (Van Horne & Dutot, 2016). In this sense, collaboration between universities and companies, given by a combination of both intellectual and economic capabilities, should boost entrepreneurial activities, while the government, through its policies, must introduce the entrepreneurial potential for new firms to be effectively created and developed (Kim et al., 2012). Although there are few empirical examinations of the effect of collaborations among Triple Helix agents on entrepreneurial activities, we suggest that these collaborations can promote some entrepreneurial activities, such as the early internationalization of NTBFs. In this paper we analyze four specific cases of Mexican technology-based entrepreneurs, who were involved in multiple interactions with an University Business Accelerator and some agencies related with the Mexican government.

2.1.1. University–Industry relationship. According to Audretsch (2014), the role of the University has evolved considerably over time, and are now considered a central element in regional development. In this way, universities today have the mandate to respond to the needs of social and economic context, actively contributing to economic development through technology transfer, dissemination of knowledge and the generation of entrepreneurship capital (Audretsch, 2014; Etzkowitz, 2013). The collaboration between University-Industry refers to the interaction between any department of higher
education and industry. It occurs primarily through the exchange of knowledge and technology and could significantly improve the competitive position of firms in the market (Perkmann et al., 2013). Many previous studies have tried to establish various forms of linkages between the University and business, mainly analyzing the processes of knowledge transfer between them (Gulbrandsen, Mowery, & Feldman, 2011). These studies demonstrate that the transfer of different types of knowledge occurs through various channels, pathways or components (Bekkers & Badas Freitas, 2008).

One type of university organization that establishes formal links with the industry is the UBA. An accelerator is a new generation of Incubation Centers (ICs) that allows entrepreneurs to take advantage of a variety of knowledge, resources and support services, offered from the academia (Cohen, 2013; Pauwels, Clarysse, Wright, & Van Hove, 2016). An UBA offers different opportunities for networking, education and mentoring (Bruneel, Ratinho, Clarysse, & Groen, 2012). They are also useful for access to investors and other key players in the entrepreneurial environment (Malek, Maine, & McCarthy, 2014). In addition, there is evidence that the firms participating in programs as an incubator or accelerator of business, have had a greater chance of success compared to the companies that they have not (Miller and Bound 2011).

2.1.2. Industry–Government relationship. Several countries have implemented policies that seek to facilitate the creation of favorable entrepreneurial environments, reduce restrictions on entrepreneurship and promote innovation and internationalization (Audretsch & Link, 2012). According to Cumming (Cumming et al., 2015), policies that promote internationalization encourage companies to export early and intensively, so that they can make a sustained contribution to the balance of foreign trade. Governments have therefore launched a plethora of publicly funded support services that seek to foster and increase internationalization of firms. In Latin America, for example, several governments have designed and implemented business development systems aimed at promoting exports (Cardoza, Fornes, Farber, Gonzalez Duarte, & Ruiz Gutierrez, 2016). Other government services that have been recorded in the literature include support for trade missions, sponsorship for participation of trade fair, provision of assistance for tenders, assistance in consortium formation, exports financing, and support through of foreign offices (Cumming et al., 2015).

Therefore, on the basis of these evidences, it is suggested that the relationship between firms and
government are produced through a number of policy tools that influence the capabilities and competitiveness of firms and that encourage the internationalization of firms (Minniti, 2008).

2.1.3. University-Government relationship. The literature has shown that the mission of universities is no longer limited exclusively to teaching and research but is increasingly committed to entrepreneurial activities and the transference of knowledge to non-academic actors, especially business and the wider community (Audretsch, 2014). In this sense, several studies have indicated that this new university model is a key factor for the economic and business development of a region (Urbano & Guerrero, 2013). Many countries, therefore, are providing political and financial incentives for universities to forge collaborative links with industry and place entrepreneurial activities in their internal management agenda (Miller, McAdam, & McAdam, 2014). One of the promising policy tools that support innovation and technology-oriented entrepreneurial growth are the Incubation Centers (ICs) (Wann, Lu, Lozada, & Cangahuala, 2017). These are operationalized through science parks, technology incubators, innovation centers and accelerators. However, the most governments promote the functioning of these institutions under the management structure of universities. In Latin American countries for example, around 50 percent of ICs have some relation with a university (Wann et al., 2017). Finally, it is important to emphasize that the collaboration between the university and the government plays an important role in supporting the entrepreneur, since they function as "access portals" to networks, knowledge and subsidies (Guerrero, Urbano, Fayolle, Kloxten, & Mian, 2016). A common practice in emerging economies, for example, is that policymakers establish the requirement of the development of enterprise-university partnership to receive some innovation subsidies (Guerrero & Urbano, 2016).

Finally, as discussed above, the Triple Helix will form when there are formal reciprocal relationships and linkages that develop between the three spheres (Etzkowitz, 2003). The mutual adaptations between the spheres will lead to the creation of synergies and the exchange of resources improving the performance of each one. The Incubation Centers associated with Universities are recognized as a formal mechanism both to transfer knowledge and to incorporate young people or new companies into entrepreneurial networks (Böllingtoft, 2012), while governments can “change the rules of the game” (Etzkowitz & Leydesdorff, 2000; Lundberg, 2013; Van Horne & Dutot, 2016). Therefore, based on
these arguments, the purpose of next section is to focus on the networks and knowledge perspective that the literature identifies as relevant for the internationalization of firms.

2.2. Networks and Knowledge Transfer

2.2.1. Networks approach to the internationalization. The entrepreneurial networks play an important role affecting new venture performance (Jack, 2010; Xie & Lv, 2016). Although there are different types of networks, the literature indicates that new companies build relationships with various stakeholders such as customers, suppliers, competitors or government support agencies, which may have different roles and importance in the development of firms (Nyuur, Brečić, & Simintiras, 2016). In addition, when firms build relationships and assume a position in the network, they can obtain relevant information to develop new knowledge, identify and exploit new business opportunities, even in foreign markets (Johanson & Vahlne, 2009).

However, firms can take advantage of their networks differently depending on the specific advantages of each country (Rugman, Oh, & Lim, 2012). Institutional theory suggests in this sense that developing countries' firms must overcome significant barriers in the internationalization process, associated with lack of resources, institutional weaknesses and a more adverse environment (Ciravegna, López, & Kundu, 2014). This is particularly interesting because, although there are no conclusive results (Ciravegna, Majano, & Zhan, 2014), it appears that emerging-markets based firms tend to overcome internal institutional barriers by relying more on entrepreneurial networks compared to firms based in developed economies (Khanna & Palepu, 2010).

This study focuses on new technology-based firms (NTBFs) based in an emerging economy. The literature on entrepreneurial internationalization has paid special attention to them. The success of these firms has been linked especially to the founder's distinctive capacities such as business education and managerial experience (Ganotakis, 2012; Wennberg, Wiklund, & Wright, 2011). However, technological entrepreneurs often have a technical background and lack the necessary business skills and market orientation for the commercial development of their ideas (Löfsten, 2016; Rojas & Huergo, 2016). They also present problems accessing appropriate business networks (Visintin & Pittino, 2014). However some organizations such as Incubation Centers (ICs) they can fill the lack of resources and accelerate the success and development of ventures. There is evidence that ICs can provide important business networks specific to an industry (Löfsten, 2016). Bollingtoft
suggests in this sense that ICs can provide a 'bridge' between companies and its environment with the purpose of leveraging entrepreneurial talent and/or resources. Furthermore, ICs linked to a university can provide a wealth of information, knowledge and expertise, which is vital for the survival of the new ventures and young firms and it may also reduce the uncertainty they experience. (Scillitoe & Chakrabarti, 2010).

Finally, literature based on ICs tends to focus on the transfer of technological knowledge, and very few examine the transfer of other types of knowledge that can be equally important in the development of the company. For example, Patton (2014) focuses on how ICs transferred managerial, entrepreneurial and technological knowledge to enhance the business model of new technology firms. Therefore, the following section describes three types of knowledge that have been recognized as relevant to the success and performance of new technology-based firms.

2.2.2. Knowledge approach to internationalization. According to resource-based view of the firm, the knowledge is a relevant factor for obtain a competitive advantage (Barney, 1991; Grant, 1996). In this line, recent research suggests that, for technology-based companies, two specific types of knowledge - technological and market knowledge - can have positive implications for achieving desirable results (Marvel & Lumpkin, 2007). However, in theories related to international expansion, appears the need for the internationalization knowledge, that in combination with the technological and market knowledge's, relevantly influence on the internationalization of small and new firms (Fletcher & Harris, 2012).

In this line, technological knowledge refers to the degree of knowledge possessed an entrepreneur about the products, technologies and/or processes that are relevant for their business (Burgers, Van Den Bosch, & Volberda, 2008b). The acquisition of this knowledge is considered a critical factor because it would allow them to respond rapidly to the actions of competitors and changing market needs. Moreover, the accumulation of technological knowledge will enable the entrepreneur to better understand and evaluate the commercial potential of new opportunities even in international markets (Dhanaraj & Beamish, 2003).

Similarly, some theories of international business have emphasized from the beginning on the acquisition of market knowledge. According Burgers et al (2008), market knowledge refers to knowledge of potential customers, how to enter markets, marketing approaches and business models.
Other authors point out that this knowledge is associated with the understanding of the internal culture, institutional frameworks of government, rules and regulations of the domestic market (Fletcher & Harris, 2012). This knowledge can help small technology-based firms to reduce some of the complexities of the disruptive and dynamic environments in which they operate and take advantage of growth opportunities (Sullivan & Marvel, 2011).

Finally, the knowledge of internationalization is a key factor to explaining the rapid expansion international of the firms. This knowledge type is associated with international experience and knowledge of institutional framework, norms and values that apply in markets where companies operate (Eriksson, Johanson, Majkgård, & Sharma, 1997). It further relates to the knowledge of customers and competitors international, and also the know-how in possession of firms that may help to explore and exploit growth opportunities in international markets (Voudouris, Dimitratos, & Salavou, 2011).

3. METHODOLOGY

This research uses an inductive approach based on retrospective cases studies as empirical evidence to create theoretical constructs and propositions (Street & Ward, 2010). The unit of analysis will be the firm, and multiple cases will be used rather than a single case study. Case studies are powerful empirical descriptions of a particular phenomenon that can help to build theories (Yin, 2014).

Furthermore, in their literature review of early internationalization of firms, both Rialp et al. (2005) and Aspelund et al. (2007) emphasized that a qualitative approach guarantees plain understanding of the complexities associated with the internationalization processes of new firms.

Therefore, in this research, a multiple case study is used to explain how the continuous interaction between the actors of the Triple Helix allowed an early internationalization of some NTBFs based in emerging economies. For this purpose, multiple sources of information were used to gather data from each sphere of Triple Helix. In this way, a University Incubation Center was identified. This Incubator worked as a University Business Accelerator (UBA), and in this study represents the sphere of the University. In addition, four Mexican NTBFs represent the sphere of industry, and several government programs for business development that represent the sphere of the Mexican government.
(e.g., TechBA Program or some programs Mexican Science and Technology National Council, CONACYT).

In the case of UBA, evidence was obtained of the business accelerator articulated by EGADE Business School, the Graduate School of Tecnológico de Monterrey, one of the largest and prestigious private universities in Mexico and Latin America. The UBA has a team of managers and academic specialists, often involved in research, consulting, education and activities to transform and promote new firms with high market potential in sustainable businesses. To collect the information, one of the managers of the UBA was interviewed by one of the authors through a semi-structured and open-ended interview, guided by a list of topics. In this sense, the interviewee was asked first to describe the general operations and the processes of selection of participating companies in the UBA. Based on this information, he was asked to describe in more detail, (1) the principal services provided to participating companies, (2) the significant events in the interaction with selected firms in this study, and (3) the relationship between UBA and various government local entities of Mexico.

On the other hand, the criteria for selecting NTBFs were as follows. First, they had to have participated and completed the advisory programs delivered by the UBA. Secondly, the NTBFs had to show clear signs that their internationalization had occurred after and as a result of having participated in the program of the UBA.

Finally, these firms had to adapt to the profile of early internationalization firms, since they were internationalized up to 10 years after being born (Milanov & Fernhaber, 2009). In this study, all companies had internationalized before 10 years since its inception and after their participation in the UBA program. Therefore, the selected companies were suitable for this study.

Cases of these firms were prepared according to the methodology proposed by Yin (2014), based on the development of in-depth interviews using structural and descriptive questions (Andriopoulos & Slater, 2013; Chetty, 1996). The interviews focused on the entrepreneurs' past experiences, so the guidelines for retrospective studies of Miller et al. (1997) and Huber and Power (1985) were followed. A retrospective case study is a type of longitudinal case study design in which all data, including first-person accounts, are collected when the events and activities under study have already occurred, and the outcomes of these events and activities are known (Street & Ward, 2010). In this study, all the facts – i.e., the participation of the entrepreneurs in the UBA program and the early
internationalization of their firms – occurred before the interviews, which made it appropriate to adopt a retrospective perspective.

In the interview process, all entrepreneurs were asked to describe in detail the process of creating their companies and the reasons why they had decided to participate in the UBA. Later, were asked information about the following issues: (1) a description of their experience both with the UBA program and with local government entities; (2) a description of how he produced the internationalization of their businesses; (3) construction of their networks and the importance of these to their companies, and (4) the acquisition of knowledge to internationalize their services and/or products.

All the interviews were digitally recorded and transcribed literally. In addition, e-mail communication was used to collect further information and to clarify any inconsistent issues. After transcribing the interviews, the responses were coded and analyzed according to the concepts identified in the literature (Miles & Huberman, 1994). The analysis of the encoded data, involved the search for common patterns among cases (Eisenhardt, 1989) in order to identify some findings that were framed in the context of the IE literature, thereby strengthening the internal validity of the research.

Furthermore the interviews both with entrepreneurs and managers of UBA, allowed us to obtain relevant evidence about the government role on the process of internationalization of each of these NTBFs. Particularly, evidence of TechBA program is obtained. This is a program of the Ministry of Economy of Mexico operated by the United States-Mexico Foundation for Science (FUMEC) seeking to work with highly innovative companies to bring them to the global market, increase their exports and creating high-value jobs in Mexico.

Finally, Table 1 summarizes the key information on the case firms. The four firms were internationalized before 10 years since its inception, arriving to different international destinations.

*Table 1. Information on the Case Firms and their Early Internationalization Process*
In the following section, specific findings for each observed interaction between the actors of the triple helix are detailed.

4. RESULTS AND DISCUSSION

In this section are the findings contained in the various interactions that occurred between the different institutional spheres. It is important to emphasize that, the Mexican government through its national public policy, offers various support programs and activities aimed at encouraging technological development, innovation and linkages between institutional actors.

4.1. Findings

4.1.1. University–Industry relationship. Mexican NTBFs whose cases were developed for this article, had a wide variety of interactions, especially with the UBA, entity which collaborated with the firms during their internationalization process.

**Case 1:** This Case is a company dedicated to creating solutions for medical imaging in three dimensions (3D).

Shortly after starting his company, the founder was actively involved in the UBA, through which had access to academics, mentors or coaches experts in business who gave him different types of knowledge, those who helped him in the planning of their strategies and in developing its business plan. Additionally, the MBA students together with professors from the EGADE Business School,
support him with market research studies to better understand the possibilities of their technology on the market.

In addition, the Accelerator enabled him access to different networks, which helped him acquire technological knowledge. For example, the EGADE Business School, as an institutional part of a larger organization - Tecnológico de Monterrey, got permission for testing in the Center for Innovation and Technology Transfer in Health (CiTES) of the Hospital San José. From this relationship, the Case 1 was able to acquire technological knowledge to validate and further develop its technology and its business model.

On the other hand, the UBA allowed the company to access public and private investment networks, such as the Innovation Fund of Nuevo Leon State, also called FONLIN, the program of Trustees of the Tecnológico de Monterrey and the Entrepreneurs Program of Nacional Financiera, NAFIN (a national public financial agency). Similarly, the relationship of the UBA with the federal government, particularly with CONACYT, enabled the company obtaining funds from government programs for the development of the business in early stages.

In accordance with the founder of the Case 1, the relationship with the UBA helped the firm to have access to several knowledge and resources that they had no, allowing to define and develop an international market entry strategy. They have also allowed access to different networks that have helped to reduce the development time of its products, to minimize the disadvantages of size and novelty, and additionally, open doors for new industry partners in a region as Silicon Valley.

**Case 2:** This case is a company created to provide IT solutions to the connectivity in organizations. The founder of the Case 2, attended to the UBA of EGADE Business School, because of the affinity he had with his alma mater, the Tecnológico de Monterrey. The founder started the company with a regional mindset. And his participation in the UBA allowed her changing his mind.

The work and the knowledge acquired from the UBA mentors, allowed him to develop a business plan, implement a growth strategy and learn to do businesses in the international market. He also received knowledge about the needs of national customers as well as large international customers such as governments and global companies. Furthermore, the UBA program strengthened some individual skills of the founder, improving their public speaking skills and business language. Finally, during the period of participation in the UBA, the potential of an international business plan was
validated, because the SOA Technology, developed by Oracle and offered by the Case 2, was defined as key to differentiate the offer of the firm in the global market. Regarding the above, the founder points out:

>To me, it helped a lot communicate with people who had knowledge ... And it was good. I approached the Accelerator EGADE Business School, and I feel it was good. The success is to learn how to change ways of thinking in each market... with the right advice, it is easier...

Moreover, the relationship with the UBA benefited the Case 2 when the firm apply to the TechBA Program. This favored its expansion to the Silicon Valley region and access to a network of international consultants, who provided to entrepreneurs the internationalization knowledge. For the founder of the Case 2, his participation in the UBA was fundamental, because the interaction with consultants and researchers in business issues enabled the firm to acquire specialized knowledge. Moreover, networks they delivered market information for the Case 2, thereby reducing the liabilities of size, newness and foreignness. According to him, a valuable characteristic of networks is that the participants made recommendations and these are given as in a laboratory, as in a "controlled environment", which reduces the risk, because not expose it to market.

Case 3: This case is a high-tech enterprise specialized in developing applications for image processing. In 2005 it was accepted in the UBA of EGADE Business School to participate in the Technology-Based Business Development Program. There, he was taught to develop and validate its business model. Likewise, he was provided with the knowledge about potential customers to compete in the national and international market. Moreover some of the individual skills of the founder were reinforced. Thus, he learned how to sell an idea and how to present their project to partners and investors.

The UBA provided the knowledge needed to prepare the international strategy of the Case 3. As part of this strategy, a relationship was made between the Case 3 and the Office of the Mexican Institute of Industrial Property (IMPI), in order to protect the intellectual property of its technological developments. This allowed subsequently make contact with the United States Patent and Trademark Office, USPTO.

For the founder of the Case 3, his participation in the UBA was very useful:
The UBA helped us have a quick overview of the skills required to have a business... we opened the eyes in many ways... as engineers we often think that are more important the technology skills, but through the Business Accelerator, we saw the true proportion of things...

During his stay in UBA program, the Case 3 was benefited with networks access. For example, was contacted with the firm of the Case 4 (another company that participated in the UBA of EGADE Business School described in the next section) with whom the firm built a business relationship that would lead to the Case 3 to develop the "DARIUS Project". In this project, the Case 3 acted as technology partner and was responsible for the design, programming and implementation of render engine, core element in this project. Likewise, the UBA contacted the Case 3 with the Ministry of Economy to apply the TechBA Program in Silicon Valley in which was accepted.

Since before participating in the UBA Program, the founder of the Case 3 considered the networks as fundamental in Internationalization.

It's like a paradox, because you want to be international, and you can travel and everything, but you do not have the necessary contacts...

According to the founder, the networks allowed the company to obtain a constant flow of information about the market and industry. In his view, the networks have enabled it to know the plans and actions it takes with its main customers or major industry players, and they have influenced the decision making of the company. In addition, networks have allowed access to specialized information, in particular business issues, helping in the selection and diversification of its markets.

**Case 4:** The Case 4 is a consortium of new companies in ICTs sectors, which belong to a single CEO and founder. In 2006, the three companies of Case 4 were invited to participate in the Technology-Based Business Development Program of EGADE Business School. The participation in the Business Accelerator was fundamental, because it allowed firms to interact with experts in business, which conducted them through a deep assessment of the Group. From that diagnosis, was defined for each of the companies, a strategy of international growth, which was reflected in new business plans.

---

1 This project aims to enhance graphics processing and high quality images through algorithms with FPGA technology.
Furthermore, interaction was significant, because some academics and students of the MBA, they developed and provided a complete market research to the 3 companies.

Another benefit that provided by the UBA to Case 4 was access to different types of networks that provide both knowledge’s and financing for the three projects. For example, in the search for financial resources, the UBA supported to companies in their interaction with CONACYT, from which they raised funds for the development of the Platform for Digital Content Distribution. Similarly, the UBA it was a bridge to connect the companies with other government agencies such as NAFIN, from whom it obtains market information on the different financing options; and ProMexico from which it obtains relevant information on the international markets.

Furthermore, the UBA Program allowed Case 4 to contact and work with Case 3, a company that participated in the accelerator program. This relationship allowed Digital Minds, significantly reduce costs of the project for the Center for Advanced Design. Later these companies collaborated on the Project DARIUS, which was to develop a render engine to offer a web service in a global scale.

Another relationship allowed by the UBA Program was to promote a commercial agreement between the Case 4 and Alestra - a national leader in the telecommunications sector in Mexico.

Finally, to promote the internationalization of companies, the UBA contacted some firms of Case 4 with the TechBA Program of the Ministry of Economy, thus allowing its international expansion to Canada and Madrid respectively.

To the Case 4 founder, the knowledge’s and networks to which had access:

...Contributed an important value in the internationalization of our companies, allowing us to access knowledge and other resources, as business partners, who in turn gave us access to other clients that otherwise we would not have access. This network of partners reduces the liability of outsidership to the market.

As noted in the findings, the NTBFs acquired diverse knowledge directly from the UBA. In addition, through the UBA program, instances were created to access important collaboration networks.

Literature often points out that networking is one of the most important services offered by modern Incubation Centers such as UBA (Pauwels et al., 2016; Rubin et al., 2015). In this sense, this study considers that the NTBFs acquired directly from UBA different types of knowledge, but also
indirectly through the networks facilitated by UBA. Therefore, this study corroborates the findings found in previous literature. Table 2 presents a summary of the different types of knowledge acquired from UBA.

Table 2. Types of Knowledge acquired directly and indirectly by the NTBFs from the UBA Program

<table>
<thead>
<tr>
<th>Knowledge acquired by NTBFs</th>
<th>Directly from UBA</th>
<th>Indirectly from UBA (networks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case 1</td>
<td>Market Knowledge</td>
<td>Market Knowledge</td>
</tr>
<tr>
<td>Case 2</td>
<td>Market Knowledge</td>
<td>Technological Knowledge</td>
</tr>
<tr>
<td>Case 3</td>
<td>Market Knowledge</td>
<td>Internationalization Knowledge</td>
</tr>
<tr>
<td>Case 4</td>
<td>Market Knowledge</td>
<td>Internationalization Knowledge</td>
</tr>
<tr>
<td>Case 5</td>
<td>Market Knowledge</td>
<td>Internationalization Knowledge</td>
</tr>
</tbody>
</table>

Source: Own Elaboration

4.1.2. Industry–Government relationship. In our research, most of the NTBFs interactions with the government were related to access to support programs for internationalization or for accessing financial resources for the protection and/or development of technology or business.

Case 1: The Case 1 experience with the government was supported by its participation in the UBA of EGADE Business School. This allows it to get a government fund of almost $30,000 USD to leverage the development of its business. Subsequently, the company receives funds from the state government, through the government programs FONLIN and INVITE. Also participates in the program to support technology-based companies called Entrepreneurs Program of CONACYT–NAFIN.

The government support of greater impact for the firm was the TechBA program in Silicon Valley, sponsored by the Ministry of Economy of the Mexican Government. It was through TechBA that the company had access to resources to expand into the United States and land in the Silicon Valley ecosystem. This allows it to gain access to an extensive network of investors and specialists, who helped to the NTBFs to form an Advisory Board to improve its business proposition, and also it allowed it access to technology, financial and business experts. This eventually triggered the internationalization of the company.
**Case 2:** The first relationship with the government went with the Ministry of Economy to implement the Prosoft Program in order to become certified in the quality system of the Mexican software industry. This qualification helped the firm to document and standardize the software development processes. However, the initiative with greater impact on the internationalization of the firm was the TechBA program in Silicon Valley. This program enabled the company to establish a major business relationship with Oracle company, the main supplier of the SOA technology. Further allows it to interact with the major international consulting firms in the region, as well as know the players in the industry. These relationships allowed Case 2 to get their first big customer, the Government of Chile. This project allowed them to later expand the firm to other countries in South America.

**Case 3:** During his participation in the UBA, Case 3 obtained a seed fund from the Ministry of Economy. The resources of the seed fund were used to trigger the development of some technological products. Case 3 also had contact with the Mexican Institute of Industrial Property (IMPI), for the protection of the technological developments that was generating, using the price preference program for SMEs that had this institute.

The TechBA Program, supported by the Ministry of Economy, was the program that ignited the internationalization process of Case 3. Through this program, Case 3, had accessed to the ecosystem of Silicon Valley, allowing contact to consultants specialized in technology-based businesses and direct access to information about its technology and its competitors. This relationship strengthens their knowledge related to its business. Moreover, it was through the contact with the networks of TechBA that Case 3 got its first international contract with an American company, Electroglas. Finally, through the funds and other support obtained from TechBA Program was boosted the process of patenting at the USPTO, and founded a new company, Case 3 International, in the United States.

**Case 4:** The experience of the founder of Case 4 with the Mexican government started through the application of the firms to various government funds. For example, the Digital Media Technologies, obtained funding from CONACYT for the development of the Platform for Digital Content Distribution and the DARIUS Project. Additionally, both to Digital Minds and TiM, the government provided support through the TechBA Program for marketing their products and services in Canada and Spain, the latter, with the intention of expanding to the rest of Europe. Also, the Case 4 had
access to the NAFIN, entity that invested in the group, allowing strengthen and allowed to complete the implementation of the firm projects, especially the Center for Advanced Design, Animation and Special Effects of Digital Minds. Another government program was used, for example, ProMéxico. This is a program that helps to promote, in abroad, the products or services of Mexican firms.

4.1.3. University–Government relationship. The interactions between the university and the government occurred between the UBA of EGADE Business School and several entities of state and federal government.

This is how the UBA obtained an initial fund of $370,000 USD from CONACYT for the development and implementation of the Technology-Based Business Development Program. Given the success of the program, the Ministry of Economy asked the UBA make a second edition of the program by assigning new funds for an amount of $590,000 USD. The recognition of the Ministry of Economy to the UBA of EGADE Business School, as a business accelerator, allowed them access annually to the funds from the federal government to support companies wishing to obtain their services. It also made it part of the Network of National and International Accelerators, where was the TechBA program, which promoted the internationalization of several of the NTBFs mentioned in this study.

The results of each of the interactions between the triple-helix actors have been previously described. The interaction between the government and the other actors in the triple helix is mainly characterized by the provision of resources. Government is key in this regard for the interaction between UBA and Industry, which is characterized by the transfer of different types of knowledge and the creation / access to important collaboration networks. Finally, the Table 3 summarizes the findings found from the interaction between the triple-helix agents.
Table 3. Main results of interactions between triple-helix actors

<table>
<thead>
<tr>
<th>University-Government Relationship</th>
<th>University-Industry Relationship</th>
<th>Industry-Government Relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td>The relationship between UBA and the Government involves public funds to implement the Technology-Based Firms Acceleration Program. It also facilitates the incorporation of UBA into the National and International Network of Business Accelerators.</td>
<td>Through the UBA Program, • The entrepreneurs interacted with advisors from whom they acquire knowledge related to the market. Through the networks provided by the UBA Program, • The entrepreneurs interacted with MBA students from EGADE Business School from whom they acquired market knowledge. • The entrepreneurs interacted with CITES, from whom they were able to acquire technological knowledge, thus improving their product technologically. • the entrepreneurs were able to access different Public and Private Investment Networks.</td>
<td>Through the government, • The company has access to public financing and business consulting, such as FONLIN, INVITE, NAFIN and TechBA.</td>
</tr>
<tr>
<td>Case 1</td>
<td>Through UBA Program, • The entrepreneurs develop their business plan; they also know the needs of the national and international clients. Through the networks provided by the UBA Program, • The entrepreneurs interacted with TechBA, who provided market and internationalization knowledge.</td>
<td>Through the government, the company has access to public financing and business consulting, such as TechBA. These, in turn, make a bridge with important partners - ORACLE - and a large client - Government of Chile.</td>
</tr>
<tr>
<td>Case 2</td>
<td>Through the UBA Program, • Knowledge about potential customers was provided both in the domestic and international market. The advisors provided the knowledge needed to prepare the international strategy of firm. Through the networks provided by the UBA Program, • The entrepreneurs interacted with several public and private institutions (Case 4, TechBA among others) from which the acquired specialized information on business issues that were relevant to the diversification of their markets.</td>
<td>Through the government, • The company has access to public funding of national (IMPI) and international (TechBA) patents.</td>
</tr>
<tr>
<td>Case 3</td>
<td>Through the UBA Program, • The entrepreneurs acquire knowledge related to the internal market. In addition an internationalization strategy for each company was created. Through the networks provided by the UBA Program, • The entrepreneurs interacted with private firms such as Case 3 and Alestra from which they acquired market. • The entrepreneurs interacted with public institutions such as NAFIN, ProMexico and TechBA from which they acquired market and internationalization knowledge.</td>
<td>Through the government, • The company has access to public financing and business consulting, such as CONACYT, TechBA, NAFIN, ProMexico. Some of these institutions promoted the internationalization of the company.</td>
</tr>
<tr>
<td>Case 4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4.2. DISCUSSIONS AND PROPOSITIONS

Our findings based on the interactions of the actors of the triple helix model, allows us to develop some propositions that are detailed below.

First, we argue that technology entrepreneurs in emerging economies may have different characteristics to their counterparts in developed economies. The scholars have highlighted some features of the entrepreneur, such as a high tolerance for risk and a higher capacity for innovation. Similarly, some research from the *International Entrepreneurship* field have emphasized that entrepreneurs have a global mindset (Nummela, Saarenketo, & Puumalainen, 2009). For example, Harvestone *et al.* (Harveston, Kedia, & Davis, 2000) found that the founders of the Born Globals Firms had a much more positive mindset towards globalization compared to managers of firms gradually internationalized. In this regard, our research seems not to coincide entirely with existing literature. Some of our cases had not a positive attitude towards internationalization. Thus, we believe that the NTBFs-UBA interaction, allowed a change of mentality in those entrepreneurs who have an initial negative perception towards internationalization. This may suggest that some entrepreneurs in emerging economies may need assistance from external agent that generates a positive change of mentality towards international activities. Therefore, we propose:

**Proposition 1:** NTBFs entrepreneurs may need an external agent that triggers a positive change of mentality towards entrepreneurial internationalization.

On the other hand, we believe that the acquisition of different types of knowledge is another factor that triggers a change in mentality among entrepreneurs. International Business literature recognizes that opportunities to expand into new international markets arise from the combination of different sources and types of knowledge (Burgers *et al.*, 2008b). In this sense, networks can be important sources of knowledge and of other equally important resources in the process of internationalization of new firms (Johanson and Vahlne 2009). Our results suggest that the resources transferred in the NTBFs interactions with the other actors of the triple helix, are of a different nature.
Regarding to the NTBFs-UBA interaction, our study shows that the four NTBFs in the program of UBA, received a combination of different knowledge types. This makes sense since the UBA program is designed to insert any type of knowledge that participating firms need and thus stimulate their growth. At the same time, the NTBFs who participated in that accelerator program were benefited from access to different types of networks that also provided knowledge. In this sense, we hold that the UBA plays a direct and indirect role in the NTBFs participating. Therefore, we argue the following propositions:

**Proposition 2:** The University Business Accelerators develops a supplier role of different types of knowledge - technological, market and internationalization knowledge - and therefore can directly influence the internationalization of its participating companies.

**Proposition 3:** The University Business Accelerator develops a brokering role of knowledge networks, and therefore can indirectly influence the internationalization of its participating companies.

On the other hand, the relationship between technology-base entrepreneurs with the government is summarized in the transfer of two types of resources. First, the government was related with firms through various funding programs. Second, some government agencies acted as intermediaries and facilitators of different types of networks, which in turn facilitated to NTBFs, the knowledge’s and contacts with international customers. The figure of the government as intermediary of networks is not strange. Recently, O’Gorman y Evers (O’Gorman & Evers, 2011) showed that an Export Promotion Organization (EPO) from the Irish Government, played an important role in intermediation of knowledge and networks, thus influencing the internationalization of new firms related to the EPO. Therefore, in light of evidence we argue the following propositions:

**Proposition 4:** Governments in emerging economies, through its various programs to support new ventures, play an important role as providers of economic resources and therefore can directly influence the internationalization of new firms.
Proposition 5: Governments in emerging economies, through some specific programs to support new ventures, develop a brokering role of knowledge networks, and thus indirectly influence the internationalization of new firms.

In relation to the interaction between the Mexican government (through its various entities) with the UBA, a fairly new relationship is demonstrated. Recent literature indicates that governments are using a range of public policies to promote and strengthen links between universities and firms. Under the premise that the university is naturally a business incubator (Etzkowitz, 2003), many public programs encourage universities to enable them to develop commercially viable technologies and thus linked with industry (Yusuf, 2008). Although, there are other support services for firms, the incubators and business accelerators are one of the most effective instruments to stimulate the creation and development of innovative start-ups (Ahmad & Ingle, 2011). In our study, for example, some Mexican governmental institutions, such as CONACYT were an important support for the creation and strengthening of the UBA. In this regard, policies such as driven through CONACYT have the purpose of strengthen the link between universities and firms, so that these can stimulate innovation, improve their competitiveness and projected in the both domestic and international markets. Therefore, in light of the evidence, we hold that:

Proposition 6: Governments in emerging economies, develop public policies aimed at strengthening the links between universities and firms, and therefore can indirectly influence the internationalization of the new ventures.

Finally, Figure 1 depicts the interactions in a particular environment, where innovation and the links between universities, firms and government are encouraged. In our study, the result of these interactions is characterized by the direct and indirect transfer of diverse resources influencing the rapid internationalization of NTBFs.
Figure 1. The early internationalization of NTBFs as a result of the Triple Helix interactions

Source: Own Elaboration

5. CONCLUSIONS

This study aimed to investigate examine how NTBFs in emerging economies develop their collaborative networks and acquire the necessary knowledge to carry out the rapid internationalization. For this, a longitudinal case study was carried out, through which it is possible to obtain several contributions aimed to different fields of research. First, we suggest that this work is an important contribution to the field of IE, since it is the first research that analyzes the entrepreneurial internationalization from the Triple Helix perspective, that includes the interaction between several institutional actors in a specific environment. This paper responds therefore to the call of Keupp and Gassmann (2009), who note that the IE field would benefit from using qualitative studies describing the deployment of resources and the links of firms before and after their internationalization. The findings obtained in this study suggest, in this sense, that the rapid internationalization of some NTBFs based in emerging economies are the result of a dynamic process of interactions between different institutional actors of an
environment. These results are in line with Guerrero et al. (Guerrero & Urbano, 2016) who point out that this type of collaboration is reinforced when the enterprise has a high-growth orientation. Second, we suggest it is a contribution to the literature focused on the model of the triple helix. Previous literature has emphasized that the triple-helix actors not only perform their own roles, but also supplement the roles of weaker actors, for example, by transferring various types of resources and knowledge (Guerrero & Urbano, 2016; Kim & Lee, 2016). Therefore, this work contributes evidence that corroborates the findings of previous studies, since: 1) different types of knowledge were transferred, including the technological, market and internationalization knowledge; 2) entrepreneurs were allowed access to important networks of collaboration, and finally, 3) was allowed access to various government financing programs. The synergies produced from the transfer of these resources, materialized not only in the creation of new technologies, but also in the rapid internationalization of NTBFs.

On the other hand, the literature that studies the acquisition of knowledge and its influence on the internationalization of firms, often focuses on direct experience or on some specific networks as sources of knowledge (Freeman, Hutchings, Lazaris, & Zyngier, 2010). However, this work is somewhat different, because it explains access to networks and the knowledge acquisition of the companies from a broader and more dynamic perspective, focusing on the interaction between actors embedded in an innovation system. Given the management constraints and the environment barriers faced by new technology-based firms in emerging economies (Ciravegna, López, et al., 2014), the findings of this study suggest that these interactions may represent the reality of several technological companies in this type of economies.

It is also worth noting that there are some limitations to be taken into account. First, both the methodology and the number of cases of this research could be considered a limitation, therefore, the results of this study can not be generalized (Yin, 2014). Some authors suggest that the selected cases will be sufficient if they involve a set of sufficient situations to explain the phenomenon raised in our study objective (see for example, Chetty, 1996; Eisenhardt & Graebner, 2007). We believe this paper meets these conditions. Nevertheless, future research should include quantitative analysis and observe at the influence of triple-helix agents on the
entrepreneurial internationalization of firms in emerging economies. Second, the companies in our study were chosen from a group of ventures participating in a program to accelerate technology-based firms of EGADE Business School. Given the entry requirements, most companies cannot participate in university-driven business acceleration programs. However, there are several forms of university-industry collaboration, such as the contract research, research consortia, consulting and founding of co-operative research centers, among others (Scandura, 2016). Therefore, future research should explore whether other forms of university-industry collaboration equally impact on the international entrepreneurial behavior of companies. Third, although this is the first study to propose a research framework emerging from the intersection between entrepreneurial internationalization and the triple helix model, we are aware that the interactions between the institutional spheres, which represent the triple helix model, may vary depending on the context. It is clear that in other countries there may be other institutional actors, which interact in different ways, and even allow access to a greater variety of types and sources of knowledge for the internationalization of new firms. For example, several research suggests the emergence of user-driven innovation models, which represent a fourth helix in an innovation ecosystem (Miller, McAdam, Moffett, Alexander, & Puthusserry, 2016; Van Horne & Dutot, 2016). It may be probable in this sense that users (quadruple helix) can influence in some way the entrepreneurial internationalization. Therefore, future research should take these considerations into account and observe the role of other institutional actors in entrepreneurial internationalization.

Finally, this study has important practical implications for entrepreneurs and public policy officials. For policy makers, this study presents evidence of the importance of institutional collaborative networks. If policymakers in emerging economies are hoping to improve the competitiveness of new firms, there is still a need to improve corporate access to these institutional networks. It is also necessary to strengthen and create new institutions that disseminate key information for entrepreneurs. This work is relevant since it shows that the Mexican government is playing an important role in stimulating the interaction and collaboration between institutional actors. The result is reflected in the rapid internationalization of the four cases in this study. For entrepreneurs, this study provides information on the benefits
of interacting with both public and private actors, for example participation in the Incubation Centers. For university managers in emerging economies, the University Incubation Centers and their different variants, are a good example to contribute to the competitiveness of new firms and narrow the gap with entrepreneurs.

REFERENCES


Fontes, M., & Coombs, R. 1996. New technology-based firm formation in a less advanced


Visintin, F., & Pittino, D. 2014. Founding team composition and early performance of


