Market Knowledge and Innovation Capabilities in Small Technology Firms from Emerging Economies in Latin America

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Abstract

Technology firms from emerging economies in Latin America are an emerging phenomenon. Institutional environments and the level of industrial development in countries in the region give rise to specific internationalization processes that need to be understood in their similarities and differences with respect to technology firms from industrialized nations. Latin American economies also differ among themselves in the degree in which they have been able to develop favourable contexts for the birth and growth of technology-based firms.

We present results from comparative case study research based on in-depth interviews and secondary data about the ways in which technology firms in Argentina and Mexico find and develop knowledge sources they need to survive and enter global markets. We find important similarities in the ways in which they find partners and build the necessary alliances in order to obtain the technological and market knowledge they need, and in the ways in which such learning behaviours require revisions and adaptations of their original business models.

We also find significant differences in the patterns that technology firms from both countries exhibit in building their collaboration networks, as opposed to those presented by firms from industrialized economies. We discuss the ways in which this research contributes to the knowledge about rapid internationalization processes of (born global) technology firms.

Introduction

Emerging economies' institutions are still rapidly evolving, and in many instances they have not yet resulted in internationally competitive ecosystems for entrepreneurial development. Technology firms born in these contexts face a double challenge: even as they face international competition from aggressive incumbent firms in the markets that they seek to enter, they still

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have to shape their local and global collaborations in order to overcome their local institutional context shortcomings.

Since the last years of the past century, several studies in Latin America (Alcorta and Peres, 1998; Bruton, Ahlstrom, and Puky, 2009; Dutrénit and Arza, 2010; Katz, 2001; Maloney, Manzano, and Warner, 2002; Olavarrieta and Villena, 2014; Sutz, 2000; Velho, 2005) have documented institutional fragilities that in many instances have still not been overcome. Following export substitution policies that were in place in the second half of last century, some countries in the region have assumed more open market arrangements, a fact that, in Mexico at least, has still to result in a strong and more competitive economy that would enable the country to grow at a faster pace. Several countries in the region, like Argentina, Mexico and Brazil, have had economic crises that still mean significant drawbacks for the institutional maturity of their national and regional innovation systems, that still prevent them from achieving the dynamic efficiency effects that would be expected from trade liberalization (Chudnovsky, López, and Pupato, 2006; Geske Dijkstra, 2000).

As a whole, Latin America has invested insufficient resources in science, technology and innovation. Resources allocated to S&T in Argentina, Chile, Brazil, Colombia and Mexico, have gone mostly to basic science, with little regard to its application. Interaction between universities and industry has been very scant, and usually antagonistic. Most of the investment in R&D in these countries comes from the public sector. In many cases this is connected to the fact that import substitution policies have sheltered their local industry from foreign competitors. As some of these countries have opened their economies, their efforts to invest in the development of domestic technological capabilities have taken different forms and have achieved different rates of success (Becerra Rodríguez, Serna Gómez, and Naranjo Valencia. J., 2013; Ciravegna, Lopez,

and Kundu, 2013; Crespi and Zuniga, 2012; Etzkowitz and Brisolla, 1999; Goedhuys and Veugelers, 2012; Hall and Maffioli, 2008; Molina-Domene and Pietrobelli, 2012; Vonortas, 2002). Few of these countries, however, have been able to counteract the institutional weaknesses and market failures that still hamper their innovation systems' ability to support technology-based firms.

Technology Firms in Latin American Emerging Economies

Given these differences in institutional contexts, and the different strategies that countries have followed in trying to develop more technological innovation capabilities, it is important to understand the patterns in the development and growth of technology firms in their midst. Some studies have made headway in this effort (Andrés, Agramunt, and Puccinelli, 2014; Arechavala-Vargas, Madrigal-Torres, and Jaén-Jiménez, 2012; Ciravegna et al., 2013; Lopez, Kundu, and Ciravegna, 2008; Vargas and McCarthy, 2010; Zuniga and Crespi, 2013), but there is still a lot to learn about how technology-based firms are born in different Latin American contexts, and the ways in which the distinct institutional contexts favour their development.

Generally speaking, technology firms from Latin American emerging economies have to find their way in international markets with very little resources, at least as compared to their counterparts from industrialised nations. R&D infrastructure is not as developed as in industrialised nations, venture capital is not as available, and regional innovation systems are still in the process of development. In this context, public research institutes, intermediate organizations, and public policy measures attain a critical significance for the survival of technology firms in the region (Andrés et al., 2014; Vonortas, 2002).

Knowledge Sources in the Development of Technological and Marketing Capabilities in Rapidly Internationalizing Technology Firms

Much research has been reported in the literature about how smaller "born-global" firms overcome their inherent limitations in order to enter global markets: they lack economies of scale and the resources to grow rapidly (Bell, McNaughton, Young, and Crick, 2003; Cavusgil and Knight, 2015; Chandra, Styles, and Wilkinson, 2012; Chetty and Campbell-Hunt, 2004; Freeman, Edwards, and Schroder, 2006; Knight and Cavusgil, 2004). Small and medium-sized firms naturally face constraints and uncertainties and are less able than larger firms to manage uncertainty and risk. They have less resources available to cope with unforeseen challenges and adversity. Personal networks (social capital) are frequently a source of knowledge and support to overcome such constraints (Harris and Wheeler, 2005; Ibeh and Kasem, 2011; Yli-Renko, Autio, and Sapienza, 2001). Studies on the role of networks indicate that small firms are often able to overcome resource constraints and capability limitations when they are in a position to tap into networks that provide them with access to ''external'' resources (Ciravegna, Majano, and Zhan, 2014; Musteen, Francis, and Datta, 2010). Their ability to acquire and exchange knowledge, and their learning capability, in a cooperative effort becomes a key resource (Powell, Koput, and Smith-Doerr, 1996).

Although much of the research in this area has been conducted in industrialized economies, networks have a definitely enabling role for born-global technology firms (Brännback, Carsrud, and Renko, 2007; Brännback and Heinonen, n.d.; Freeman et al., 2006; Freeman, Hutchings, Lazaris, and Zyngier, 2010; Gassmann and Keupp, 2007).

Networks and clusters in Latin American countries are significant enablers of international market knowledge acquisition (Felzensztein, Brodt, and Gimmon, 2014;

Felzensztein, Stringer, Benson-Rea, and Freeman, 2014), although much research still remains to be done about how technology firms develop the networks they need in order to obtain relevant knowledge. Agglomeration of technology firms, for example, is still very incipient, most of them appearing in an isolated fashion, a fact which calls for a need to understand the processes by which they find partner organizations and the ways in which they develop collaboration partnerships that they need to develop their technological capabilities in accordance to market opportunities abroad.

The aim of our study is, therefore, to document and understand the ways in which technology-based firms in Latin America find their way into international markets, given that their technological capabilities are under development, and given that their market knowledge and resources are less than those of the incumbent firms in developed economies that they compete with.

Method

Our research uses a comparative case study approach to gather and organize the data, primarily through the use of in-depth interviews. Comparative case studies methods have been successfully used by small firm researchers (Chetty, 1996) in order to study ongoing small firms within their own context, as well as the business networks in which they function (Halinen and Törnroos, 2005). We seek to use a systematic comparison of cases within two different countries (Mexico and Argentina) in order to identify variables which are systemic in nature (as with respect to the local institutional environment, and the search for sources of knowledge, for example).

We use the grounded theory approach (Corbin and Strauss, 1990; Glaser and Strauss, 1967) in order to explore similarities and differences in the challenges that technology

entrepreneurs face when undertaking their endeavour, and as they learn and develop the technological and marketing capabilities their firms need. Secondary sources were also used to understand the firms' profile, their technologies and the markets they have undertaken to enter. Interview transcripts were analysed with the aid of content analysis software in order to document evidence about theoretically established categories as well as to inductively identify new ones, as relevant to the research questions.

Results

We studied 6 firms, 3 from Argentina and 4 from Mexico, in the software and biotechnology sectors. All of the firms have been founded in the last 10 years and have rapidly entered global markets, although not necessarily having originally planned to do so. All of them also fulfil the criterion of having technological knowledge as their main asset, rather than financial resources or infrastructure. All of the participating firms have built their alliance network after their founding. They have done so empirically and intuitively, mainly in response to problems faced as they needed to obtain technological and market knowledge. Cases are presented under a comparison framework that highlights their similarities and differences under specific variables dealing with their internationalization strategies, the construction of their alliance networks and the sources and nature of the knowledge they gain through them.

Technology firms participating in our study are readily able to generate products for which local markets have little or no demand. A common pattern was found in which recourse to international market was as much a need for survival as an opportunity that could be readily realized, given the necessary changes in their business model. Information and communication technologies enable them to find technological knowledge sources with relative ease, whether

directly from the scientific and technological literature, or with the aid of technology partners, whether locally or from overseas.

However, as these firms enter international markets, finding and obtaining relevant market knowledge presents important challenges. Their efforts tend to use initially local resources to find needed knowledge, but they soon need to find partners abroad, in order to gain the necessary knowledge and to increase their marketing capabilities. Frequently, these developments require significant revisions of their initial business model, a fact that demands very agile decision making in their management teams.

Most of the entrepreneurs participating in the study had significant experience or training either abroad or in MNC's management teams, but not necessarily personal contacts already developed with people or institutions that could help the internationalization effort. According to interviewees' accounts, however, this fact is not so much related to the "psychological distance" tenet about internationalisation processes, as much as the ability to develop technologically differentiated products and services. Frequently, this ability is what represents the opportunity to find technology partners, and in turn these partners provide an easier access to market knowledge.

Discussion

The use of existing networks seems to be at least as important as developing new alliances along the way. While existing networks naturally tend to be local, in all of the cases studied firms needed to find new allies, both local and global, as they faced challenges and uncertainties in the technological field, as well as in the markets they attempted to enter. In most cases, these challenges have forced the firms to change their original business models, sometimes radically. In

all cases, technology and market opportunities tend to be inextricably intertwined, as technological solutions to problems faced usually open new market opportunities.

In the cases studied we find that, in building their networks and alliances, the acquisition of market knowledge is as important as the acquisition of technological knowledge. Given that technology firms from emergent technologies do not have at their disposal strong financial assets in order to develop commercialization capabilities, they usually need to resort to the building of the necessary networks in order to enter international markets. These alliances may be for the purpose of gaining market knowledge only, or even to commercialize their products and services.

Whereas technology firms from industrialised economies tend to guide their decision making in order to maximize technological leadership, decisions in technology firms from emerging economies tend to follow criteria that enable them to maximize the development market capabilities. In order to do that, they will frequently rely on their own technological allies, which may point to useful opportunities that can be exploited with their technologies. Technology firms from emergent economies usually do not have either the resources or the technological infrastructure to open up business opportunities based on disruptive or frontier technologies. In most of the cases studied here, we have found that they exploit business opportunities based on readily available knowledge, which can be brought to the development of new products with collaboration from technology partners that frequently double up as market advisors or allies.

Conclusion

We thus find that technology firms from both Argentina and Mexico exhibit common patterns with respect to several processes that are critical for their survival. In the first place our results indicate that they find technology-based business opportunities that are usually available

in the specialized literature. In contrast to those opportunities exploited by technology-based firms from industrialized economies, their business are not derived from internal research and development of frontier technologies. Given that, they initially develop products and services that can be achieved from readily available technologies, but that have been overlooked by technology or market leaders. They may initially attempt to develop a new product or service either for the domestic or for international markets. As they face challenges and obstacles, they will need the help of local and international allies in order to obtain the relevant knowledge. As they acquire this knowledge, they will frequently need to revise their business models accordingly.

The main differences that we find with respect to technology-based firms from industrialized economies have to do with the availability of venture capital and with the availability of research and development infrastructure in their local environment. This structural factor determines important differences in decision making criteria, as well as in the development of the business networks they need. The understanding of these differences, as well as the understanding of the similarities and differences that national contexts present to these firms in Latin America should help devise more relevant policies, but will also contribute importantly to the theoretical knowledge of internationalization processes in technology-based firms across emergent economies and between them and developed economies. Contributions are also identified in the field of institutional change and evolution within regional and national innovation systems, with the aim of continuing this research as more case studies from new Latin American countries are conducted. A research agenda is also sketched, as pertinent to emerging economies in the region.

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