

Start-up Facilitators, Clustering Effects, and the Internationalization of High-Tech New Ventures

Abstract

This paper aims at contributing to the understanding of the extent to which two types of start-up facilitators – the technology incubator and the technology park – may help the early internationalization of high-tech firms. The study uses the case method of research, and analyses two cases, one of each type of facilitator: Porto Digital and Genesis Institute, both located in Brazil. Primary and secondary data were collected. Primary data was obtained by means of 21 in-depth interview with several actors in both organizations, including firm owners, and other members of the organizations. The results show the specificities of these organizations, and the type of clustering effects they promote, comparing them with clusters that appeared spontaneously.

1. INTRODUCTION

A growing body of literature in recent years has addressed the issue of the rapid internationalization of new ventures (e.g. Bell, 1995; Sharma and Blomstermo, 2003). Yet none of these studies, to our knowledge, dealt with the contribution of technology parks and incubators to the internationalization of high-tech start-ups.

Also, the extant literature on science and technology parks and business incubation has not focused on the specific issue of the internationalization of start-ups, or to what extent these start-up facilitators support the internationalization of their tenants.ⁱ A related stream of research covers the internationalization of industrial clusters (of which technology parks can be considered a special case), but even if internationalization appears as a side-topic in several studies, few of them have focused on this issue. In fact, Maccarini, Scabini, and Zuchella (2004, p.2) suggest that the internationalization of clusters and industrial districts is “an emerging research subject in the international business agenda”. The lack of literature on the internationalization of high-tech start-ups in technology parks and incubators thus presents an opportunity for new studies on the subject.

This paper aims at contributing to the understanding of the extent to which two types of start-up facilitators – the technology incubator and the technology park – may help the early internationalization of high-tech firms. This paper proceeds as follows. In the next section we review the concepts of technology parks and incubators, in order to provide an understanding of these types of organization and their role in the development of high-tech start-ups. Section 3 examines the literature on the internationalization of clusters and entrepreneurial firms, and the factors that seem to accelerate their internationalization. Section 4 presents the methodology adopted in the study. Section 5 describes the results of the study, which are discussed in Section 6. The final section presents the final considerations, recommendations, and limitations of the study.

2. CONCEPTUALIZING TECHNOLOGY PARKS AND TECHNOLOGY INCUBATORS

Technology parks and technology incubators are two different but related forms of start-up facilitators. They differ to some extent, but they have many aspects in common. Their common purpose is to accelerate the creation and development of high-tech new ventures and reduce their failure rates (Aaboen, 2009; Bergek and Normann, 2008). Both are planned, created, and managed to provide an enriching and protected milieu that fosters the development of these firms. In this regard, they differ from the typical cluster or industrial district, that usually appears spontaneously (Porter, 1998).

Technology Parks

There is no consensus on a definition of technology parks. According to the International Association of Science Parks, a technology park, also referred to as a “science park”, is defined as:

“...an organisation managed by specialised professionals, whose main aim is to increase the wealth of its community by promoting the culture of innovation and the competitiveness of its associated businesses and knowledge-based institutions. To enable these goals to be met, a Science Park stimulates and manages the flow of knowledge and technology amongst universities, R&D institutions, companies and markets; it facilitates the creation and growth of innovation-based companies through incubation and spin-off processes; and provides other value-added services together with high quality space and facilities.” (IASP, 2002).

Other definitions indicate that a technology park might be physical or cybernetic (Sanz, 2001). These parks provide the infrastructure, support services, and access to technical and financial networks. They often these parks have incubator facilities to support the creation and early development of new ventures (Sofouli and Vonortas, 2007). They may have not only start-ups and already established entrepreneurial firms, but also large and medium-sized firms attracted by the opportunities and services offered by the park.

Incubators

Definitions of incubators also proliferate in the literature, which is said to be plagued with “definitional ambiguity” (Hackett and Dilts, 2004, p.59). In their often-quoted literature review, these authors offer the following definition of a business incubator:

“...a shared office-space facility that seeks to provide its incubatees... with a strategic, value-adding intervention system... of monitoring and business assistance. This system controls and links resources with the objective of facilitating the successful new venture development of the incubatees while simultaneously containing the cost of their potential failure” (Hackett and Dilts, 2004, p.57).

They emphasized, however, the need to see the incubator as a totality and “not just a shared-space office facility, infrastructure and mission statement. Rather, the incubator is also a network of individuals and organizations...” (Hackett and Dilts, 2004, p.57). Accordingly, Peters, Rice and Sundararajan (2004) indicated that networking and coaching were as relevant to the success of incubation as infrastructure and support services. Another definition is provided by the National Business Incubation Association (NBIA) of the U.S.:

“Business incubation is a business support process that accelerates the successful development of start-up and fledgling companies by providing entrepreneurs with an array of targeted resources and services. These services are usually developed or orchestrated by incubator management and offered both in the business incubator and through its network of contacts” (NBIA, 2005).

There are many different models of incubators. Carayannis and Von Zedwitz (2005) proposed a classification with five types of incubators: university incubator, the independent commercial incubator, the regional business incubator, the company-internal incubator, and the virtual incubator. Grimaldi and Grandi (2005) offer a slightly different typology, and suggest that such variety of types is a consequence of the diversity of needs of incubatees. These typologies are built around the sponsor/stakeholder (Vanderstraeten and Matthyssens, 2008). Another classification takes into consideration the type of activity of the incubator, such as economic development incubators, social incubators, basic research incubators, technology incubators and mixed incubators. Incubators are expected to provide infrastructure, contact with support organizations, and access to technical and financial networks, and to offer monitoring, counseling and coaching services to incubatees. They are created to nurture start-ups and new ventures until they mature enough (“graduate”) to proceed on their own.

The Brazilian experience with incubation is well documented in the international literature (e.g. Almeida, 2005; Chandra and Fealey, 2009; Etzkovitz, Mello, and Almeida, 2005). In 2009, there were around 400 business incubators in Brazil, compared to 1,000 in the U.S., and 500 in China, and Brazil ranked 4th in the world in number of incubators, following the U.S., Germany, and China (Chandra and Fealey, 2009). The incubator studied in this research can be classified as a university technology incubator.

Comparison of the Two Models of Start-Up Facilitators

The main differences have to do with the scope and size of each organization's activities. The incubator focuses on an early stage of a firm's life cycle, while the technology park serves a broader scope of firms, including those in a more advanced stage of their life cycle. In addition, incubators differ from technology parks in the length of stay: temporary in the incubator, more permanent in the park. The services rendered by the two organizations are similar, except for more personalized services of monitoring, counseling, and coaching, which the incubator is more capable of offering

because of its smaller number of tenants. On the other side, because of its larger scale, the technology park is able to manage the flow of knowledge, a service that is typically not expected from incubators, although they do aim at providing access to relevant technical and market knowledge to their incubatees.

Table 1 presents a comparison of the characteristics of the two start-up facilitator organizations examined in this study.

Table 1 – Comparison of Technology Parks and Technology Incubators

	Technology Park	Technology Incubator
Goals	Promote innovation and competitiveness of its tenants	Promote the successful new-venture development of its incubatees
Target firms	Start-ups SMEs already established Large and medium-sized firms Multinationals	Start-ups
Services provided	Infrastructure, space and facilities Contact with support organizations Access to technical and financial networks Management of the flow of knowledge	Office-space facility Contact with support organizations Access to technical and financial networks Monitoring, counseling and coaching Access to knowledge
Size of the organization	Larger	Smaller
Length of stay in the organization	Permanent	Temporary

It should be noted, however, that both organizations offer the benefits of clustering effects, which come from the agglomeration of firms (in this case, high-tech firms) into a limited geographic space, permitting the creation of favorable conditions arising from interactions, such as knowledge generation and diffusion. Transfers of knowledge are of special importance, because they include not only technical knowledge, but also productive and managerial know-how; not only objective, but also tacit knowledge (Scott and Garofoli, 2007), of the type that is of paramount importance to the international development of firms (Forsgren, 2002).

3. INTERNATIONALIZATION OF CLUSTERS, TECHNOLOGY PARKS AND INCUBATORS

In the extant literature on clusters, of which technology parks are sometimes seen as a special case, internationalization appears as a peripheral issue, or in the context of global supply chains. Few studies have focused on how clustering effects may be used to promote the internationalization of firms in a cluster. In this study, we focused on three specific clustering effects: (i) networking, (ii) isomorphism; and (iii) cooperation. In addition, we looked at the role of several actors in promoting the internationalization of the cluster.

Clustering Effects

Networking is one of the most studied clustering effects. In the industrial districts and clusters literature, networks are seen as the essence of a cluster's competitive advantage. A cluster can be conceptualized as a set of inter-organization linkages within the cluster, which permits to build trust, foster cooperation, and reduce opportunistic behavior (Porter, 1990; Iammarino, Sanna-Randacio, and Savona, 2006). In addition, the cluster has linkages with outside organizations of several types, public and private. These are relational assets that can be used to accelerate firms' growth and competitiveness, and also its internationalization. In fact, a recent study of high-tech firms in a Chinese science park brought evidence that export orientation and performance seemed to be associated not only to innovation capabilities, but also to the ability to access global networks (Filatotchev, Liu, Buck, and Wright, 2009).

In addition to the insights provided by the literature on clusters, network theory – one of the main perspectives that compete to explain the internationalization process of firms – also provides a rich set of concepts and empirical research to understand how networks help internationalization. In fact, networks are crucial in the internationalization of smaller firms (Bonaccorsi, 1992; Chetty and Holm, 2000; Sharma and Blomstermo, 2003). There is often a network in the beginning of their internationalization process (Bonaccorsi, 1992). Firms may enter international markets following their networks, or even anticipating the network's move. Other firms use their networks to support them in their first steps of internationalization (Welch and Luostarinen, 1993), while others actively built networks to jump from one foreign market to another. Internationalization itself can be seen as a network of relationships that connects individuals and firms in a country with others in foreign countries (Johansson and Mattson, 1988).

Another clustering effect is isomorphism, a process by which companies in a cluster imitate each other (DiMaggio and Powell, 1991). Isomorphic behavior is a result of proximity and interaction. For this reason, it is in the very nature of a cluster. Therefore, if a leading firm in a cluster goes international, others would tend to imitate, generating a self-fed chain of events, to the point where the whole cluster might become actively involved with foreign markets (Da Rocha, Kury, and Monteiro, 2009).

A third clustering effect is cooperation. It can be horizontal (for example, among smaller firms in the cluster), or vertical (for example, in a supply chain). The level of cooperation in a cluster is associated to several factors such as the local culture, the history of the cluster, the existence of historical ties among its members, the degree of complementariness in their economic activities, the types of institutions of collective governance, among others (Gaggio, 2006). When internationalization becomes a collective project, all firms and entities in the cluster may benefit from it.

The Role of Flagship Firms and Key Individuals

Flagship firms play a pivotal role in cluster development. These firms are formal or informal leaders, being “at the heart of the network” (Ernst and Kim, 2002, p.1422). They can be multinationals (Rugman and D'Cruz, 1997, 2000), or they can be domestic organizations (Ferreira, Tavares, and Hesterly, 2006). These firms are typically responsible for: defining the goals and the strategy to be followed by the cluster;

coordinating the network; maintaining the relationships with external actors (Rugman and D'Cruz, 1997, 2000); absorbing, accumulating, and integrating innovations (Gupta and Subramanian, 2007). They also tend to serve as role models and to exert leadership over other firms in the cluster. Although it does not happen in every case, it is common to find that specific individuals act as leaders in the cluster, and they are often associated to flagship organizations. These individuals play a pivotal role in mobilizing cluster members and providing strategic direction. When considering internationalization, flagship firms and key individuals may signal to other cluster members the benefits of internationalization, and they can actively help the cluster to internationalize (Da Rocha, Kury and Monteiro, 2009).

The Role of External Actors

Several external actors may contribute in different ways to the cluster (Brusco, 1990). The literature points out to two types of organizations that are attracted to the cluster: support organizations of various sorts, and buyers from outside the cluster. Support organizations include government agencies, research institutes, universities, business incubators, nonprofit organizations, industry associations, trade organizations, etc. Many of those often have facilities in the cluster to facilitate the offer of their services. These organizations play a significant role in the development of a cluster, since they provide cost-effective services due to scale and scope economies, concentration and homogeneity of the cluster. In the case of internationalization, support institutions offer counseling and coaching services related to international activities; and they are expected to manage an information flow about foreign markets and overseas operations. They are also supposed to offer personnel training. In the case of internationalization, support institutions would offer counseling and coaching services related to international activities; and they would be expected to provide information about foreign markets and overseas operations.

Foreign buyers may trigger the internationalization process (a paradigmatic example is the Sinos Valley footwear cluster in Brazil reported by Schmitz, 1999a, 1999b). These intermediaries can transfer technical know-how from producers in one country to those in another; they can bridge the gap between supply in developing markets and demand in developed markets; and they can help local firms to mobilize resources and energies to serve foreign markets (Ellis, 2003). On the dark side, they may keep in their hands the control of foreign operations, separating producers in the cluster from the final consumer in the foreign market.

4. METHODOLOGY

This research is an exploratory study using the case method of investigation. The study used two units of analysis. First, it looked at the technology park or incubator as an entity in itself, following the research tradition on business incubators, science and technology parks, and high-tech clusters. Second, it looked at specific start-ups that were nurtured by these organizations and engaged in internationalization processes.

We have selected one case of each type of start-up facilitators for the study, among those considered most successful in Brazil: Porto Digital, a technology park located in the city of Recife, state of Pernambuco, and Genesis Institute, a university business incubator located in the city of Rio de Janeiro, state of Rio de Janeiro. We then studied eight software firms from Porto Digital and five from Genesis Institute that had some degree of international experience. Table 2 provides a comparison of the main characteristics of the two start-up facilitators selected for the study.

Table 2 – Characteristics of Porto Digital and Genesis Institute

Characteristics	Porto Digital	Genesis Institute
Incubation Model	Technology park	Business incubator
Location (city, state)	Recife, Pernambuco	Rio de Janeiro, Rio de Janeiro
Date of creation	2000	1997
Funding	Government, universities, private	Government, university, private
No. of firms	130 high-tech firms	51 high-tech firms

Data collection in Porto Digital was carried out during 2007-2008, and in Genesis Institute during 2009, including both secondary and primary data. Secondary data were extracted from the sites of the organizations studied, as well as dissertations and theses, articles in newspapers and business magazines, and other sources in the internet. Primary data was gathered by means of in-depth interviews with key players in these organizations (Porto Digital and Genesis Institute). Interviewees were company founders and key executives, managers of these two organizations and other participating organizations, as well as specialists. Interviews lasted one hour in the average. A total of 21 interviews were made: 14 in connection with Porto Digital and seven with Genesis Incubator. All interviews were recorded and transcriptions were made of each. Additional consultations by telephone and e-mail were made as analysis progressed.

The analysis started with a complete description of each organization and each of its tenants. Previously selected analytical categories, based on the literature, were then used to organize the data collected for the study.

5. THE INTERNATIONALIZATION OF SOFTWARE FIRMS AT PORTO DIGITAL

Porto Digital is an information and communication technology (ICT) park, located in Pernambuco, the most developed state of Northeast Brazil, a poorer region of the country. It started in July 2000 as an economic development project, combining public and private investment. The State government also provided the park's infrastructure. It is located in a historical site of the city of Recife, the old harbor and port area. The park is managed by a nonprofit organization, the Porto Digital Management Unit. It offers several advantages to member organizations, including a promotional fund, a human capital fund (dedicated to vocational training), and a guaranty fund (providing guarantees to bank loans). In addition, it offers specific financial incentives, including reduction of city taxes, and financing at subsidized interest rates.

After ten years of its inception, the park had 130 small and medium-sized ICT firms, four ICT multinationals (Motorola, Samsung, Dell, and Sun Microsystems), and several other organizations providing a broad set of support and complementary services. The park hosted four “anchor” organizations: SECTMA, the Department of Science, Technology and the Environment of the State of Pernambuco, which is the authority responsible for defining and implementing state policies for science and technology; C.E.S.A.R, the Recife Center for Advanced Studies and Systems, which is both a technology incubator and a research institute; CIn, the IT Center of the Federal University of Pernambuco, which offers academic programs (M.Sc. and PhD in Computer Sciences), and also has a business incubator; and Softex Recife, the Recife Technology Center for Software Exports, that funded and supported several initiatives within Porto Digital, such as the Information Technology Business Center.

Joint Internationalization Efforts at Porto Digital

Porto Digital is considered the largest technology park in Brazil, and one of the most successful in attracting new ventures and established firms, including large multinationals. The city of Recife owes to the park, to a large extent, its present reputation as a center of ICT development in Brazil.

The seeds for the establishment of a center of excellence in ICT in Recife are found in the 1980s, when two businessmen, João Carlos Paes Mendonça, owner of the largest supermarket chain in Northeast Brazil, and Jorge Baptista da Silva, owner of a regional bank, Banco Nacional do Norte (Banorte), gave the necessary stimuli to the development of a local ICT basis. The ICT needs of these firms were partly served by IBM's and Burroughs' subsidiaries in Recife, but they also supported the development of local human capital in the area. Banorte, for example, had its own software house, employing more than 400 technical people. However, when Banorte was sold to Banco Bandeirantes, with headquarters in São Paulo, Southeast Brazil, the acquirer had centralized ICT operations and did not need the Recife software house, which was then closed. Its closure generated a myriad of small new ICT ventures, since firms in the region were unable to absorb these ICT specialists. The same happened when IBM and Burroughs (later part of Unisys) in the 1990s were forced to reengineer their organizations, in response to radical changes in the computer industry. This movement led a substantial number of well-trained and experienced engineers, managers, and technicians to open their own firms, serving specific market niches. The basis for a local indigenous ICT industry was then set. This industry, however, lacked market access to the larger firms in the Southeast and South of Brazil; their development was impeded by the size of the regional market.

A parallel movement was originated by a group of scholars from the Federal University of Pernambuco, under the leadership of Professor Sílvia Meira, an inspired representative of the ICT academic community in Northeast Brazil. These scholars had obtained their doctoral degrees in the U.S. and Western Europe, and believed that Recife had the potential to become a center of excellence in ICT. They created C.E.S.A.R in 1996, a combination of a private research institute and a business incubator, whose mission was to serve as an interface between the university and the market. C.E.S.A.R established offices in São Paulo and Brasília, partnerships with

several universities in Brazil, Germany, United Kingdom, France, India and Luxembourg. Despite local jealousies and rivalry, there is general agreement that C.E.S.A.R. played an important role in the development of the ICT industry of Recife and set a very high standard of excellence to be followed by other local firms and organizations. C.E.S.A.R. participated in the creation of Porto Digital and moved its headquarters to the park just after its inception.

A third initiative, which would later support the creation of Porto Digital, was Softex Recife. In 1992, CNPq, the National Council for Scientific Development, in partnership with the United Nations, created a program to develop the exports of software from Brazil, Softex 2000. In 1996, the program evolved to the creation of the Softex Society, a non government organization dedicated to foster the development of software in the country. Its operational arm in Recife was Softex Recife. According to a member of Porto Digital's Board interviewed for this study, Softex was an important agent to promote cooperation among firms in the park. It showed the value of "institutional cooperation for competition".

Starting two years after its inception, and once the infrastructure was made available, a large number of local small software firms migrated to Porto Digital, and new ventures were established there. Porto Digital grew to become the largest technology park in Brazil. The presence of four large ICT multinational firms in the park created several opportunities for smaller firms to partner and sell their services. Other multinationals, such as IBM, have also established regional headquarters in Recife, although not in Porto Digital. Nokia established the Nokia Institute, "dedicated to building applications on open source platforms", according to the site of Porto Digital.

The environment at Porto Digital provided, therefore, the necessary requirements to nurture and develop small ICT firms. The greatest challenge, however, was to create market access to existing businesses and to new ventures, which meant to access the larger industrialized markets of the Southeast and South of the country. There were, however, no official goals concerning the internationalization of firms in the park. Although efforts to reach the Southern Brazilian markets were quite successful, due mainly to the attainment of a national reputation, the internationalization of Porto Digital was still in its infancy in 2010.

A major effort to create the basis for a broad internationalization movement of firms located in Porto Digital started in 2002, with a program called Integrated ICT Sector Project (PSI), a joint initiative of the Softex Society, Apex-Brasil (the Brazilian Trade and Investment Promotion Agency), and the local agency of Sebrae (the Brazilian Service of Support to Micro and Small Enterprises). Contacts were made in several countries, and distribution channels developed in Germany, the United Kingdom, the U.S., and Italy. Nevertheless, it was difficult for these firms to serve those markets because of their small scale. Therefore, the solution adopted to reach international markets was the creation of a firm in the U.S., a joint venture of several firms in the park.

Noordtek was founded by 35 companies in the next year and started to operate, but the initiative as a whole was unsuccessful. Interviewees attributed the failure to several

reasons. First, Sebrae Pernambuco apparently withdrew its financial support before the operation was strong enough to survive on its own. Second, there was a lack of trust between smaller firms and C.E.S.A.R, and a suspicion that while the costs were shared, the benefits might go mainly to the larger member of this cooperative effort. Third, most firms were not committed to internationalization; they would rather stay in their “area of security” and serve the local and Southern markets of Brazil, which required less effort and offered less risk. Fourth, neither the park nor the firms had an internationalization strategy. One entrepreneur pointed out that “internationalization has no mercy with the lack of a strategy to enter foreign markets”.

Although the initiative failed, several positive spillover effects remained. First, many firms later benefitted in their individual internationalization processes from these efforts, such as the use of distribution channels in foreign countries that were developed earlier. Also, many firms had the chance to participate in foreign fairs and exhibitions and developed contacts overseas. Finally, the initiative had the merit of opening the minds of a number of entrepreneurs in the park to the potential of foreign markets.

Timing of Internationalization and Foreign Markets

Table 3 presents some characteristics of Porto Digital's software firms selected for the study. Four out of the eight firms were founded in the 1990s, while the other four were created in the 2000s. Only two firms of the firms studied already started their activities at Porto Digital; all the others operated previously in another location.

International activities started very early for some firms and later for others: firms that were created after 2000 had their initial sales between 0 and 4 years after inception, while firms founded in the 1990s varied between 4 and 8 years to start their internationalization. Nevertheless, when considering the years after installation in Porto Digital, the average goes down to one year for the five companies that internationalized after moving to the technology park.

Table 3 – Characteristics of the Software Firms from Porto Digital Studied

Firms	Year of Foundation	Year of Location in Porto Digital	Year of internationalization	No.of foreign markets (2008)	Type of software
D'Accord	1999	2002	2003	64	Music
Facilit	1994	2005	1999	1	Portals and virtual communities
InForma	1993	2001	2001	1	Management of physical assets; maintenance
Jynx	2000	2003	2004	2	Games
Meantime	2003	2003	2005	several	Games
Midia Vox	1994	2005	2000	12	Computerized communications
Pitang	2005	2005	2005	2	Software house
Preload	2003	2005	2004	several	Games

The Internationalization Process

Interviewees agreed that the number of firms with any international activities in the park was still quite limited, and even those that had foreign sales did not have a large percentage of their total income coming from overseas markets. They believed that although being a member of Porto Digital facilitated their entry in the larger and more developed markets of Southern Brazil, the technology park was inconsequential to their international activities.

The entrepreneurs interviewed were unanimous in explaining that their internationalization was an individual rather than a group process, independently of whether they had their first international sales before or after locating their facilities in Porto Digital. They saw their internationalization process as a result mainly of their own efforts and the use of personal networks.

In fact, firms indicated basically three motivations to internationalize: a desire of the founders to enter international markets since inception; opportunities provided by the founders' personal networks; and unexpected orders from overseas (usually coming from previous contacts). Some companies showed proactive efforts to internationalize; other companies were essentially passive in their internationalization efforts; they reacted to demands from foreign markets.

When asked whether other firms in the park influenced their internationalization process, two interviewees indicated C.E.S.A.R as their role model; the other three (of the five firms that internationalized after their establishment in the park) emphasized they had followed an independent track. Yet, when asked whether their own internationalization influenced other firms in the park, they generally believed that it did impact other firms' decisions to go abroad. This suggests that isomorphism appears in the park, but it might be a more complex issue than it could appear at first glance.

One additional reason to believe that firm internationalization benefits from the park environment, stimulating isomorphic behavior, comes from a general agreement among interviewees of the considerable advantages deriving from belonging to the park. Among those, networking and sharing are the most important. Networking is defined as the ability "to have lunch with other entrepreneurs or technical people" and "informal conversations between company owners", more than anything else. The proximity of firms invites continuous contacts which in turn promote the flow of technical, commercial, and strategic information among park members. The park is also seen as providing several other advantages that could facilitate internationalization: access to high-quality human capital, personnel training and motivation, easier access to participation in international fairs and exhibitions, and the possibility of combining firms' resources to serve a (foreign) order.

The two incubators in the park generate a continuous flow of new ventures to be established in the park. Spin-offs have also occurred. Contrary to the firms that initially moved into Porto Digital, these new firms were born in the park, and had more ties to their parent organization. They tend to have more cooperative projects among themselves, because of the special linkages that exist among the mother company and

its progeny. One such case is Pitang, a spin-off of C.E.S.A.R, which still develops joint projects with the mother organization.

Multinationals in the park did not seem to act as facilitators of the internationalization process; they would rather use the services of local firms to serve the Brazilian market. Nevertheless, they generated positive spillovers, including a continuous supply of well-trained technicians and managers, subcontracting, technology transfer, and financial support to the park. They also promoted the park's reputation and attracted newcomers. Nokia and Motorola, two of the leading firms in the cellular industry, were potential customers of several new products designed by small firms to serve the mobile games market.

However, other multinationals have played a role in the internationalization process of certain firms. For example, Midia Vox partnered with Avaya, a global corporation competing in the market for enterprise communications systems. After a first project in Chile, Midia Vox rendered services to other subsidiaries of the multinational in several markets. When this process started, however, Midia Vox had not yet established facilities at Porto Digital. Another case is Meantime Games, which was still incubated at C.E.S.A.R at the time of fieldwork. This company established a relationship with Vodafone, one of the leading companies in the global mobile telecommunications industry; Vodafone distributed Meantime products in several countries in Europe, Asia, and in Australia. In both cases, however, the firms had a dependent internationalization process, based on one large customer. While Midia Vox did have the opportunity of being involved in a truly international experience, Meantime used Vodafone as a distribution channel to other markets, without getting experiential knowledge from its international activities.

The role of C.E.S.A.R is undisputed in every aspect of Porto Digital's development, including the internationalization processes of at least a few firms in the park. Because a number of firms in the technology park were first incubated by C.E.S.A.R, they also benefitted from opportunities generated during their incubation period, as well as from their special linkage with the mother organization. C.E.S.A.R is, in fact, the most internationalized organization within the park, and the one with most international linkages. Although it has been a role model for many firms, it was sometimes seen as a powerful competitor, which could take business away from smaller firms. It should also be pointed out the importance of at least one of the founders of this organization, Professor Silvio Meira, described as "a visionary", "very influential", "a man with an exceptional network", "with access to every authority in the state", and "with an unending capacity of attract the attention of the media".

One aspect that also seemed to influence a firm's promptness to internationalize was the specific product-market area where it competed. For example, firms producing computer and mobile games considered internationalization a necessary step for growth, or even survival. The market for games was perceived as a "global market", while the Brazilian market was seen as "too small to have enough scale". To compete in this market a firm needed to sell the product to "at least 500 users" and the product had "to be available in several languages".

Impediments to Internationalization

Entrepreneurs believed that the main barrier to internationalize was the lack of a “Made in” image, since Brazil was not seen as a source of software development by customers overseas, contrary to India, China, or Israel. They were ambivalent, however, when considering cultural barriers. On one side, there was a perception that technical proximity reduced or eliminated cultural distance: it was easy to relate to partners with similar technical background. On the other side, differences in business practices were perceived by some as a serious obstacle to internationalization. Other obstacles perceived were the lack of scale to compete overseas, and the limited access to channels of distribution abroad.

6. THE INTERNATIONALIZATION OF SOFTWARE FIRMS INCUBATED BY GENESIS INSTITUTE

Genesis Institute is part of the Pontifical Catholic University of Rio de Janeiro (PUC-Rio), which is considered the leading private university in Brazil. Genesis Institute has several units, including a technology incubator; a pre-incubator, to support the steps before the foundation of the firm; a cultural incubator, to foster the development of new ventures in the area of Culture & Arts; a social incubator, to support new community ventures; a jewelry design incubator; a “junior consulting firm”, to develop projects and to serve as a “hands-on” experience for university students; training and academic education programs; and several units that offer support services to the incubatees. The technology incubator was the first to be created and to operate.

Internationalization Efforts at PUC-Rio and Genesis Institute

The environment of a university incubator, such as Genesis, differs to some extent from that of a technology park. Its ability to fulfill its goals depends on the type of services rendered by the incubator, as well as those offered by the university. It also depends on the ability of the university to provide an enriching and creative milieu to the entrepreneurs in the specific area of incubation. On this regard, PUC-Rio, where Genesis is located, excels. It has a complete range of academic centers and units which are located in a premium area of the city of Rio de Janeiro, allowing easy contact with other institutions or firms in the city. The departments within the university have close interaction with the incubators, which is facilitated by the proximity of buildings inside the campus. In addition, PUC-Rio has a very large number of international linkages with universities and research centers abroad.

The Incubator, the Institute, or the University, until 2010, did not develop any specific programs, projects, or activities to help incubated firms to go abroad. In spite of this, the Genesis Institute was already a member or had partnerships with several international organizations aiming at the development of new ventures. Nonetheless, most of these organizations were more concerned with innovation and support to new ventures than with internationalization. Aware of these shortcomings in rendering services to support the early internationalization of incubatees, Genesis Institute developed several activities in 2009 to increase its links with international

organizations. In fact, one of the goals of the Institute was to improve its ability to provide counseling and other support services to foster firm internationalization efforts.

Timing of Internationalization and Foreign Markets

According to sources internal to Genesis Institute, a very small number of firms incubated by Genesis had international activities at the time of the study. This information is not totally reliable, since there was no systematic follow-up of firms' activities after some years of their graduation.

Table 4 shows some characteristics of the firms studied that were incubated by Genesis Technology Incubator. All incubated firms studied belonged to the software industry. Of the five firms studied, two were created in the 1990s, and the other three in the early 2000s. The two firms born in the 1990s took 4 and 7 years to internationalize. The three firms created in the early 2000s internationalized between 2 and 4 years after inception. Four of these firms internationalized in the 2000s and one in 1999. Interestingly, three firms started their internationalization after their graduation from the incubator.

Table 4 – Characteristics of the Software Firms Incubated by Genesis Studied

Firms	Year of Found- ation	Year of Location in Genesis	Year of Graduation from Genesis	Year of internatio- nalization	No.of foreign markets (2008)	Type of software
Compera	2000	2000	2003	2004	3	Games
EduWeb	1998	1998	2000	2005	2	e-learning
Milestone	2001	2003	2006	2003	2	Human resources and knowledge management
QuickMind	1995	1997	1998	1999	6	e-learning
SuperWaba	2000	2005	(*)	2003	several	Platform for personal digital assistants and smart phones

(*) The company had not graduated from the incubator at the time of fieldwork.

The Internationalization Process

The entrepreneurs interviewed whose companies were incubated in Genesis had a more favorable view of the role of the incubator in their internationalization than their counterparts of the technology park, with the exception of one, which considered “small” the impact and relevance of incubation for the firm’s internationalization.

The environment provided by Genesis offered three types of opportunities that were propitious to internationalization, which they believed would not be available if they had not been incubated. One was the possibility of connecting to multiple networks, which in turn gave access to opportunities in the domestic market and, in some cases, abroad. Milestone, for example, early in its internationalization participated in a project with a German research institute, by means of a partnership between this institute and PUC-Rio. At the end of the project, Milestone had developed one of its products, with the support of this institute. In addition, PUC-Rio provided opportunities for Milestone’s

partners to spend some months in other countries, thus helping them to develop ties with technical people in foreign institutions. EduWeb's founders also saw the relationships provided by PUC as relevant to the firm's international development. One of the entrepreneurs argued that the relationship with senior professors was a very important means of having access to the professor's network abroad. A founder of QuickMind summarized the role of PUC-Rio in the development of the firm as follows: "What was the contribution of PUC-Rio to the development of my business? Everything. My partners are from PUC-Rio, as well as my ex-partners. People that helped us to get venture capital also were from PUC-Rio. Everything in our experience is connected to PUC-Rio."

A second opportunity was more subtle, but was clearly stated by two entrepreneurs. It had to do with acquiring a certain discipline, a specific mind-set, almost a "brainwash", which included values, norms, and practices (such as the need to plan, to define a strategy, and to organize the business). A founder of QuickMind noted that the incubator and PUC-Rio provided "values and norms that we internalized without even noticing... a way of thinking..." One of EduWeb's founders considered that the relationship with PUC gave him "the basis to think about internationalization, an inevitable path for IT firms..." For him, the key element in the formation of this mind-set was the close contact between incubated firms and the various departments and laboratories of the university.

Visibility was a third important opportunity generated by the incubation process, as the firm could associate its name to PUC-Rio's image. The association with the university's brand name also gave firms credibility in the domestic and, to a lesser extent, in foreign markets. Finally, the incubation period gave firms access to a continuous flow of information concerning both the domestic and the external market, such as information on international fairs and exhibitions, on special programs to support internationalization, etc.

Nevertheless, although the incubator and the university provided an environment favorable to internationalization, the five incubatees agreed in that it did not offer specific services that could facilitate the process, such as market studies, direct contact with potential customers, or even counseling on how to approach foreign markets. In other words, they offered an environment that permitted to access international opportunities, but there were no deliberate actions in this direction.

Entrepreneurs believed that internationalization was a gradual process. In spite of the perception of problems and risks, interviewees considered internationalization a necessary step in their companies' growth. One entrepreneur observed that "software is global by nature"; therefore, a software firm could not avoid entering international markets, it was a natural characteristic of the product-market served by the firm. In addition, entering international markets was perceived as creating future opportunities in terms of international financing and access to venture capital, since only firms with international operations would be able to exploit such opportunities. Inward internationalization was also seen as important; one firm, for example, had a contract with an Indian firm to perform testing services.

Motivations to internationalize in two cases came from PUC-Rio's linkages with international institutions: for example, Milestone and EduWeb used contacts provided by the university, but Milestone did so even before entering the incubator. Initial opportunities abroad also came from the entrepreneurs' personal networks, as in the case of QuickMind. And both Compera and SuperWaba were contacted by foreign customers soliciting their products or services. Although their initiation was reactive, both firms seemed to move to a more proactive behavior as internationalization progressed.

Imitation of other firms that were incubated at the same time or before seemed to be an accepted practice. Entrepreneurs saw it as part of their learning environment and did not deny that one firm in the incubator influenced another, and vice-versa. However, because of the small number of internationalized firms incubated by Genesis, the influence of one firm on another was more based on life stories than on informal contacts. This sharing environment seemed to promote cooperation among firms. In fact, it was not uncommon to have associations between firms incubated by Genesis. Cooperation rather than competition appeared to be the basis of these relationships.

Government agencies and other organizations, such as Sebrae and Apex-Brasil, seemed to have much less importance to these firms than to their counterparts at Porto Digital in their initiation to international markets. Other support organizations, such as Finep and Softex, apparently played a positive, but still distant role. Multinationals played a role in accelerating firm internationalization in certain cases, but not in connection with the incubator. For example, one firm used Microsoft to access different external markets for an e-learning product; another used Yamaha's Brazilian subsidiary to approach other subsidiaries of the firm in foreign markets.

Impediments to Internationalization

Again, the lack of a country-of-origin image for the Brazilian software was seen as the most important impediment to firm internationalization, "since foreign markets do not perceive Brazil as a global player in software development". Lack of foreign networks was also mentioned. One entrepreneur believed that if the incubator provided more opportunities for networking with foreign research institutes and firms, this would certainly be an accelerator of incubatees' internationalization. Interviewees also mentioned the lack of "practical information" to help get started in international business, and information about potential export markets.

Another limitation concerns the availability of resources to dedicate to overseas business. One major resource was management time. For example, QuickMind opened a subsidiary in the U.S. with a local partner; this was seen as the only way of operating abroad, since the entrepreneur had his attention focused in the domestic market and did not have time to develop the business in the U.S. However, despite these efforts, the percentage of foreign sales on total company sales was very small. In addition, the availability of financial resources was perceived as a major barrier, and most firms preferred to continue to invest in the opportunities presented by the domestic market. The need for frequent travelling was another perceived obstacle, since it required resources that were not available to a small entrepreneurial firm.

7. DISCUSSION

We have examined in this study three types of clustering effects: (i) networking; (ii) isomorphism; and (iii) cooperation.

Inter-firm linkages in a technology park, although similar to those described in the literature on industrial clusters and districts, differ in some important aspects. When a cluster appears spontaneously in a given geographical location, people not only work, but they also live their lives in the cluster (Becattini, 1990, 1991). Thus, relationships are not only work-related, but they also belong to the realm of kinship, friendship, politics, and religion. Therefore, networks based on different levels of interaction coexist in natural clusters. The embedding of multiple networks in natural clusters, although to some extent redundant in terms of participants, puts in motion systemic interactions of a kind that is not as easily found in a technology park, where ties among individuals are mainly of a technical nature. Porto Digital did not seem to be an exception in this regard. In comparison, Genesis' incubatees seemed to be more fully embedded in the environment of the university. Part of the reason is that these were typically young entrepreneurs, and most of them graduated from PUC-Rio. They spent, therefore, most of their adult lives at the university, and were strongly influenced by it.

Linkages between Porto Digital's SMEs and other organizations were many, especially when considering the presence of multinationals and of several support organizations. The flagship organization at Porto Digital, C.E.S.A.R, also displayed a considerable number of outside linkages. However, the most effective linkages seemed to be with Brazilian organizations, rather than international organizations. The same stands for Genesis, although less for PUC-Rio.

The entrepreneurs interviewed in this study, without exception, recognized these linkages (both inter-firm and external) as the outstanding advantage of being a member of a technology park or incubator. In their view, relationships within these organizations had mainly positive impacts on business growth. They disagreed, however, when evaluating their impact on their firm's internationalization.

Isomorphism is an important and frequently observed result of clustering (DiMaggio and Powell, 1990). Firms in Genesis displayed more this behavior than those at Porto Digital. The reasons could be associated to their origin; while most Porto Digital firms already existed before the creation of the park, Genesis' incubatees, in most cases, were born in the incubator, and their founders very often were educated at PUC-Rio. In addition to the fact that Porto Digital's tenants came from different backgrounds, they were more heterogeneous with respect to size than Genesis' incubatees. As indicated earlier, incubatees at Genesis tended to share PUC-Rio's organizational culture and values, and to learn similar business practices, while many tenants at Porto Digital have had the opportunity of developing their business culture and to adopt business practices before moving to the park. Homogeneity, as well as a common ancestry, seems to make firms more prone to isomorphic behavior (Lazerson and Lorenzoni, 1999).

In the case of Genesis, imitation of successful firms in the incubator, or that had already graduated, was considered part of the learning process, and therefore stimulated by the organization. At Porto Digital, firms were prouder of their own culture and achievements; in this situation, entrepreneurs would probably tend to be more individualistic. Therefore, imitation might not be considered a desirable behavior, or one of which entrepreneurs should be proud of. Nevertheless, although most firms at Porto Digital were unable to see their internationalization as a result of park membership, it appears that, at least to some extent, imitative behavior concerning internationalization was also occurring at Porto Digital. Imitative processes may happen in a subtle and often unconscious manner in a cluster. It is in the midst of informal contacts that important decisions are taken, new ideas are disseminated, technical information is exchanged, and experiences are shared. Because of the elusive nature of these interactions, entrepreneurs might not be aware of how much their mind-set and their actions are shaped by their counterparts. In a sense, they are absorbing the culture of the cluster – a phenomenon similar to an individual being raised in its own national culture.

Another clustering effect is cooperation (Iglori, 2001; Markusen, 1995). In the case of Porto Digital, this study identified a joint experience designed to unite the efforts of a group of firms to enter foreign markets, but the experience was not successful, the main reason probably being lack of trust.

The participation of several government agencies, at the state or federal level, universities, and private associations had a very positive impact in the development of Porto Digital. As to Genesis Institute, its location within one of the best Brazilian universities and the several linkages between the incubator and government and private organizations also positively impacted the development of incubatees. Nevertheless, the absence of links with foreign institutions is noteworthy. Neither organization – Porto Digital or Genesis Institute – had a network of foreign universities and institutes with strong linkages, although both showed, at least on paper, some international connections, which could at best be defined as weak linkages. But the university (PUC-Rio) offered to its incubatees what Genesis lacked: a network of foreign institutions, which could be accessed using the various departments and laboratories of the university, whose professors and researchers had the person-to-person ties within these foreign organizations. The use of these networks, however, depended on which department, or which professors were associated to the project. It very much depended on luck. As to Porto Digital, the flagship organization – C.E.S.A.R – also displayed several ties with foreign organizations which could eventually be used by Porto Digital's tenants. These ties were not readily available to smaller firms, and their use depended on their connection with C.E.S.A.R.

Porto Digital had a strong advantage over Genesis Institute because of the presence of ICT multinational corporations' facilities in the park. This advantage, however, did not seem to be, as one might expect, a facilitator of internationalization. Subsidiaries of multinational firms typically used the services rendered by Porto Digital's tenants to serve the Brazilian market. In spite of that, multinationals appeared in several of the cases examined as a distribution channel in foreign markets for software products of

tenants of Porto Digital and Genesis. In these cases, the relationship between the entrepreneurial firm and the multinational was not a result of its presence in the park or incubator, but rather an independent event. It is possible that in the future, with the expansion of Brazilian exports of software, and the creation of a positive country-of-origin effect, multinationals will more readily become distribution channels of Brazilian software abroad, as they create a network of software developers in Brazil. Such outcome is not necessarily only positive, since smaller firms may be alienated from direct contact with international markets, and, as a consequence, may not acquire the experiential learning believed to be crucial to the development of their internationalization processes.

The flagship organization in Porto Digital is C.E.S.A.R., not the multinational firms (Ferreira, Tavares, and Hesterly, 2006; Rugman and D'Cruz, 1997, 2000). It stands as a role model for smaller entrepreneurial firms, because it is also a domestic organization, whose initial competences and resources were limited, and also because of the role played by its founder, a well-known and admired member of the cluster. This organization played a central role in the creation and coordination of the cluster, providing strategic leadership, relating to players external to the cluster, and attracting new partners. In addition, it provided incubatees and spin-offs to the cluster.

8. CONCLUSIONS AND RECOMMENDATIONS

The two nurturing organizations examined in this study present several similarities and differences, and it is to some extent difficult to compare them. This study's results showed that although both start-up facilitators displayed some of the clustering effects expected, these effects were to some extent limited, when compared to "natural" clusters. Networking was the most important clustering effect in these two start-up facilitators. Even then, it was limited to technical networking, lacking other aspects of the community life, so well presented by Becattini (1990, 1991) and other scholars that studied the Italian industrial districts. The other two effects studied – isomorphism and cooperation – were not as easily observed in these organizations.

It is well documented in the literature of international entrepreneurship and born globals the role played by networking in promoting firm internationalization. Entrepreneurs use their personal and firm relationships to enter foreign markets, while building new ones. The more diversified (non-redundant) these connections, the higher the probability of success in attaining international presence in overseas markets. Under this perspective, a major contribution of the start-up facilitator would be to provide as many international ties as possible, in order to increase the probability of successful internationalization by their tenants. A major recommendation to these start-up facilitators is that they should aim at helping their tenants to connect to international networks of research institutes, customers, suppliers and complementors (Carayannis and Von Zedtwitz, 2005).

This study has several limitations. The two organizations chosen for analysis – Porto Digital and Genesis Institute – although quite successful in Brazil, are not necessarily representative of other experiences. Many studies have indicated that certain

characteristics of technology parks and incubators are associated to the degree of success of start-ups (Lendner and Dowling, 2007; Sun, Ni and Neung, 2007). There is no reason to believe that this is not also the case when considering the ability of a start-up to internationalize. This research, however, has not explored in-depth the characteristics of start-up facilitators in the internationalization process of new high-tech ventures. Therefore, this is an avenue for future research. Another limitation is the choice of Brazil as a locus of research. There is some evidence of a location effect on the characteristics and performance of clusters and incubators, as well as in the appearance and characteristics of born globals (Dib, Da Rocha and Da Silva, 2010; Sun, Ni and Neung, 2007). The research also suffers from limitations typical of the methods used, including post-decision bias, since interviews with founders and managers of the firms were conducted after the decision to internationalize was actually made.

References

- Aaboen, L. (2009). Explaining incubators using firm analogy. *Technovation*, 29 (10), 657-670.
- Almeida, M. (2005). The evolution of the incubator movement in Brazil. *International Journal of Technology and Globalization*. 1(2), 258-277.
- Becattini, G.. (1990). The Marshallian industrial district as a socioeconomic notion. In: Pyke, F.; Becattini, G., & Sengenberger, W. (eds.). *Industrial districts and inter-firm cooperation in Italy*. Geneva: International Institute for Labour Studies.
- Becattini, G.. (1991). Italian industrial districts: problems and perspectives. *International Studies of Management & Organization*, 21(1), 83-90.
- Bell, J. (1995). The internationalization of small computer software firms: a further challenge to 'stage' theories. *European Journal of Marketing*, 29(8), 60–75.
- Bergek, A., & Norrman, C. (2008). Incubator best practice: a framework. *Technovation*, 28 (1/2), 20-29.
- Bonaccorsi, A. (2002). On the relationship between firm size and export intensity. *Journal of International Business Studies*, 23: 605–35.
- Brusco, S. (1990). The idea of industrial district: Its genesis. In *Industrial districts and inter-firm cooperation in Italy*. In: Pyke, F., Becattini, G., & Sengenberger, W. (eds.) Geneva: International Institute of Labour Studies, p. 10–19.
- Carayannis, E.G., & Von Zedtwitz, M. (2005). Architecting gloCal (global-local), real-virtual incubator networks (G-Rvins) as catalysts and accelerators of entrepreneurship in transitioning and developing economies: lessons learned and best practices from current development and business incubation practices. *Technovation*, 25(2), 95-111.
- Chandra, A., & Fealey, T. (2009). Business incubation in the United States, China and Brazil: a comparison of role of government, incubator funding and financial services. *International Journal of Entrepreneurship*, 13 (special Issue), 67-86.
- Chetty, S., & Holm, D.B. (2000). Internationalisation of small to medium-sized manufacturing firms: A network approach. *International Business Review*, 9: 77–95.
- Da Rocha, A., Kury, B., & Monteiro, J. (2009). The diffusion of exporting in Brazilian clusters. *Entrepreneurship & Regional Development*, 21(5), 529-552.

- DiMaggio, P.J., & Powell, W.W. (1991). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. In: Powell, W.W., & DiMaggio, P.J. (eds.). *The new institutionalism in organizational analysis*. Chicago: The University of Chicago Press, 5–28.
- Ernst, D., & Kim, L. (2002). Global production networks, knowledge diffusion, and local capability formation. *Research Policy*, 31, 1417–29.
- Etzkowitz, H., Mello, J.M.C., & Almeida, M. (2005) Towards “meta-innovation” in Brazil: the evolution of the incubator and the emergence of a triple helix. *Research Policy*, 34(4), 411-425.
- Ferreira, M.P., Tavares, A.T., Hesterly, W. (2006). Evolution of industry clusters through spin-offs and the role of flagship firms. In: Tavares, A.T., & Teixeira, A. (org.). *Multinationals, clusters and innovation: does public policy matter?* New York, Palgrave MacMillan, 87-106.
- Filatotchev, I., Liu, X., Buck, T., Wright, M. (2009). The export orientation and export performance of high-technology SMEs in emerging markets: the effects of knowledge transfer by returnee entrepreneurs. *Journal of International Business Studies*, 40 (6), 1005-1021.
- Forsgren, M. (2002). The concept of learning in the Uppsala internationalization process model: A critical review. *International Business Review*, 11: 257–77.
- Gaggio, G. (2006). Pyramids of trust: Social embeddedness and political culture in two Italian gold jewellery districts. *Enterprise & Society*, 7(), 19–57.
- Grimaldi, R., & Grandi, A. (2005). Business incubators and new venture creation: an assessment of incubating models. *Technovation*, 25(2), 111-126.
- Gupta, V., & Subramanian. R. (2008). Seven perspectives on regional clusters and the case of Grand Rapids office furniture city. *International Business Review*, 17: 371–84.
- Hackett, S.M., & Dilts, D.M. (2004). A systematic review of business incubation research. *Journal of Technology Transfer*, 29 (1), 55-82.
- Iammarino, S., Sanna-Randacio, F., & Savona, M. (2006). Obstacles to innovation and multinational firms in the Italian regions: Firm-level evidence from the Third Community Innovation Survey. In: Tavares, A.T., & Teixeira, A. (eds.) *Multinationals, clusters and innovation: Does public policy matter?* New York: Palgrave, 63–83.
- IASP – International Association of Science Parks. (2010). About Science and Technology Parks. 2002. Available in <http://www.iasp.ws/publico/index.jsp?enl=2> (access on April 18, 2010).
- Iglori, D.C. (2001). *Economia dos clusters industriais e desenvolvimento*. São Paulo, Iglu.
- Johansson, J., and L.G. Mattson. 1988. Internationalization in industrial systems – a network approach. In: Buckley, P.J., & Ghauri, P.N. *The internationalization of the firm: A reader*. London: Academic Press, 303–21.
- Lazerson, M., & Lorenzoni, G. (1999). Resisting organizational inertia: The evolution of industrial districts. *Journal of Management and Governance*, 3, 361–77.
- Lendner, C., & Dowling, M. (2007). The organization structure of university business incubators and their impact on the success of start-ups: an international study. *International Journal of Entrepreneurship and Innovation Management*, 7 (6), 541-556.
- Maccarini, M.E., Scabini, P., & Zucchella, A. (2006). Internationalization strategies in Italian district-based firms: theoretical modeling and empirical evidence. In: Conference on Clusters, Industrial Districts and Firms: The Challenge of Globalization, Modena. Modena: Facoltà di Economia Marco Biagi, 2006. Available in: www.economia.unimore.it. Access 23 jun 2008.

Markusen, A. (1995). Áreas de atração de investimentos em um espaço econômico cambiante: uma tipologia de distritos industriais. *Nova Economia*, 5(2), 9-44.

NBIA – National Business Incubation Association. (2005). What is business incubation? Available in: http://www.nbia.org/resource_library/what_is/ (access on April 18, 2010).

Peters, L., Rice, M., & Sundararajan, M. (2004). The role of incubators in the entrepreneurial process. *Journal of Technology Transfer*, 29 (1), 83-91.

Porter, M.F. (1998). Clusters and the new economics of competition. *Harvard Business Review*, 76(6), 77-94.

Rugman, A., & D'Cruz, J. (1997). The theory of the flagship firm. *European Management Journal*, 15, 403–12.

Rugman, A., & D'Cruz, J. (2000). *Multinationals as flagship firms: regional business networks*. Oxford: Oxford University Press.

Sanz, L. (2002). Available in: <http://www.iasp.ws/publico/index.jsp?enl=2> (access on April 18, 2010).

Schmitz, H. (1995). Small shoemakers and Fordish giants: tale of a supercluster. *World Development*, 23(1), 9–28.

Schmitz, H. (1999a). Global competition and local cooperation: Success and failure in the Sinos Valley, Brazil. *World Development*, 27, 1627–46.

Schmitz, H. (1999b). Collective efficiency and increasing returns. *Cambridge Journal of Economics*, 23, 465–83.

Scott, A.J., & Garofoli, G. (2007). The regional question in economic development. In: Scott, A.J., & Garofoli, G. *Development on the ground: clusters, networks and regions in emerging economies*. London: Routledge, 3–22.

Sharma, D.D., & Blomstermo, A. (2003). The internationalization process of born globals: a network view. *International Business Review*, 12: 739–53.

Sofouli, E., & Vonortas, N.S. (2007). S&T parks and business incubators in middle-sized countries: the case of Greece. *Journal of Technology Transfer*, 32, 525-544.

Sun, H., Ni, W., & Leung, J. (2007). Critical success factors for technological incubation: case study of Hong Kong science and technology parks. *International Journal of Management*, 24 (2), 346-363.

Vanderstraeten, J., & Matthyssens, P. (2008). Business incubators and the internationalization process of their start-ups. Paper presented at the CIMaR 2008 Meeting, Rio de Janeiro, Consortium for International Marketing Research, 2008.

Welch, L.S., & Luostarinen, R. (1993). Inward-outward connections in internationalization. *Journal of International Marketing*, 1(1), 46–58.

ⁱ As to the internationalization of incubators and their incubatees, the writers of this paper did not find any previous research covering this topic. The only scientific paper on the internationalization of business incubators and their incubatees was a communication presented by Vanderstraeten and Matthyssens (2008) during the CIMaR 2008 meeting in Rio de Janeiro, Brazil. Unfortunately, their research was still in

progress and no results were presented in the conference. They also reported that they were unable to identify previous studies.