Inter-Organizational Knowledge Sharing in Incubated Companies: Reality or Myth?

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Abstract: The incubator provides incubated companies with support to help to turn their ideas into feasible businesses; they have access to the university facilities, such as libraries, researchers and physical space, etc., and enjoy the benefits of the science and technology park (STP) structure. Such an environment may enable inter-organizational knowledge sharing (IKS), which may occur between incubated companies (SU); between SU and companies and entities resident in the STP; between SU and the university; and between SU and companies or associations outside the STP. This research aims to analyse IKS considering the relations of the SUs with other companies and organizations located in a STP. For this purpose, a qualitative research was carried out among companies incubated within a university business incubator in a STP in Brazil. These companies were chosen because the incubator and the STP have received awards for the results obtained in their period of operation. The incubator was established in 2003. Data were collected through interviews with the managers of 20 SUs, which are engaged in different areas of business, have been operating within the incubator for between six and fifty-eight months and have up to ten employees. The main benefits cited by the respondents in relation to IKS were increased sales and networking, as well as the improvement in their products and services. While improved processes was a benefit mentioned by only three of the SUs. This indicates an association between IKS and results. The IKS in the respondent SUs can be characterized as informal, with little concern for documentation. This may be related to the small number of employees in these companies, who perform various functions and have less time to generate documentation, while also feeling less need for documentation due to the ease of physical contact between them because of the lack of hierarchical levels and the fact they share the same physical space. The formal initiatives taken to create opportunities for knowledge sharing between the companies are provided by the management of the incubator. However, there is noticeably little interaction between the SUs and the entities and companies resident in the Science and Technology Park, so there is the possibility of leveraging such relationships. The research results indicate that IKS is not a myth, but it is not yet a reality. That is, it is an opportunity to be leveraged by the incubator for the benefit of the incubated companies, as is the encouragement of documentation.

Keywords: knowledge sharing, incubators, science and technology parks, inter-organizational

1. Introduction

Globalization of markets and economies demands that companies present differentiated products and services in order to keep their customers. One of the ways to succeed in doing that is to adequately use the knowledge that exists within the company to offer innovative solutions. Knowledge is understood to be “information combined with experience, context, interpretation and reflection” (Davenport et al., 1998, p. 43).

Knowledge is seen as a company asset, and as such, must be managed and renewed. Identify the necessary knowledge to achieve the objectives of the company is one of the keys for the success. Managers must encourage their co-workers to share knowledge among themselves, and verify if knowledge is available to all of those who need it, even if it’s outside the company. Inter-organizational knowledge sharing (IKS) can be understood as a process, in which one unit is affected by the knowledge of the other unit. One way to encourage knowledge sharing is to place the company geographically close to other, in order to facilitate people’s interaction.

Science and Technology Parks (STP) in Universities shelter companies from different business sectors and sizes (start-ups and residents), in areas close to laboratories, research institutes, libraries and University researchers. The incubator in a STP is the place in which start-ups (SU) receive incentive and have access to the knowledge they need to maintain competitiveness. These parks may be a good environment for the creation and development of companies, creating jobs, providing quick solution to problems and reducing the time employed in product and service development, accelerating the *time to market* and promoting innovation. Geographical proximity can facilitates the relationship between companies, bringing positive reflexes on innovation, however, it is not a guarantee.

There is a gap in the literature regarding inter-organizational knowledge sharing among start-ups. University-based incubators are relevant for the economic development of the regions (Bergek and Norman, 2008). The

focus of this research is on knowledge sharing between start-ups of a university-based incubator part of a STP in Brazil.

2. Knowledge sharing and incubators

2.1 Inter-organizational knowledge sharing

Companies face situations in which they have to break paradigms to satisfy the needs of the market in which they operate (Grant, 1996; Lawson et al., 2009). The situations can be of many sorts, such as legislation particularities, doubts or problems with clients, creation of new products or services and evaluation on the competitors' positioning. Collaborative alliances between companies can be more important than their very own research and development departments (Valkokari, Paasi and Rantala, 2012). An example of this tendency of integration is the announced made by two traditional competitors in the automotive business, General Motors and Daimler-Chrysler, about the development of products together (Husted and Michailova, 2010). Inter-organizational knowledge sharing involve two or more companies of the same business or of complementary business and even competitors.

Spinello (1998) states that knowledge sharing relations between companies are dynamic, and names this process knowledge chain. This knowledge chain is made of two dimensions: conscience and response capacity. The author explains that external conscience is the capacity the company has to search knowledge in other places. Internal conscience reflects the companies' resources and also its necessities. Internal conscience indicates not only who knows what and what they know, but also what they need to know. The author affirms that companies without conscience are immobilized before the market's needs. The internal response capacity is that which habilitates the company to answer to the market's needs, develop new products or benefit from an economical opportunity. Lastly, the external response capacity is the condition a company has to successfully place their new products or services in the market. To increase the chances of success, the company has to involve its targets audience in development.

Knowledge is classified in tacit, which is difficult to be formalized, and explicit, which is structured and documented (Nonaka, 1994; Nonaka and Konno, 1998). Small and medium-sized companies mainly adopt informal conversations to share knowledge (McAdam and Reid, 2001), which are based in tacit knowledge.

The knowledge sharing mechanisms are presented by Oliveira, Maçada and Curado (2014). The authors classified the mechanisms in technological (for example, wiki) and non-technological (for example, face-to-face meeting). Saito et al. (2007) calls non-technological mechanisms as practices and technological mechanisms as technologies. The mechanisms adopted for IKS are associated with the codification and personalization strategies presented by Hansen et al. (1999). Codification most of the time demands technological mechanisms, while personalization needs technology support only when people are dispersed geographically.

The research of Yang and Kim (2007) shows that the sharing of knowledge and information among companies is based on: a) perception of benefit, which is the gain of some competitive advantage when sharing it with others; b) norms of cooperation, which define how much the company is willing to share its knowledge and information; c) relative strength, which is the capacity of one company to influence the other in its decisions and d) the competence of the companies' information technology in potentiating and coordinating knowledge and information sharing.

In companies that do not incentive their workers to share knowledge, the capacity to innovate is smaller, because the experience of their workers is not used to gain competitive advantage in the market in which they act (Hansen, 2002). In companies that incentive and prioritize knowledge sharing, the chance of success should be bigger. The will to share knowledge depends on the confidence between the different levels involved in the process (Holste and Fields, 2009) and it is up to the managers to create conditions, tools and processes to stimulate co-workers to share knowledge (Nonaka and Konno, 1998).

The development of new products and services, the innovation and the solution of problems will be more agile if knowledge is available to those who need it (Burk, 1999). Sharing knowledge may increase productivity and productive processes, and create new business opportunities, helping the company to achieve their goals (Yi, 2009).

Sharing knowledge can reduce turnover, because it contributes with the improvement of organizational performance (Reychav and Weisberg, 2009). Companies that learn to share knowledge will raise their productivity and have more satisfied workers (Brian, 2011). Gurteen (1999, p. 35) says that knowledge sharing is important to companies because: "New knowledge leads to sustainable competitive advantage, in the form of competitive intelligence; Tacit knowledge resides in the mind of employees, and this knowledge is lost when they leave the organization; Companies do not know what they know; Knowledge is received and applied in one part of the company is not used in others; Changes in information and communication technologies may cause changes in business and society". In some companies, for example, fifty percent of what was up-to-date five years ago may be obsolete today.

2.2 Company incubators

IASP (2002) defines STP as an organization managed by specialized professionals, whose main objective is to increase the wealth of their community by promoting a culture of innovation and competitiveness of its member companies and institutions based on knowledge. According to IASP (2002), "In order for these goals to be accomplished, a science park stimulates and manages the flow of knowledge and technology between universities, research and development institutions, companies and markets, that facilitate the creation and growth of enterprises based on innovation through incubation and process spin-offs, and offers other value-added services along with high quality space and installations".

The common point in all definitions of incubators (Ahmad and Ingle, 2011; European Commission, 2002; National Business Incubation Association, 2014; Mian, 1997) is that their goal is to help start-ups to become self-sufficient after the incubation time. Incubation happens so that companies have more chances of survival after leaving the incubator (Grimaldi and Grandi, 2005). An incubator has four main objectives: 1) to collaborate for economic development, 2) to aid in the commercialization of technology, 3) to increment regional development and 4) to promote entrepreneurship (Al-Mubaraki, Sharp and Busler, 2013).

One of the goals of an incubator located in a university is to support academics so that their researches have commercial viability (Ahmad and Ingle, 2011). The incubator offers to start-ups: physical space, business support and business network (Bergek and Norrman, 2008; Becker e Gassmann 2006). The business network can leverage the inter-organizational knowledge sharing.

The start-ups are similar in size (Carayannis et al., 2006). In relation to large companies, the start-ups have advantages (for example, few hierarchical levels) and disadvantages (for example, few resources) for knowledge sharing (DiPasquale, 2010). The graduation process occurs when companies leave the incubators (Bergek and Norrman, 2008), which happens normally in up to two years. In some cases, the incubation time may be extended due to factors that delay the beginning of the companies' operations, such as operating licenses or special conditions, such as legislation changes. In other cases, the company may be kept a while longer in the incubator because it may still need its support to operate (Al-Mubaraki, Sharp and Busler, 2013).

2.3 Knowledge sharing between star-ups in a STP

This research will analyse knowledge sharing between start-ups in a STP considering three dimensions: type of knowledge (what?); mechanisms (how?); industry (who?); benefits obtained by sharing (why?). These dimensions are presented in Table 1.

Table 1: Analysed dimensions

Dimensions	Categories
Type of knowledge (What?)	Management; products and services
	Tacit; explicit
Mechanisms (How?)	With Information Technology; Without Information Technology
	Formal, informal
Industry (Who?)	Complementary; competitor; client; supplier; any
Benefits (Why?)	Business; products and services; management

3. Method

The work's general objective is to analyse how start-ups in a university-based incubator share knowledge between themselves, in the manager's point of view. As these relations may be formal or informal, and may

occur in different ways among companies, the qualitative approach was used in this research (Malhotra, 2002). The data were collected using semi structured interviews. This is a cross sectional type of research, with data collected in a specific period of time.

The interviews were accomplished considering an interview guide (questions about socio-demographic characteristics and four dimensions mentioned before), which was validated by a doctor specialized in the subject. Initially, contact was made with the managing body of the Science and Technology Park (STP) which provided the names, telephone numbers and e-mails of the companies' administrators. Twenty semi structured interviews were made with the administrators of twenty different companies incubated, and each interview lasted from twenty to fifty minutes. Apart from these twenty start-ups, the incubator shelters four more companies, which didn't want to participate in this research. In the STP, besides the start-ups, there are five professional associations and fifty three companies of different sizes. The STP may reach more than a thousand collaborators. To maintain data confidentiality, start-ups will be named SU01 until SU20.

The interviews were transcribed, categorized and afterwards analysed using the MAXQDA® software. Bardin (2008) defines content analysis as "a set of communication analysis techniques". The content analysis was made according to what's recommended by Bardin (2008). According to the literature review, the categories were clustered in four dimensions: 1) type of knowledge; 2) mechanisms; 3) industry; 4) benefits. The dimensions and categories used in the analysis are presented in the literature review (Table 1).

4. Data analysis

The companies incubated have one to ten employees. This size complies with Bollingtoft and Ulhoi (2005), who say that companies leave the incubator when they reach the size of fifteen to twenty collaborators. According to Hytti and Maki (2007), smaller companies are the ones who most enjoy the benefits of incubators.

The start-ups are incubated in periods ranging from six to fifty eight months, and the average incubation time is twenty two months. The incubators' policy establishes that the maximum time frame is two years, but in special cases (such as legislation changes or legal barriers) that delay the companies' installation after signing the incubation contract, the incubator allows companies to extend that time frame. It is aligned with Al-Mubaraki, Sharp and Busler (2013). This time frame extension occurred for the companies SU01, SU02, SU03, SU04, SU05, SU06, SU07 and SU08. The Table 2 summarizes the companies' socio-demographic data. In Table 2, the column labelled "Employees" indicates how many people work at the company, considering associates and effective workers. The "Associates" column shows how many of the collaborators are associates, and the "Venture Capital" column indicates if the company has received or receives venture capital any time in its history.

Table 2: Socio-demographic data

Company	Employees	Associates	Incubation (months)	Venture Capital
SU01	8	2	58	No
SU02	6	2	57	No
SU03	4	2	45	No
SU04	8	2	36	No
SU05	2	2	31	No
SU06	2	2	29	No
SU07	10	5	28	Yes
SU08	6	2	28	No
SU09	3	2	24	No
SU10	2	2	22	No
SU11	2	2	22	No
SU12	2	2	22	No
SU13	6	2	14	No
SU14	2	2	13	No
SU15	2	2	10	No
SU16	4	4	9	No
SU17	2	2	8	No
SU18	1	1	7	Yes
SU19	6	3	6	No
SU20	2	2	2	No

Table 3 shows type of knowledge shared and type of employees. The "Employees" column shows whether knowledge sharing is practiced only by the managers, only by the other workers or by everyone. The intra-organizational knowledge sharing column shows whether the company demonstrates concern about internally sharing the knowledge obtained inside the STP, and the Area of Knowledge columns indicates whether the company shares knowledge about management or products/services, or both.

Table 3: Type of knowledge and employees

Company	Employees	Intra-organizational knowledge sharing	Area of knowledge
SU01	All	No	Management
SU02	Managers	No	Both
SU03	All	No	Management
SU04	All	No	Both
SU05	Managers	No	Products/Services
SU06	All	No	Management
SU07	All	No	Products/Services
SU08	Managers	Yes	Management
SU09	All	No	Products/Services
SU10	Managers	No	Management
SU11	Managers	No	Both
SU12	Managers	No	Management
SU13	All	No	Management
SU14	All	No	Management
SU15	Managers	No	Both
SU16	Managers	Yes	Both
SU17	Managers	No	Management
SU18	All	No	Both
SU19	All	No	Both
SU20	All	Yes	Management

Table 3 shows that fifteen percent (15%) of companies are concerned with internally share knowledge collected from other companies in the STP and forty-five percent (45%) of them share knowledge only through their managers. Moreover, only one of the companies incubated for more than two years has shown intra organizational knowledge sharing concerns. It suggested that companies encourage the knowledge sharing at all hierarchical levels as recommended by Nonaka and Takeuchi (2009).

The little experience in management of companies (Hytti and Maki, 2007) is verified in this research considering that ten interviewed reported sharing knowledge only about management. Considering the companies that, in addition to management, share knowledge about products and services, the amount rises to eighty-five percent (85%). These percentages corroborate Chank and Lau (2005), who claim that SU have greater self-sufficiency in technical and productive areas than in the management area.

The start-ups are small, and very dependent on immediate results as mentioned by Burke (2011). This is perceived on Table 4, which shows the benefits expected by respondents when they share knowledge. The most cited benefits, about thirty six percent of the respondents, are directly linked to corporate earnings. This is corroborated by Isabelle (2013), which states that people form and maintain their networks when they want to realize their own interests. This may be a consequence of the small number of employees and the focus on short-term results. This can be illustrated by the interviewed from SU02, who said: "Look, when I share, I am trying to make of the other part a customer". The fact that they are installed in an incubator contributes to the business structure is lean, and this may be indicative of small concern with benefits such as cost reduction and access to information, as shown in Table 4.

Table 4: Benefits

Expected Benefit	Number of SU	Percentage	Accumulated percentage
Increase business results	12	36,36	36,36
Networking	9	27,27	63,63
Better quality in products/services	4	12,12	75,75
Enhance processes	3	9,09	84,84

Expected Benefit	Number of SU	Percentage	Accumulated percentage
Cost Reduction	2	6,06	90,9
Better information access	1	3,03	93,93
Increase entrepreneurship	1	3,03	96,96
No benefits expected	1	3,03	100,0

The most widely used IKS mechanism by the interviewed managers is the e-mail. The probable causes of this can be low cost, easy access to this feature and the fact documenting the issues discussed. Managers rarely cited the use of social networks, websites and electronic folders as mechanism for IKS.

The six most cited IKS mechanisms that do not involve the use of information technology. In this set of six most cited, two are related directly to business (face-to-face meeting and meeting of incubated). Knowledge sharing happens more in informal situations, which is aligned with Lam and Lambermont-Ford (2010). These informal settings, however, do not favour the explicit knowledge, but favour the benefit of networking cited in Table 4, which can help companies achieve their goals, which is aligned with Swift and Hwang (2013).

Only the SU04 respondent cited concern in documenting collected knowledge from other companies. The lean structure and the small number of employees make the SU very dependent on the tacit knowledge, as pointed out by Oliveira et al. (2014). This is evidenced by the SU16 respondent, who said "The SU16 has never had a documented partnership with another company, to collaborate or share information."

According to Rollins (2011), the size of the company interferes with knowledge sharing relations. In this research, it was not possible to verify (Table 5), for example, the interviewed SU16 said: "No matter. It has graduated companies that were very good friends, we socialized a lot here, had lunch always, graduated, left the park and we are still, of course, the relationship, right.". The relationship with larger companies may be beneficial to the SU, it can show them how they share knowledge and take advantage of sharing processes.

Table 5: Size

Size	Number of companies
Any size	8
Equal	5
Only bigger	4
Not mentioned	2
Only smaller	1

Table 6 summarizes the results obtained for the analysed dimensions. The age and size of the start-ups could be part of the explanation of the results. The number of employees makes difficult documentation (explicit knowledge), which could in part explain the preference for informal IKS, based on tacit knowledge, without use of information technology. Nevertheless, the codification is relevant for the companies growing.

Table 6: Results of analysed dimensions.

IKS Dimensions	**Categories**
Type of knowledge (What?)	Management (17 SU); Products and services (10 SU)
	Tacit > explicit
Mechanisms (How?)	Without Information Technology > With Information Technology Meetings; E-mail
	Informal > Formal
Industry (Who?)	Area – Complementary (15 SU) Size – Any size (8); Equal (5)
Benefits from (Why?)	Increase business results; Networking

5. Conclusions, limitations and future research

In this research was analysed the inter-organizational knowledge sharing between start-ups, considering the type of knowledge, the mechanisms and the benefits. The research results indicate that IKS is not a myth, but it is not yet a reality. Most of the start-ups shares knowledge about management, without support of information technology, in an informal way. Increase business results and networking are the most cited benefits associated to IKS. This results is probably facilitated by small number of employees and reduced number of hierarchical level in the SU.

This results showed that incubator as well as STP do not exploit all the opportunities arising from the fact that the start-ups are geographically close. The small structure proved to be one of the barriers faced by companies to share knowledge. The small number of employees cause accumulation of functions and makes managers prioritize short-term actions, in areas that are of their own knowledge, failing to invest time interacting with companies from other branches and sizes. The small structure also has an impact on knowledge sharing with entities that can be strategically important for the SU. The lack of interaction between companies can be the result of activities of accumulation, due to the reduced number of employees.

Growth is the goal of all companies, but the current scenario shows that sustainable growth is based on knowledge, and this knowledge is used and generated by people. Respondents managers are focused on the benefits of sharing aimed at the achievement of growth purposes On the other hand, show little concern with the benefits that knowledge-sharing can bring to their employees. Encourage employees to share knowledge internally and with other companies can benefit those who donate and those who collect knowledge. Donors can show that their knowledge is important for everyone and collectors of knowledge will be shortening the achievement of your goals. In any of these situations, employees should be aware that the knowledge it possesses is also an asset of the company and, as such, should be passed and documented. Incorporate external knowledge is important not only to the productive areas of the company, but also for managers.

The knowledge sharing mechanisms without the use of information technology are exploited by companies. The mechanisms that use information technology can be used to explore other opportunities. The creation of blogs and wikis demonstrating knowledge of the company in the technical and management areas can also be encouraged by managers.

The contribution provided by this research is useful both for the incubator and start-ups, as it shows a diagnosis of is being done related to IKS, and the aspects that can be developed. From an academic standpoint, this research contributes by presenting the dimensions related to IKS (type of knowledge, mechanisms, industry and benefits). The results also highlights that can be developed to leverage IKS.

This research major limitation is the data collection through only one interview on each company. As future research, we intend to seek other evidence on the IKS between the SU, as well as to analyse the relationship of the companies with the University and the external environment to the STP. Also as future research, it is suggested to compare the reality of companies located in different STPs.

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