
Territory, innovation processes in SMEs, and intermediary actors: the case of the ICT sector in the Greater Montreal Area

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Abstract: In this paper, we are interested in the role of the intermediary actors of a given territory and their relation to the innovation process in small businesses. Innovation and technological change evolve differently in small businesses than in large companies that have more resources and can afford the cost of research and development. Four main factors determine innovation in small businesses: strategic advantages (or market opportunities); technological competencies; organisational capacities and the decision-making process. During the innovation process, small businesses usually need the assistance of intermediary actors in order to access external resources. Those intermediaries assume what we call an 'intermediation function', that is essential for the innovation process. By using the concept of 'intermediation function', we have suggested a classification of the intermediary actors according to their contributions to the innovation process. We found that these contributions could be in the commercialisation of the product, in the knowledge base, in the financial and human resources or as sources of information. Among these contributions, the knowledge base is the one that appears to be most important for the development of small businesses and is the main contribution of the intermediary actors.

Keywords: innovation process; intermediary actors; cluster; small business; Canada.

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1 Introduction

Knowledge is increasingly recognised by researchers from diverse disciplines as a fundamental resource of production, making it an essential factor in our contemporary economy. Many studies from the economic and social sciences have shown that innovation has a territorial dimension that determines the dynamic of the innovative process and that, as a consequence, the innovative capacity of businesses depends on the characteristics of the territory where they are located. Of these studies, some examine clusters, such as those by Marshall (1890), Porter (1990) and Maskell (2001), while others focus on innovative milieus (Camagni and Maillat, 2006; Matteaccioli; and Tabaries, 2007) as well as the link between proximity, innovation, and the competitiveness of businesses. Other studies that investigate the territorial dimension of innovation are associated with innovation systems or apply this approach along with associated concepts, such as: ‘learning region’, ‘regional innovation system’, ‘creative cities’, and ‘innovative milieu’ (see Pilati and Tremblay, 2007). All these different concepts can be associated with the phenomenon of the territorialisation of innovation. However, studies on the territorial dimension of innovation have generally been oriented toward the analysis of the proximity effects on the innovation process or the results.

In this paper, we are interested in the role of the actors of the territory and their relation to the innovation process in small businesses. Innovation evolves differently in small businesses than in large companies that have more resources and can afford the cost of research and development. Four main factors determine innovation in small businesses: strategic advantages (market opportunities); technological competencies (that comes from the technological trajectory, the training, the technological intelligence, and the networks); organisational capacities; and the decision-making process [Julien, (2002), p.14]. Access to a network of actors promotes interaction and the learning and transfer of competencies, according to the evolutionist theory of innovation. These actors may be located in the same territory as the company, but could just as well be based elsewhere, including in other countries. This is the framework that guides our research. Our approach starts by identifying the actors of the territory who participate in the process and then determine their role in the innovation process of SME. Our

theoretical framework is based on the innovation systems approach, according to which the limits of a system determine the actors that are taken into consideration in the process. Some authors determine the limits by considering the spatial or geographical dimensions (Nelson, 1993; Lundvall, 1992; Freeman, 1987; Cooke et al., 1997), while others consider the sectorial dimensions (Malerba, 2005), and still others the technological dimensions (Carlsson and Stankiewicz, 1995). The main concepts that emerged from the research about the limits are the *national innovation systems*, the *regional innovation systems*, the *sectorial innovation systems*, and the *technological innovation systems*. For this study, we adopted the regional innovation systems approach and examined the information and communications technologies (ICT) sector in the Greater Montreal Area in order to identify the actors who participate in innovation. We chose the ICT sector because competitiveness in this sector depends mainly on innovation, and also because many intermediary organisations in this sector are associated with the innovation process. According to an analysis of the external sources of information on innovation, based on data from the Survey of Innovation 2005 from Statistics Canada for the ICT sector (see Table 1), the intermediaries (clients, associations, universities) and intermediation activities (trade fairs, exhibitions, etc.) play a greater role in the innovation process in ICT than in the textile and aeronautic industries. We begin this paper with a discussion of the state of research on innovation processes, followed by a presentation of our research questions, our scientific contribution, our research methodology, the results obtained, and finally our analysis. We conclude with the lessons to be drawn from the research and future perspectives.

2 Literature review

2.1 Innovation process

2.1.1 Description

According to the evolutionist approach, innovation is a ‘coupling process’ (Freeman, 1982). In other words, it should take account of the market as much as the technological progress. The innovation process is also uncertain (i.e., its result cannot be determined in advance), collective, interactive, and cumulative. To innovate, small businesses must interact with other actors in order to access resources that constitute essential inputs for innovation. These interactions can take place internally (e.g., between marketing, production, and research and development (R&D) departments) and externally (e.g., with consultants, other firms and consumers). In both cases, they facilitate the acquisition of competencies for innovation (Kline and Rosenberg, 1986). Innovation requires competencies that, acquired over time through learning processes, contribute to creating a knowledge base. This learning may take place internally with the renewal or improvement of routine practices, or externally with the use of technology by the clients and the sharing of information with other organisations (Darchen and Tremblay, 2013). A systemic approach to analyse innovation can be used to identify the actors of the process, who may be individuals or organisations. Among the organisations are R&D and educational institutions, manufacturing businesses, consumers, and venture capital. These different organisations perform their activities within the system, i.e., within an institutional setting that frames their behaviour (Edquist, 2001). These activities are the

functions of the system that allow us to evaluate its performance. The relations may be between the organisations, between the organisations and the institutions, or between the institutions.

Table 1 Sources of information of high importance for innovation

	<i>Manufacturing industry ICT</i>	<i>Aeronautic products industry</i>	<i>Textile industry</i>
Internal sources			
Research and development (R&D) staff	73.1	62.5	51.4
Sales and of marketing staff	51.8	19.2	32.4
Production staff	23.9	18.3	35.6
Management staff	27.3	18.3	33.3
Other plants or R&D laboratories in the firm	10.7	-	14.4
Sources from the market			
Suppliers of equipment, materials, components, or software	26.7	-	33.5
Clients or consumers	69.5	-	47.2
Competitors or other firms in the sector	19.0	-	15.2
Consultants	3.6	-	9.9
Commercial laboratories or R&D firms	1.7	-	5.7
Institutional sources			
Universities or institutes of higher education	5.3	-	3.4
Colleges or technical institutes	0.0	-	1.1
Federal government research laboratories	0.7	-	1.2
Provincial or territorial government research laboratories	0.0	-	-
Private non-profit research institutes	1.2	-	3.4
Other sources			
Conferences, trade fairs, and exhibitions	30.1	13.5	16.0
Scientific journals and trade or technical publications	15.4	-	10.7
Investors (banks, venture capitalists, etc.)	2.0	-	2.3
Industrial associations	2.7	-	5.7
Internet	21.4	-	7.6
Experienced risk-takers or entrepreneurs	9.2	-	3.5

Note: For confidentiality purpose some data in the aeronautic industry from Statistics Canada survey are missing in the table.

Source: Quebec Data, Statistics Canada, Survey of Innovation (2005)

2.1.2 *Process and location*

The location can influence the interactions and thereby the innovative capacity of businesses (Klein et al., 2003; Fontan et al., 2005; Pilon and Tremblay, 2013). The role of

location in the interactions has been shown in prior research on clusters, in particular in studies by Marshall (1890) and Porter (1990) and in research on innovative milieus (Camagni, and Maillat, 2006; Matteaccioli and Tabariès, 2007). According to Marshall, the relationships between firms that form clusters are characterised by cooperation as well as competition. They cooperate either formally (e.g., the purchase of raw materials) or informally (e.g., exchange of information). This allows them to realise external economies of scale by sharing infrastructures, services, and know-how and by reducing their transaction costs. Maskell (2001) complements this theory by showing that the improvement of the possibility of knowledge creation explains the existence of the cluster. This improvement is achieved by reducing the costs for coordinating the dissemination of knowledge and also by resolving problems related to asymmetry of information. The firms join clusters in order to benefit from the knowledge and collective learning that allows them to innovate more rapidly and to remain competitive in the context of a knowledge-based economy. Porter (1990), by linking the phenomenon of clusters to the competitiveness of businesses or industries, shows that those who get together benefit from competitive advantages, in particular through increases in productivity and the capacity to innovate. Other researchers (Camagni and Maillat, 2006; Matteaccioli and Tabariès, 2007; etc.) applied an approach using the concept of the 'innovative milieu',¹ which is based on the premise that, over time, with the clustering of the actors, interdependencies form, develop, and give rise to a way to learn and to cooperate within the collective of actors (businesses, research and training institutions, local public organisations, etc.) that make the milieu innovative. The cooperation takes the form of networks of actors who have expectations with regard to the competencies, practices and attitudes of their members. The actors, although interdependent, nevertheless make strategic choices in the management of their material and immaterial resources and maintain a relative independence and autonomy. Moreover, access to knowledge is essential in the innovation process. This knowledge may be codified or tacit. The latter is a lot more important because it is not available on the market. Unlike codified knowledge, it is difficult to express through the rational language of signs and words. According to Gertler (2001, p.7), "the tacit dimension of knowledge exists in the background of our consciousness, enabling us to focus our conscious attention to specific tasks and problems". Ambrosini and Cliff (2001) by reviewing the work of several authors (Polanyi, 1962, 1966, 1976; Nonaka, 1991; Sternberg, 1994; Ravetz, 1971) have outlined four features of tacit knowledge. First, tacit knowledge cannot be formalised easily as opposed to codified knowledge that can be written and shared through articles or books for example. Second, tacit knowledge is personal knowledge; in others words, it is embedded knowledge and cannot be shared without the intervention of the owner. Third, tacit knowledge is practical and finally context specific (related to a product, a particular market or technology, etc.). Finally, tacit knowledge is acquired through the execution of a particular job in a particular situation that could be for example during the process of manufacturing a product with a particular technology.

The sharing of tacit knowledge requires interaction between individuals or organisations that share the same values, language, and culture. This contributes to establishing trust between individuals or organisations, which is an essential condition for facilitating collaboration. Thus, given that tacit knowledge can be transmitted only through interactions, geographic proximity becomes a key factor for exchanges, explaining the interest of the concentration of firms in certain regions and the constitution

of clusters or industrial zones. However, other authors (Darchen and Tremblay, 2013; Tremblay et al., 2002) underline the importance of relational proximity, beyond physical or geographic proximity. Moreover, tacit knowledge is intrinsic to the individual ('embodied knowledge'), contrary to codified knowledge, which can be learned from training or teaching institutions, or even from manuals. The availability and retention of these 'talents' (Florida, 2000) in a given geographic space thus becomes a challenge for companies, cities, regions, and countries, as these talents participate in the innovation process. These talents are attracted or localised in environments that correspond to their criteria and that offer attractive conditions. This issue is a topic of debate (see Pilati and Tremblay, 2008; Darchen and Tremblay, 2008; Pilon and Tremblay, 2013); however, attractive factors could be quality of life, diversity, and the accessibility to social and economic systems (Florida, 2000).

2.1.3 Processes and intermediary organisations

The study of intermediaries can be done on the basis of actors and at national, regional, or local levels. According to Howell (2006, p.720), intermediation can be defined as:

An organisation or body that acts as an agent or broker in any aspect of the innovation process between two or more parties. Such intermediary activities include: helping to provide information about potential collaborators; brokering a transaction between two or more parties; acting as a mediator, or go between, for bodies or organisations that are already collaborating; and helping find advice, funding and support for the innovation outcomes of such collaborations.

The literature review on intermediary actors reveals a typology of those who participate in the innovation process and sheds light on the different roles they play. Pittaway et al. (2004) have studied the link between business networks and the capacity for innovation. Their study revealed that the diversity of partners is beneficial for the innovation process, in particular with the integration of different knowledge bases, practices, and ways of thinking. These partners can be suppliers, clients, or third parties (trade and business associations, consultants) or scientific partners (universities), and each play a role in the innovation process. Doutriaux (2003) has studied the role of universities in the development of clusters in the high-tech industry in Canada (telecommunications and biotechnology – Toronto; pharmaceuticals and aeronautics – Montreal) by analysing the evolution of the most dynamic eleven high technology clusters of Canada between the years 1980 and 1990. The results of his study showed that universities are major catalysts rather than initiators of the creation and development of businesses in the high-tech sector. Moreover, they participate in the construction of the local knowledge base that allows clusters to develop and grow. Dalziel (2006), using data from the 2003 Survey of Innovation of Statistics Canada, showed that industrial associations are facilitators of innovation ('enabler role') and that they have a huge impact on the capacity of Canadian businesses to innovate. Smedlund (2006) studied intermediation at the regional level on the basis of the approach of the regional innovation system. He classified the intermediaries as organisations that can act at the national, regional, or local level. He also showed that the intermediaries in a regional innovation system play an important role in the creation and stimulation of the network dynamics, in the sharing of innovation strategies between actors, and in the attraction of the anchor tenants in the region. A survey of Statistics Canada allowed us to

confirm some of these elements for the different sectors that are included in our research (see Table 1).

Howell (2006), by reviewing the studies on intermediaries, shows that the intermediaries can be organisations (associations, etc.) and that the roles that emerge are dissemination, technology transfer, or business support. Dissemination and technology transfer include the following activities: information transfer, decision-making support, evaluation of new technologies, identification of partners, technology transfer, and stimulation in the formalisation (license or contracts) of the relations of informal collaboration. The transfer of knowledge or technology, for its part, consists of: facilitating the process of transferring knowledge and technology, helping businesses that do not benefit from network externalities, helping in the transformation of ideas and knowledge to be transferred, and providing solutions derived from a new combination of existing ideas. Lastly, the business support consists of: helping in the adaptation of solutions according to the specific needs of the businesses; promoting links between the actors of the technological system; participating in the development of the policies; and assisting with the implementation of links or the transformation of relations in a network or an innovation system. The organisations are the ‘superstructure’ (intermediaries) that helps to facilitate and coordinate the flux of information toward the businesses that are the infrastructure (‘substructure’), that is to say, those that generate innovations.

Table 2 Roles of the intermediaries

<i>Authors</i>	<i>Typology of intermediaries</i>	<i>Roles identified</i>
Pittaway et al. (2004)	Suppliers, clients, trade and business associations, consultants, universities or research laboratories	Networking, integration of the knowledge bases
Doutriaux (2003)	Universities	Catalysts of the creation and development of high-tech firms, building of the local knowledge base
Dalziel (2006)	Industrial associations	Enablers of innovation
Smedlund (2006)	Organisations at the national, regional, or local level	Creation and stimulation of the network dynamics, sharing of innovation strategies between actors, attraction of anchor tenants to the region
Howell (2006)	Associations	Dissemination of knowledge, technology transfer, business support

3 Research questions and scientific contribution

In our research, we use a combined approach (meso and micro) in order to understand the role of the intermediary organisations, which constitutes one of our scientific contributions to the analysis of intermediation in innovation. The main objective of our research is to try to determine the role of the intermediaries in the innovation process of businesses of the ICT sector in Montreal. Our aim is to identify the actors of the territory who participate in the process and to determine the intermediation functions that are related to the innovation process of SMEs in the ICT sector. Our research questions are formulated on the basis of these above-mentioned research objectives.

- Q1 Who are the intermediaries who participate in the innovation process of ICT firms?
- Q2 What are the intermediation functions assumed by these organisations?
- Q3 Are these functions associated with the inputs of the innovation process in the businesses?

4 Methodology

4.1 Data collection and methodology

Our research is part of a larger research project at the Canadian level on regional innovation systems in various metropolitan areas. Our research team only covered Montreal and has focused on the intermediary actors within the aeronautical, textile and ICT sectors in the Greater Montreal Area, while others studied other sectors in other Canadian regions, depending on the most important sectors in the region. Our research uses a combination of a qualitative and quantitative methodology. The quantitative data comes from the survey of ICT realised by Statistics Canada in 2003 and 2005, and the qualitative data comes from interviews conducted in the field, in Montreal. In our research, we have interviewed seventeen intermediary organisations, but only seven interviews are used here, since the others do not concern the ICT sector. We also collected data from firms for a data triangulation purpose. The data concerning the firms will be presented in another paper that is in progress, but serves here as secondary data for confirmation purposes. The selection of the intermediaries was based on their relevance to our research objectives. This article is based on the data from the interviews held with the intermediary organisations and the review of the documentation available from their websites and annual reports.

The interviews conducted with the targeted intermediary organisations have been transcribed and codified with the qualitative analysis software NVivo 8 on the basis of the topics that correspond to the inputs of the process identified by Adam et al. (2006).

4.2 The respondents

As mentioned above, while we identified and interviewed 17 intermediary organisations in the area, there were only seven intervening in the ICT sector. These are the actors who participate in innovation and intermediation activities in this industry. The ICT sector was chosen because it is one of the important sectors of activity in Montreal, a sector where competitiveness is determined by innovation and where many intermediary organisations are involved in the innovation process. The respondents for this study are presented in Table 3².

Table 3 Overview of the respondents

<i>Type of intermediary organisation</i>	<i>Number</i>	<i>ID</i>
Associations	3	Org. 1, Org. 2, and Org. 6
Research and training centre	2	Org. 3, Org. 7
Government programme manager	1	Org. 5
Incubator	1	Org. 4

Table 4 Definition of the intermediation functions

<i>Intermediation functions</i>	<i>Definitions</i>
Venture capital	Putting entrepreneurs in relation with the local or foreign suppliers of venture capital through promotion activities at determined intervals.
Interaction	Putting entrepreneurs in relation with networking activities at determined intervals.
Learning	Organising training and exchange activities between the firms to facilitate the transfer of or access to competencies.
Markets for new products	Organising activities that allow entrepreneurs to make new connections with potential clients that will allow them to find new contracts for their innovations.
Tacit knowledge	Organising activities that allow entrepreneurs to be coached or to benefit from specific experiences that resemble the specific situation they face with regard to a particular problem.
Codified knowledge	Disseminating information on the evolution of knowledge in the industry through the publication of documents that are made available on a regular basis to businesses or to facilitate access to this form of knowledge.

Table 5 Inputs of the innovation process

<i>Inputs</i>	<i>Measurement indicators</i>
Human resources	People involved in innovation activities (number, competencies, experience, and level of education) Propensity to innovate (attitudes and practices promoting innovation)
Material resources	Financial value
Financial resources	Amount
Ideas	Number
Knowledge base	Codified knowledge (patents) Tacit knowledge (more difficult to measure)
Sources of information (networks)	Links with other organisations Method of collecting information internally and externally
Strategy	Existence or not
Organisational structure	Work organisation (functional, specialisation, teams, etc.) Perception of the work environment
Culture	Degree to which the vision is shared Level of risk-taking Working environment
Selection process	Existence and effectiveness of tools for selecting projects
Management style	Speed Tools for process management (innovation activities) Internal and external communication system
Marketing process (planning, marketing, sales)	Number of products launched per period

4.3 The operationalisation of intermediation and the analytical framework

For the purposes of our study, we considered intermediation as the realisation of a set of functions (Edquist, 2001) that contribute to the availability of the main inputs of the innovation process in businesses. The definitions associated with these functions were obtained from our literature review, while the preliminary data was collected in the field (see Table 4). The inputs were selected on the basis of a multidimensional evaluation framework of the innovation process that was developed by Adam et al. (2006), a framework which is more oriented toward measuring the product innovation process. This suited us, as product innovation is particularly important in the ICT industry. Following a literature review on the measurement of innovation management in companies, Adam et al. (2006) proposed a framework for the management and evaluation of the innovation process on the basis of the inputs identified in Table 5. By establishing links between these elements, in our analysis of interviews, we tried to identify the intermediation functions that can be associated with these process inputs.

5 Findings

Our analysis allowed us to identify the intermediation functions on the basis of data on the mandates, the activities, as well as with the interviews. We then established the link between the identified intermediation functions and the inputs required for the process in order to see to what degree their realisation by the intermediary organisations can have an influence. These results are presented in Tables 6 to 8.

Table 6 presents the mandates and activities of intermediaries and intermediation functions associated with it. These functions are identified from the inputs used in the process of innovation that entrepreneurs can gain from their participation in these activities. We observed that the functions of intermediation related to venture capital and learning are carried out by Org.1, Org. 2 and Org. 4. The functions of intermediation interactions, tacit knowledge and markets are carried out by Org.1 and Org. 2. The intermediation related to codified knowledge is assumed by Org. 1, Org. 2, Org. 3, Org. 5 and Org. 6. Finally, the functions of research and development are carried out only by Org. 3 and Org. 5. This intermediation function of research and development can be categorised as intermediation function for codified and tacit knowledge, if one considers the type of knowledge that can result from it. The identification of the intermediation function was also done using the information collected through the interviews with the managers of the intermediary organisations. The data collected from the interviews were intended to validate or complete those we got from the documentation and the websites of the intermediary organisations. The results are presented in Table 7. We found out that some intermediation functions are confirmed while others are added. The intermediation function of venture capital is confirmed for Org. 4 but the function of tacit knowledge is added. The functions of intermediation for interactions, tacit and codified knowledge are confirmed for Org. 2. The intermediation function related to new markets is confirmed for Org. 1 and that of codified knowledge is validated for Org. 2, 3, 5 and 6. For Org. 3, the intermediation function of tacit knowledge is added while research and development is confirmed.

Table 6 Functions of intermediation vs. activities

<i>Intermediary organisation</i>	<i>Mandate</i> ¹	<i>Activities</i> ²	<i>Associated intermediation functions</i>
Org. 1	Support and accelerate the growth and competitiveness of its industry by considering all its stakeholders	Activities for search of venture capital partners or new sources of financing Knowledge and networking activities New markets and search activities	Venture capital, interactions, learning, markets for new products, tacit knowledge, codified knowledge
Org. 2	Represent IT companies and group together the directors by supporting them in reaching their growth objectives and by facilitating their access to best practices for marketing their products and services	Knowledge and networking activities Activities for search of venture capital partners or new sources of financing	Venture capital, interactions, learning, markets for new products, tacit knowledge, codified knowledge
Org. 3	Develop and transfer technologies and knowledge, to enhance the value of the products and services of the businesses and organisations, and to contribute to their marketing	Knowledge building and sharing activities	Research and development Codified knowledge
Org. 4	Offer of specialised consulting-management services and associated services for the creation and development of businesses in the fields of IT, multimedia, industrial technologies, and life sciences	Service related to business incubation	Venture capital, learning
Org. 5	Help SMEs develop new technologies that lead to the marketing of new products and new procedures or the conquest of new markets.	Scientific and industrial studies Dissemination of scientific information, study of the measurement units and techniques	Research and development Codified knowledge
Org. 6	Help organisations be more productive and contribute to the well-being of citizens by using information technologies as levers of transformation and innovation	Technological intelligence and research	Codified knowledge

Notes: ¹Information drawn from the websites of the organisations.

²Synthesis of the information about the activities drawn from interviews of the websites of organisations.

5.1 Identification of the intermediation functions based on the mandate and activities

The intermediary organisation organise different activities in order to help the small businesses to find new partners, gather new knowledge or have access to new markets. The activities associated with the search for venture capital partners or new sources of financing are: service of business incubation, workshops on financial leveraging, fundraising events, and information meetings on public financing programmes. There are also activities that help small businesses to exchange knowledge through interactive or formal learning and to build networks: dissemination of weekly newsletters on the sector, implementation of interest groups for the sharing of knowledge and information, scientific publications, business clubs ('peer to peer'), networking evenings and training. Others activities related to knowledge base building are: technological intelligence and research, providing assistance in research and development activities. There are also some activities dedicated to helping businesses to find new markets, for example through sales and marketing missions outside Canada. Finally, some activities are related to lobbying such as the participation in public hearings and public consultations. Table 6 summarises the intermediaries' mandates, the activities and the associated intermediation function.

5.2 Identification of the intermediation functions based on the interviews

Org 1 participates in the search for business partners in order to help the small business owners to find international market for their new product. As the manager said:

“Suppose you're a company and you're in business, we want to have proof that you're ready to market. For us, it's not tourism; we want people who are ready to market. We open the doors for them and it's always their business, it's not for us to decide whom they do business with, we promote those kinds of opportunities. [...] We're going to help medium-size businesses (between 15 and 20 people). The directors wear many hats, and in those cases we can provide an interesting form of assistance. We organize about 6 or 7 missions divided by sector, one in electronic game, one in e-learning [...] So that we don't get too concentrated in one sector. We choose international activities where people want to participate.”

Org. 2 focuses on learning activities by pooling business owners together like “for example, the mentoring initiative of entrepreneurs, company presidents, [...] we bring together presidents who perform well on the market”, said the manager. Org. 2 also organises different activities related to networking or business alliances and knowledge transfer. As the manager explains:

“The point is to get in contact rapidly with people who will have an impact on one's company. This could be partners for computer development or project development, then the other component concerns the whole aspect of knowledge transfer, and of watching over that. What we do is to watch the entire industry, to be an observatory of what the big technical and marketing trends are, marketing more in our case, to give them impulses and to keep a watch over them. It's more of a strategic watch but in terms of watch, is there information that can be useful for innovation in the framework of information transfer? For example, a company that developed a product, can there be a knowledge transfer? At all times, among the services in demand with us are the interest groups or business clubs, they talk about a subject that unites them, for

example Web 2.0, a huge trend. They meet once a month and will talk about Web 2.0, develop strategic alliances, connections, a little networking. With us it's more business."

Org 3 focuses on intermediation on tacit knowledge transferred through collaboration with his team member and the company. As the manager said:

"[...] in the large field of research-development-transfer, I have teams in speech recognition, in distributed systems [...] those often do research and then associate themselves with academics to do the transfer. I have other teams at the level of best practices, so, about the way of doing things; and from the development side, where the source of technological innovation comes more from industry, for example, in the form of new components [...] So, a new technology that is emerging, the businesses don't quite know what to make of it [...] Is this just something that will quickly disappear, they don't know what to do. So, we're going to define a new project, test it, and then be capable of advising businesses and even accompany them. We work with them. When we do that for a consultation, our goal is to transfer to make the company autonomous."

Org 4 helps the business owners to find venture capital. The manager explains how they do it by giving an example:

"We have a project that is at the conceptual stage, it's an IT solution, that will be hardware, it's someone who is an engineer and in command of his technologies, 8 years to develop these technologies in a firm. This person came to see us, a concept that is very well documented with someone who works alone in his company and he is very strong at the technical level and knows the parameters at the business level as well. It's our job to intervene to validate the opportunities for developing the company. We took it on very early but it's a situation where you need a fairly large venture capital investment, 2 million to have something that allows us to see the big corporations, this morning I was in a meeting with a venture capital firm and we are waiting to see, maybe a partnership within the milieu could be interesting."

The manager also outlined the importance of their support in the acquisition of competencies. He explains:

"Very recently at the level of human resources. What happens is that the small ones, the core of the technological level, usually they have it. We're not head hunters but what we do is that the principal adviser, for example, let's suppose that we had a project in the domain of a measurement tool destined to the telecom industry if we had very very strong developers, the next stage is to attract clients. Inevitably that will take a senior VP who comes from the industry. We tried to find someone, there was a case where a principal adviser who had a network of contacts who knew the project well and we'll try to find people. That, we'll do but in very specific cases. Generally, we'll do that for the positions of CEO or VP Marketing. If we don't have the network of staff contacts, we'll try at least with the entrepreneur to do a good job at testing the profile but there we'll use external resources that have a very large network."

Org 5 intervenes by helping with source of financing or venture capital and the acquisition of codified knowledge. According to the manager:

"[...] when we intervene in a company for its patent, the first thing we do is to analyze the technical elements in operation, the problems to resolve, the team, etc. [...] It's possible at this moment to do networking with research centres, universities, and maybe develop the expertise that lacks as well. We are looking

at the financing part; could other participants help the company, above all the marketing, and say who really sees to it that in 5 years the company has achieved its business figures. [...] It's the consulting, the networking, and the financing through the conditional financial contributions, so, like a contract that links the two parties. For example, if you realize a given activity, you have the right to a certain percentage of your costs."

Org 6 organises research, dissemination of knowledge activities.

"We have no internal researchers and establish contractual relations with university researchers at the time of the projects, it's a team of about 25 people, with headquarters in Quebec, with an office for a dozen of years, one person in Gaspésie then one person in Abitibi and thus we expanded the geographic location. The project, well, we'll experiment increasingly the use of technologies on-site in the sectors, in private, government, or associative businesses, we'll experiment and document and ensure that the technologies become an important lever in the reorganization of work." said the manager

Table 7 summarise the key elements from the interviews and the associated intermediation functions.

Table 7 Intermediation functions

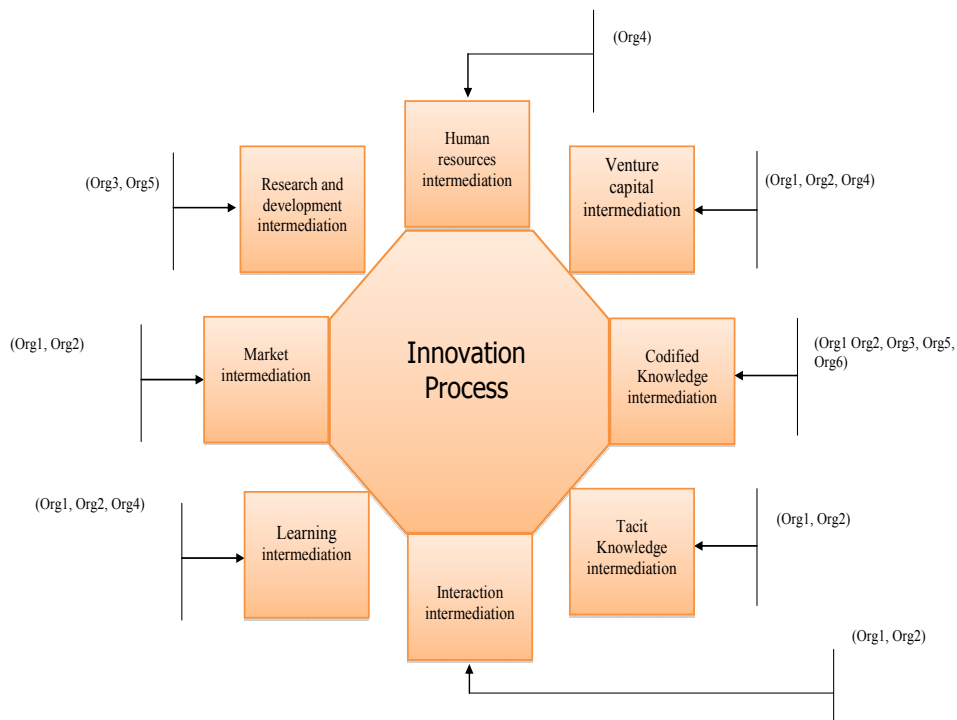
<i>Intermediary organisation</i>	<i>Key elements from interviews</i>	<i>Associated intermediation functions</i>
Org. 1	Search for business partners	Intermediation markets for the new products
Org. 2	Learning	Intermediation learning
	Networking	Intermediation tacit and codified knowledge
	Knowledge transfer	Intermediation interactions with other businesses
Org. 3	Tacit knowledge	Intermediation research and development
		Intermediation codified knowledge
Org. 4	Venture capital	Intermediation venture capital
Org. 4	Competencies	Intermediation human resources
Org. 5	Venture capital	Intermediation venture capital
	Codified knowledge	Intermediation codified knowledge
Org. 6	Research	Intermediation codified knowledge
	Dissemination of knowledge	

5.3 Analysis of the intermediation functions in relation with the inputs of the process

As mentioned above, to innovate, businesses need internal and external resources that contribute to improve their knowledge base, an essential input of the process. This knowledge base can be built through internal or external research and development, through the sharing of information, and through interactions with other external actors. By analysing the intermediation functions with regard to the process inputs, we found that the intermediaries participate in building this knowledge base through the realisation of networking activities for entrepreneurs, the dissemination of information, and by supporting capacity building through the learning process that results from the

interactions between businesses themselves, thus, between these latter and other organisations. The organisations targeted in our research are all active in the ICT sector, which is one of the major clusters of Montreal. Thus, it is possible to say that this proximity can promote interactions between businesses. The intermediary organisations, through the intermediation functions realised, also contribute to other process inputs, such as marketing, financial resources, and human resources. Based on this research, we were able to confirm that the role of the intermediary organisations consists of fulfilling diverse intermediation functions around the innovation process (see Figure 1), and, more importantly, that these activities contribute mainly to the knowledge bases of businesses.

Figure 1 Intermediation functions around the innovation process (see online version for colours)



This conclusion is consistent with the results of our literature review on the role of intermediary organisations in the innovation process, which established that this role concerns mainly the dissemination of knowledge, technology transfer, and businesses support (Howell, 2006), all elements that help to build the knowledge base. Our research shows that the dissemination of knowledge took place through activities that allowed for interactions and networking, and through collaboration with research institutions (see Org. 2, Org. 4, and Org. 6). Technology transfer took place through activities that promote learning and capacity building, such as conferences, mentoring, partnerships between businesses or between businesses and other types of organisations (see Org. 1, Org. 2, and Org. 3). Finally, business support took many forms depending on the organisations and consists of distributing knowledge on the basis of a

technological intelligence and of the search for competencies, venture capital (to finance the innovation projects), and business partners (to market innovations) (see Org. 1, Org. 4, and Org. 5).

Table 8 show the links between the innovation inputs and the intermediation functions. We found that the intermediation functions can be categorised according to their contributions to the process. The contributions could be in the commercialisation of the product, in the knowledge base, in the financial and human resources or as innovation sources of information. Among these contributions, the knowledge base is the one that is the most frequent in the data collected. Figure 1 shows the distribution of the functions according to the innovation process. It illustrates the various contributions of the intermediaries associated with the innovation inputs. The innovation process is considered as dynamic and as a cycle. During the process, the intermediaries realise several functions that allow the small business to get access to the necessary resources from the innovation idea to the commercialisation of the final product.

Table 8 Inputs and intermediation functions

<i>Inputs of the process</i>	<i>Organisation</i>	<i>Intermediation functions identified from the interviews</i>	<i>Intermediation functions identified from the activities</i>
Marketing process (Sales)	Org. 1	Intermediation markets for new products	Venture capital, interactions, learning, markets for new products, tacit knowledge, codified knowledge
Knowledge base Sources of information	Org. 2	Intermediation learning Intermediation tacit and codified knowledge Intermediation interactions with other businesses	Venture capital, interactions, learning, markets for new products, tacit knowledge, codified knowledge
Knowledge base	Org. 3	Intermediation research and development Intermediation codified knowledge	Research and development Codified knowledge
Financial resources	Org. 4	Intermediation venture capital	Venture capital
Human resources	Org. 4	Intermediation human resources	Learning
Financial resources Sources of information	Org. 5	Intermediation venture capital Intermediation codified knowledge	Research and development Codified knowledge
Knowledge base	Org. 6	Intermediation codified knowledge	Codified knowledge

6 Conclusions

This research investigated the role of intermediary organisations as actors of the territory of the Greater Montreal Area in the innovation process of SMEs from the ICT sector. Our research questions aimed essentially at identifying the actors and the intermediation functions and determining their relation with the main inputs of the innovation process.

Using the innovation systems approach, we identified many actors who fulfil intermediation functions in the innovation process and we targeted them for the interviews. The main contribution of this article is to identify the precise intermediation functions that the intermediary organisations fulfil (see Table 8), for example, for learning, product development, and the search for venture capital, human resources, or knowledge. The results also showed that the intermediary organisations thus contribute mainly to the knowledge base of the businesses, in part as concerns tacit knowledge, which is not always easily transferable and where intermediary organisations can play a crucial role.

This research has its limits, as all research, and here it is mainly due to the fact that we were interested in only one sector and that we were not able to validate all intermediation activities realised by the intermediary organisations. However, the study nevertheless provides valuable information on the roles and functions of intermediary organisations and our interviews with firms, which remain to be analysed in more detail, do tend to confirm the elements put forward here. However, this research allows us to see some trends and to categorise the intermediary organisations according to the concept of intermediation function, which is, in our opinion, a contribution for future research on the link between innovation and the role of intermediary organisations. Colleagues doing research on other sectors and other metropolitan areas could use this work to determine if intermediary organisations have the same roles in all regions or cities.

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Notes

- 1 The 'innovative milieu' is defined as: [translation] "a territorialized entity in which the interactions between economic agents are developed on the basis of their becoming proficient with the multilateral transactions that generate externalities specific to innovation, and through the convergence of learning processes through increasingly performing forms of the joint management of resources" [Maillat et al., (1993), p.4].
- 2 A second part of the research was conducted with firms in the ICT sector, which are not included here, but contribute to corroborate what is said here.