Innovation Intermediaries: Practice and Use of Evidence

by

Rodrigo Alejandro Eng

A thesis
presented to the University of Waterloo
in fulfillment of the
thesis requirement for the degree of
Master of Applied Science
in
Management Sciences

Waterloo, Ontario, Canada, 2012

Author's declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

Abstract

Governments of the G7 have relied primarily on two strategies to develop their respective economies, the commercialization of research using licensing models and new venture creation. Yet, they have acknowledged no specific approach to achieving commercialization success. In fact, the results of the methods used for the commercialization of results are generally viewed as not satisfactory, thus creating room for new approaches to be proposed. One of the strategies used to assist the commercialization process has been recently instituted through social actors called innovation intermediaries. Their involvement in the commercialization process has the potential not only to facilitate the process but also to diffuse knowledge and foster innovation.

To date, their practices are still under development, motivating academics in various disciplines to originate research studies aimed at gaining a better understanding of them. The literature has proposed definitions and attributed functions to innovation intermediaries, but it has not arrived at a definitive description of these actors or their activities. In practice, innovation intermediaries do not have a standard operational structure, established methods, or metrics to report their results; they have yet to, establish their own practices or use evidence to inform their activities. The objective of this study is to clarify their practices and challenge their current modus operandi with a view to improvement.

To explain the activities of innovation intermediaries (their practice), to expose the role of evidence, and to represent the main concerns of innovation intermediaries, a framework based on distinctive attributes of the practice was produced using insights gained from a systematic literature review, an exploratory study, and literature stressing the importance of evidence. The framework was tested using a confirmatory study in the form of an online survey with the participation of 55 innovation intermediaries from around the world.

The results show that innovation intermediaries have a predisposition to focus their practice on strategic concerns, finding a fit for the venture offering in the market while neglecting to oversee the mechanisms required for developing a viable venture offering. They tend to support their decisions anecdotally, referencing their previous experiences without the support of systematic methods to corroborate their conclusions. Their prioritized goals are first, to persuade investors and sponsors to collaborate with their clients; second, to help their clients occupy a leading position in their markets, and third, to support their clients to refine the venture offering and transform it into a commercial success.

The emergent framework has characterized the practice of innovation intermediaries, identified particular gaps in their activities and their use of evidence, and suggested that the current focus in the practice of innovation intermediaries may not be contributing all that it could to the commercialization process. This framework may be of significant value to advance this field of knowledge and hopefully contribute to professionalize the practice of these social actors. Ultimately, this research could form the foundation for strengthening evidence-based best practices for innovation intermediaries.

Keywords: innovation intermediaries, intermediation, commercialization, entrepreneurship

Acknowledgements

I would like to express my sincere thanks to my supervisor Dr. Paul Guild for his guidance and advice during the realization of this research. I am grateful that I had the opportunity to meet such a remarkable person, and work and learn from him at every stage of this exciting process.

I would also like to thank all the participants in both my studies for collaborating with the time, comments, and insights so fundamental for the realization of this study.

I also feel fortunate to have had the support and inspiration of my girlfriend Sanaz Hosseini. She has accompanied me in both the good and the tough moments of this journey.

I am grateful to have an admirable mother who has always encouraged me to keep working for what I believe and never abandon my dreams.

Finally, I would like to thank my research group members who have always provided me with valuable input to improve my work and refine my thoughts, especially Julio Noriega who has always been available, not only to discuss my work but also to provide me with guidance when I needed it the most.

Table of Contents

List of Figures

List of Tables

Chapter 1
Introduction

The commercialization of research through licensing and the economic support for new venture creation are two strategies that governments of the G7 countries have favoured to strengthen their economy (Advisory Council on Science and Technology, 1999). Although a definitive approach to increase the likelihood a successful commercialization process has not been located, innovation intermediaries (third-party individuals or organizations positioned in-between creators and users of knowledge) have emerged as facilitators of this process. However, the methods by which they achieve their results have not yet been defined in concrete terms, making it difficult to understand their direct contribution to the process. Moreover, their practice as it is now has not always met the expectations of intermediaries as being effective catalysts for innovation.

The literature on innovation intermediaries (IIs) is at the stage of shaping their practice, envisioning their potential, and interpreting their contribution to the commercialization process. Some authors argue that the value of IIs resides in their access to a variety of resources and skills developed to foster innovation (Mahnke et al., 2008; Lichtenthaler & Ernst, 2008; Bolisani & Scarso, 2009). While several authors have studied particular functions to explain what IIs do, others have proposed typologies to describe their functions and roles (Howells, 2006; Klerkxs & Leeuwis, 2009b). Nevertheless, in practice, IIs do not fit mutually exclusive categories but are fusions of them (Howells, 2006), challenging a particular designation or classification (Klerkxs & Leeuwis, 2009b). For this reason, it is hard to assess in terms of the functions proposed by the literature, which activities are more important and how they benefit the practice of IIs and the commercialization process. Moreover, the practical application of the functions proposed in the literature is restricted, sometimes ambiguous, and in most cases validated only with a case study. In addition, by looking at recent literature on entrepreneurship, new venture planning, and management, it is possible to identify a current trend highlighting the importance of evidence-based methods as tools to validate decision-making, reduce uncertainty, and cultivate a systematic perspective on new product development (Ries, 2011; Marmer et al., 2011; Barczak et al., 2009). The hope is that following this advice, new ventures and entrepreneurs can respond more effectively to challenges, develop more sustainable business, and better anticipate change. Such a trend is not likely coincidental but rather more likely to be a reflection of the demand for approaches to control the variables in new product development processes. In the same vein, evidence is of importance to IIs because it is used to support the services provided to their clients. Evidence is defined as "the body of facts or information indicating whether a

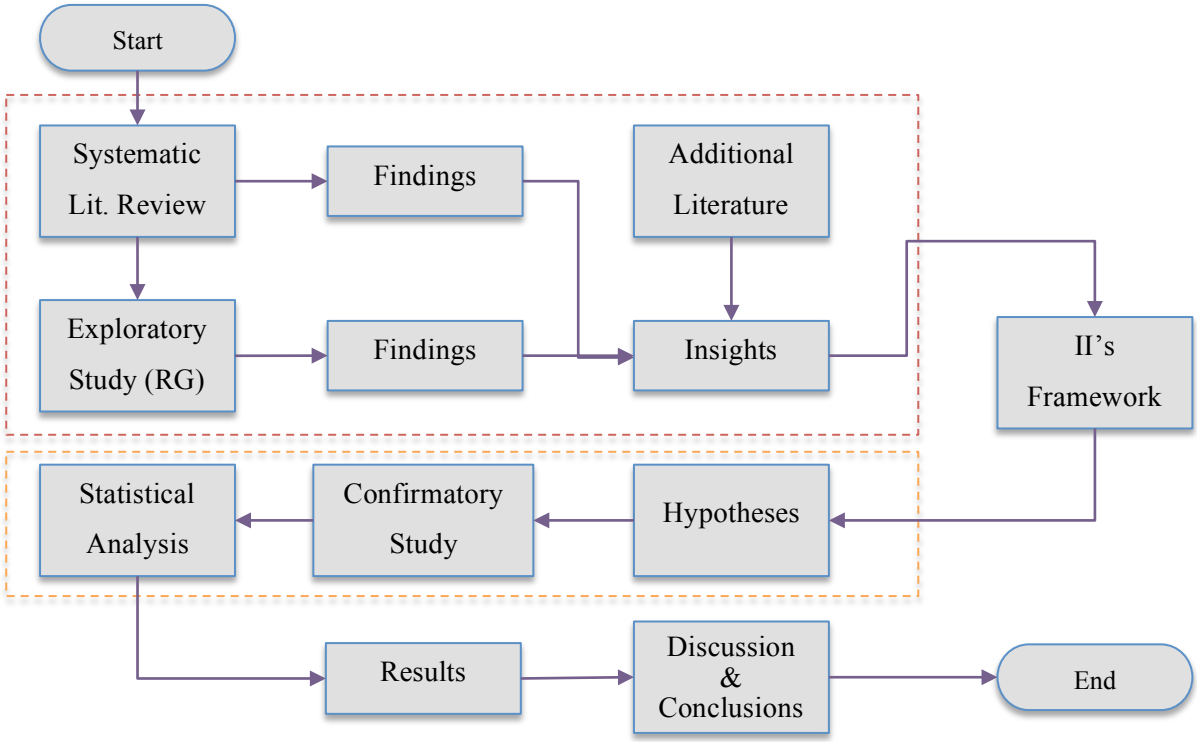
belief or proposition is true or valid" (Oxford Dictionary, 2012) and for the purposes of this study, evidence has been classified into three types: convince sponsors, refine design, and position strategically. These types describe the areas in which IIs can use evidence in their practice and clarify the importance that these types have to execute their activities in the commercialization process.

The research questions present in this study are these: How can the practice of IIs be described? What is the role that evidence plays when they deliver their services? To answer these questions, this present work proposes a framework to illustrate the practice of IIs based on three dimensions, incorporating two attributes per dimension, thus integrating a total of six characteristics present in their practice. The three dimensions are defined as follows: the frame of reference is the level at which IIs prefer to operate in their practice; the decision-making approach refers to the selected process to support their conclusions and provide advice to their clients; and the practice orientation meaning the structure that these social actors embrace to strengthen their practices. In addition, a more detailed analysis of the evidence side is carried out to represent the use of evidence in the practice of these social actors, thereby exposing gaps in their practice that prevent a direct contribution to the commercialization process.

In summary, the purposes of this study are threefold: (1) to present a new approach to characterizing the practice of IIs, (2) to challenge the practice by illustrating the emphasis that IIs give to certain activities, and (3) to reveal the position of evidence and its use by these actors in the commercialization process.

This study proposes a framework to describe the practice of IIs, thereby identifying preferences in the execution of some activities that affect IIs effectiveness in the commercialization process. These gaps reveal the need for modifying the status quo in their practices. IIs find more value when focusing their practices at a macro or strategic level. In addition they prefer to support their decisions using their personal experience rather than evidence. Nevertheless, they do use evidence classifying it in the following order: first to convince sponsors of the viability of the venture offering, second to position IIs' clients ahead of their competitors, and third to assist in the definition and implementation of operating processes to improve the venture offering.

Figure 1: Research process



The process followed in this study is illustrated in Figure 1. The first part, denoted by the top dashed rectangle, integrates the steps required in the design of a framework to describe the practice of IIs. The second part of the process, represented by the bottom rectangle, incorporates the steps used to test the proposed framework. Finally the results of a confirmatory study, plus the implications and contributions of this study, constitute the final stages of this research process.

This research study has been designed to acquire learning from three perspectives: a systematic literature review, an exploratory study, and a confirmatory study. First, the systematic literature review provided the building blocks to identify patterns present in the practice of IIs and establish the direction of an exploratory study. Next, the exploratory study assisted in the identification of relevant characteristics in the practice as supported through the repertory grid technique. Then, using the previous steps, it was possible to consolidate a framework to characterize the practice of IIs (top dashed rectangle in Figure 1). Three hypotheses were proposed to identify preferences in the practices and twelve to determine the priority of evidence in their practice. Using the input from the previous stages in the study, a confirmatory study was then designed to test the dimensions proposed to describe the practice of IIs and examine the importance of three types of evidence in their practice

(bottom dashed rectangle in Figure 1). Finally, the confirmatory study integrated insights gleaned from IIs, capturing their perception about their practices through an online survey.

To present the work of this research study, this manuscript has been organized as follows: Chapter 2 provides the context of the problem and describes use of IIs as an emergent strategy to support the commercialization process, some benefits derived from IIs' intervention, and some of the functions described by the authors. Chapter 3 introduces a systematic literature review used to clarify the current perspective from the literature. To continue exploring the practice of these social actors, this chapter follows with a description of the exploratory study, its results, and the patterns of learning identified. To complement the knowledge obtained, a current trend in the use of evidence is explained and its position in this research study is justified. This chapter concludes by presenting a framework developed to characterize the practice of IIs. Chapter 4 explains the methodology used to test the framework describing the practice of IIs. Chapter 5 presents the results of the confirmatory study. Finally, Chapter 6 shows the practical and theoretical implications of the results, discusses the limitations of the study and elaborates on potential paths for future work.

Chapter 2
Literature review

2.1 Introduction

Governments of the G7[1] countries invest heavily in research every year, hoping to activate their national economies through scientific advances, thus increasing national competitiveness (Advisory Council on Science and Technology, 1999). However, up to now, a definitive approach to commercializing research results has not yet been determined. For instance, the results of Canada's Survey of Intellectual Property Commercialization in the Higher Education Sector (Minister of Industry, 2010) state that Canadian universities have spent $ 51.12 millions to commercialize research and generated just $ 53.18 millions in revenue from this activity. In other words, the income generated in the higher education sector from the commercialization of results was only $ 2.06 million in 2008.

Another strategy to strengthen the economy of the country has been fostering an entrepreneurial culture and contributing to the creation of new ventures, thereby generating new employment and growth for the country. Yet, the survival rate of startups after their fifth year of life is only 51% (Industry Canada, 2010)[2].

The reasons given to explain an unsuccessful commercialization process are numerous, including insufficient technical or management expertise in the creators to recognize business opportunities, poor translation of needs into solutions, absence of strategic plans (Crowne, 2002), conditions in the environment influencing the process (Gelderen et al., 2006) or even "chance event(s)" (Bouchikhi, 1993). In summary, authors of the literature analyze the problem from different perspectives and levels of analysis providing an extensive range of possibilities for an unsuccessful commercialization process. This present research observes the commercialization process when it is assisted by a third party so called an innovation intermediary. IIs have emerged to facilitate the commercialization process and foster innovation between knowledge creators and knowledge users. However, the practices of IIs are new and still under development, challenging consensus formation in the literature and maybe restricting IIs' potential.

[1] Canada, France, Germany, Great Britain, Italy, Japan, and the United States
[2] The report only considers new ventures with employees

As a first step in understanding the current state of IIs' practice, a systematic review was applied to examine the literature on this field of study. The knowledge acquired at this stage served to outline the boundaries within which these social actors operate, recognize potential gaps, and acquire new insights. To fully justify the importance of IIs in commercialization processes, this chapter starts by describing the importance of IIs as facilitators followed by an explanation of their emergent roles and functions to date.

2.2 A facilitator in the commercialization process

The literature on IIs offers different perspectives to describe why such agents are required to support innovation, how they contribute to the innovation process, and what the required conditions are for their intermediation to operate. These perspectives help us clarify the environment in which intermediaries interact with other social actors and to identify the areas in which they can provide their services.

IIs can be represented as an element of a network. In fact, one of the most used concepts in the literature is that of social capital, defined as the value obtained from the way a person is connected with others (Kirkels and Duysters, 2010). In social capital, the existence of structural holes represents gaps that exist when two parties are not aware of the value that could be created if they collaborated with each other (Burt, 2005). As a result, an independent actor is needed to help close these holes and create awareness between the parties of the value of collaboration; in short, a broker who bridges groups from the same or different networks and becomes involved in the collaboration (Kirkels and Duysters, 2010). To summarize, the position of the innovation intermediary is unique; they exist to support firms due to the firms' incapacity to handle information (Popp, 2000), mediate relationships and regulate transactions (Lo et al., 2010).

2.3 Benefits of intermediaries and intermediation

This section integrates insights from the literature on the significance of intermediaries and the intermediation process as a catalyst for innovation.

According to Bolisani and Scarso (2009), small firms typically lack technical and scientific skills and sufficient economic resources, preventing them from engaging in R&D activities. Moreover, most such firms do not have the skills to monitor the environment, identify emerging technologies or adapt technologies for their needs. The authors agree that firms often have a good technical knowledge level but do not possess the specialized skills to understand how the technology can be commercialized.

On the other hand, Lichtenthaler and Ernst (2008) state that most industrial firms do not exploit their technology outside the organization because it is not part of their core business and, as a consequence, firms do not possess the competencies to do so. For this reason, outward technology transfer should be managed properly to avoid giving away technologies that represent critical competencies (Kline, 2003).

Other authors have studied the impact on firms collaborating with other firms offshore. For instance, Mahnke et al. (2008) describe how differences in culture affect the way technologies are implemented.

If some firms, especially of small and medium size, do not have the skills or the economic resources to develop such skills, how can they implement R&D, identify and acquire external technologies, accelerate the pace to develop new competencies, overcome barriers limiting the collaboration with other firms, or find suitable firms with whom to collaborate?

Lichtenthaler and Ernst (2008) state that firms that do not develop internal competencies to commercialize their technologies may benefit from intermediaries. Chesbrough (2006) argues that IIs help innovators to implement ideas from external sources faster. Finally, Mahnke et al. (2008) argue that, although firms are aware of the potential for offshore suppliers to obtain high technology services through outsourcing, intermediation capabilities need to be developed in order to reduce the cultural, professional and operational challenges associated with these relationships. However, when these capabilities cannot be developed within the firm, third-party intermediaries could be useful.

In summary, firms require the knowledge and the skills to be competent in the commercialization of technologies and in the acquisition of new technologies that will benefit innovation. The reality is that most firms are trying to survive, and their priorities are not necessarily focused on the commercialization or acquisition of technologies. However, some third-party agents have access to a variety of resources and have developed the skills to support the transfer of technology and foster innovation.

2.4 Functions of innovation intermediaries

Up to now, the literature of IIs has not agreed on a definition of innovation intermediary or on what their functions are. However, there are some salient functions that can be observed in the literature from 1989 to 2011.

Howells (2006) makes an interesting observation about how the literature of IIs can be classified in two groups: first, the literature that refers to IIs as holders of processes, and second the literature that denotes IIs as organizations. In both cases, different approaches and terminology are used. He mentions that looking at intermediation as a process, the literature focuses on two main functions: information scanning and information gathering, and communication. On the other hand, another body of literature looks at existing technologies that can be used for different purposes, users, and industries. When IIs are considered as organizations, one of their main functions is acting as a mechanism to connect or bridge creators or providers of knowledge and users of knowledge (Batterink et al. 2010; Howells, 2006; Reenstra-Bryant, 1998). This mechanism is possible due the lack of linkages between them (Stewart and Hyysalo, 2008). Moreover, IIs can connect different parties because they have access to networks of resources that are used to facilitate cooperation, empower organizations to innovate, align expectations, and keep all parties synchronized (Klerkx et. al, 2009; Johnson, 2008; Winch & Courney, 2007). However, some authors acknowledge that the function of IIs is not only to connect parties but also to help find the right partners for collaboration (Klerkx & Leeuwis, 2009a; Teece, 2000; Morgan & Crawford, 1996). Additionally, IIs help compensate for existing gaps in innovation processes such as information, managerial, cultural and cognitive (Mahnke et al., 2008; Klerkx & Leeuwis, 2008b; Hargadon, 2002). They also help reduce uncertainty, understanding the needs and requirements, and support organizations to narrow down their demand options (Klerkx et al., 2009; Boon et al. 2008; Klerkx and Leeuwis, 2008b). IIs foster communities and networks of different sources, making possible new combinations and contributing to innovation (Klerkx et al., 2009; Stewart & Hyysalo, 2008). Furthermore, they manage and preserve the integrity of the network (Mahnke et al., 2008; Stewart and Hyysalo, 2008; Snow et al., 1992). Some maintain a neutral and independent position (Batterink et al., 2010), while others represent individuals or institutions, helping them to negotiate and protecting them from opportunistic players (Stewart & Hyysalo, 2008; Morgan & Crawford, 1996; Teece, 2000).

In summary, the functions observed in the literature of IIs include helping their clients to connect with creators and users of knowledge, helping to find the right partners and facilitate collaboration, helping to compensate for gaps in the process, helping to clarify needs and limit demand options, helping to manage networks, and helping the parties to negotiate from an impartial position or a partial one when representing a client.

2.5 Drivers of research

After examining the literature and understanding the context in which IIs exist, the value added for commercialization and innovation processes, the roles and functions fulfilled by these actors, it is also important to discuss the motivations of this research study that contribute to closing some of the gaps in the literature and advancing this area of knowledge.

The literature on IIs is a recent field of study and currently under development. The functions described in the literature are sometimes disparate and there is no unique representation of the functions provided by IIs (Howells, 2006). Additional signs of an early stage are: the lack of theories (Manhke et. al, 2008), insufficient public data on IIs (Lo et al., 2010), attention to a particular function (Howells, 2006), and an initial awareness of the circumstances in which IIs are effective (Winch & Graham, 2007). Finally, Howells (2006) indicates that there is a low level of cross-reference in the literature, a lack of a full review on IIs in the existent studies, and a need for studies with good theoretical evidence to clarify what IIs do. In summary, the field requires more studies that can clarify the practice of IIs supported by strong evidence foundations. For instance quantitative studies are needed for producing novel insights on the practice of IIs as an instrument to facilitate the commercialization process.

According to the literature, the outcome of the interaction with IIs is in most cases intangible. Moreover, although they can provide services at different levels in the innovation process (Howells, 2006), it is difficult to quantify the impact or benefits on their clients (Kirkels and Duysters, 2010; Hargadon, 2002). However, as mentioned in the previous paragraph, it is unlikely to quantify the impact or benefits of such interactions when the practice itself has not been understood. Therefore, by constructing their practice, it may be possible to recognize the variables present in their practice by studying how they operate, considering their main concerns, recognizing the emphasis in their practice, and acknowledging decisions made when providing their services.

Authors of the literature have proposed typologies as an approach to making sense of the functions and the role of an innovation intermediary. However, in practice, IIs do not fit mutually exclusive categories but fusions of them (Howells, 2006), challenging any particular designation or classification (Klerkxs & Leeuwis, 2009b). For this reason, it is hard to assess in terms of the functions proposed by the literature which ones are more important and how they benefit the practice of IIs and the commercialization process. To overcome this problem, Dalziel (2010) proposes to define IIs in terms of their purpose rather than their functions since doing so allows the creation of clearer boundaries around the organizations acting as IIs. Considering Dalziel's perspective may

produce new perspectives in the description of IIs' practice and their role in the commercialization process.

Finally, there is a need in the literature for evaluation metrics and tools in the industry to measure and compare IIs' practices (Gianiodis et al., 2010; Howells, 2006; Klerkx & Leeuwis, 2008b). Nevertheless, the literature does not go beyond this point, and is limited in providing details on how these social actors perform their functions.

To expand the understanding of IIs' practice, the following stage in this study presents the process and results of a systematic literature review and exploratory study that allowed the identification of interesting patterns and conception of insights to characterize the practice of IIs.

Chapter 3
Research framework development

This chapter describes the steps followed to formulate a framework to characterize the practices of IIs. It starts by explaining the method used to explore the literature on IIs and the patterns identified to delineate their professional activities. Next, it introduces an exploratory study carried out to collect characteristics of the practices from a practitioner point of view. Last, the insights attained from these two stages are presented and complemented with a new trend in the use of evidence. Finally, this chapter concludes with the introduction of the research framework eventually used to portray the practice of IIs and presents the hypotheses used to test the framework.

3.1 Systematic literature review

A systematic literature review method was used to clarify the practices of IIs. This process started with two questions, what do IIs do? And, what is the supporting evidence to guide what they do? The systematic literature review consists of steps to gather systematically evidence answering these questions (Appendix A). The benefit for this research is that the process focuses on the identification and selection of articles that can contribute to increased understanding of IIs' activities. Moreover, the process is traceable, repeatable, and scalable. The steps include defining a scope for the review, selecting databases, formulating a search strategy to collect articles, defining and implementing criteria to include or exclude articles, implement a strategy to codify the articles collected, extract important data to answer the questions, implement a secondary search using the bibliography of the articles included in the primary search, include or exclude material using the criteria previously defined, extract data to answer the question and finally package the data collected to present the results from the process. The process used electronic databases to collect the articles; the search was executed on April 18, 2011.

3.1.1 Process summary

After determining a general scope of the literature, a selected number of keywords were used to create queries with different keyword combinations. The primary search queries were refined in various iterations until their output revealed journal articles with information describing the practices of IIs and evidence to support the findings. The criterion for the selection of the electronic database was defined with the assistance of the engineering and business librarian at the University of Waterloo. The databases included in the systematic review were Scopus, a well-known robust resource for peer-reviewed literature, and ABI/Inform, a typical resource for business research. Table 1 shows the two

search queries used in the primary search stage. “TITLE-ABS-KEY” refers to the title, abstract, or keyword of the database record; “W/3” and “W/5” is the distance in words between term 1 and term 2; “NOT AT” discards the records in a category.

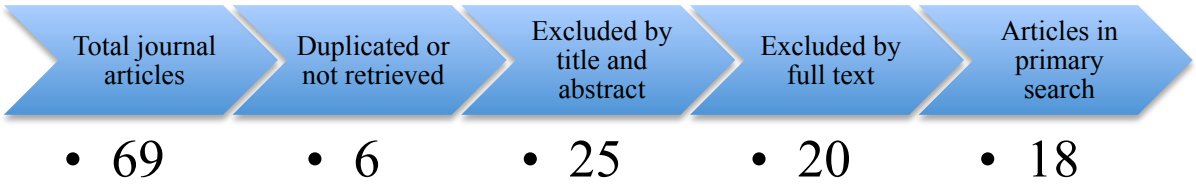
Table 1: Search strategy, primary search

Database	Search query
Scopus	(TITLE-ABS-KEY("Innovation Intermedia*") OR TITLE-ABS-KEY(innovation W/5 broker) OR TITLE-ABS-KEY(innovation W/3 arbitrator))
ABI/Inform	(Innovation Intermedia*) OR (innovation w/5 broker) OR (innovation w/3 arbitrator) OR (innomedia*) AND NOT AT (book review)

NOTE. The “*” represents all possible combinations after the last letter

The rules determining whether to accept or reject a journal article after harvesting the results from the electronic databases were defined in two stages: first by title and abstract, and second by full text review. Figure 2 illustrates the results obtained from the primary search.

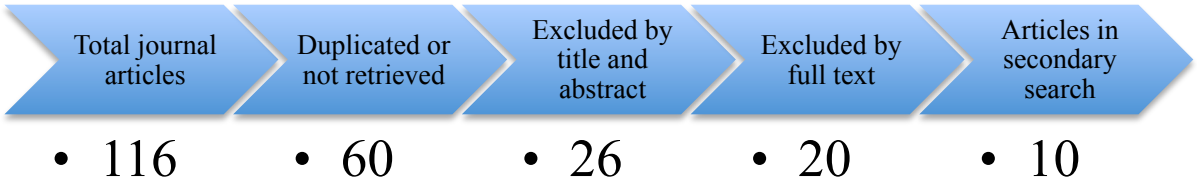
Figure 2: Primary search process



In some cases, neither the reference nor the article could be retrieved using the databases and service provided by the University of Waterloo. In other cases, the reference was found but the article could not be retrieved or ordered through RACER (Interlibrary loan service). As a result, these articles were considered to be outside the public domain and were discarded from the systematic search.

A secondary manual search was implemented after the articles collected in the primary search were coded in full text. It consisted of referring to the bibliography section of each article and selecting those articles that met the inclusion criteria. The results from this stage are presented in Figure 3.

Figure 3: Secondary search process



The information collected in this process was captured on a coding sheet and organized into different categories. These categories facilitated the management of articles and the abstraction of valuable information to produce insights from the extant literature on IIs.

3.1.2 Findings

After completing the systematic literature review, it was possible to recognize important properties in the practice of IIs. In the following paragraphs a description of identified patterns in the literature on IIs is provided. Appendix B integrates a comprehensive classification of the functions described on the literature using seven categories to clarify the angle used to describe the function, reference to methods or previous experience necessary to execute IIs' roles, the impact caused by the execution of the functions in terms of efficiency or innovation, and finally benefits attributed to IIs.

The literature depicts IIs assigning different names and a variable number of functions over time. Nevertheless, in general the literature shows a steady trend with respect of the kind of activities described. In other words, there are no drastic changes on the functions performed by IIs. In addition, the authors are consistent in describing the benefits provided by these social actors; often these benefits are pointed to illustrate the significance of IIs in fostering innovation.

It seems that the authors of the literature have paid special attention to the study of IIs on two planes. Some authors focus on studying the interaction between IIs and creators and/or users of knowledge, others concentrate on examining the interactions between IIs and the ecosystem in which they exist, and another group of authors consider both points. Those interactions focused on the venture provide value by the execution of functions intended to help an individual or organization (i.e., evaluating outcomes, validating of ideas, and helping organizations to clarify their demands). On the other hand, those interactions with the ecosystem are not concerned about a particular organization but the combination of elements that integrates networks or communities (i.e., access to networks of contacts, development of new networks, and managing existing ones). Consistent with this finding, Klerkx & Leeuwis (2008b) mentioned that some functions of IIs appear to focus on individual firms, while others seem to focus on a systemic perspective.

The literature has explained that IIs compensate for existing deficiencies on the client side (Mahnke et al., 2008; Klerkx & Leeuwis, 2008b; Hargadon, 2002). So, using their expertise, IIs guide their clients through the commercialization process. The literature translates the exposure to a variety of problems into new knowledge and experience required to obtain a better understanding of the problems and the process for proposing solutions (Winch & Courney, 2007). The experience of the intermediary not only benefits the provision of solutions but also has implications on building a reputation in the ecosystem and maintaining networks of contacts (Morgan & Crawford, 1996), essential for the sustainability of these organizations.

In conclusion, although the literature uses different names and functions to describe IIs and the activities they perform, it is possible to see a pattern on the practices maintaining a constant status quo. The literature seems to distinguish between the practice of IIs not only at a client level but also at a system level. This review found research studies that center on the role that intermediaries play when assisting specific parties, while others illustrate their role when interacting with the ecosystem. On the other hand, the systematic review also revealed that the literature considers knowledge from previous events as a key asset of an innovation intermediary. This knowledge contributes in recognizing problems, providing solutions as well as conserving a status in their environment.

The literature has shed some light on the practice of IIs to better interpret their roles and activities. However, it is necessary to explore in more detail their practices and identify more explicit signals to describe it. To build on this learning, the next stage of this study consisted of an exploratory study focused on identifying general characteristics in the practice of IIs.

3.2 Exploratory study

The objective of the exploratory investigation was to identify characteristics of the practices executed by IIs with emphasis on those that contribute to the realization of established goals. The repertory grid technique was utilized in the exploratory study. It was preferred over other methods such as structured interviews because of its flexibility and in-depth insights that may not be always explicit in the experts' mind or would take more time to identify.

3.2.1 Design of the study

3.2.1.1 Participants

The participants in the study worked for local organizations involved in innovation or commercialization of technology, performing at least three of the functions of an innovation intermediary described in the literature review.

Twenty practitioners were invited to participate. From these, twelve were interested in participating. The rest did not fit the description of an innovation intermediary or could not be scheduled for an appointment due to other commitments. The first contact was established through a phone conversation describing the study and asking questions to determine the aptness of the participant. In the end, eight practitioners were interviewed to collect data for analysis.

3.2.1.2 Materials in the study

The interview took place at the participants' organization. To facilitate the interview process, each participant received a copy of the protocol, three pieces of paper to write down the repertory grid elements, and a pen. Additionally, a computer with RepGrid V software was used to elicit information from each participant. Finally, a data projector was used to display the information on a screen and expedite the comparisons and rating process.

3.2.1.3 Procedure

A flow chart of the process can be consulted in Appendix C and the full protocol of the experiment is included in Appendix D for a more detailed reference.

The design of the repertory grid involved a face-to-face interview of one hour and fifteen minutes in total. It divided the elicitation of elements into three sets of practices (unique, essential, and non-essential) as executed by the participants.

Jankowitcz (2004) defines an element in repertory grid as "an example of, exemplar of, instance of, sampling of, or occurrence within, a particular topic". Elements are the raw material in the repertory grid technique to discover personal constructs through systematic comparisons. Moreover, the elements were always elicited in this order: unique, essential and non-essential (obstacles/challenges). The repertory grid also allowed constructs to be proposed as the interview progresses. During the interview, the participant had to write down each set of elements on a piece of paper that later was transcribed in RepGrid V software. The only requirement was to write down the elements using action verbs to simplify their comparison. In other words, a brief sentence starting

with a verb and focusing on things that the organization or the practitioner does or faces in their practice. It is important to mention that at no time was the word "element" related to any specific type of activity. However, the word "practice" was defined as an "established behavior". After the elicitation, triads of elements were randomly selected and compared by the participants to produce the constructs. This was done as response to the question: "How are two of these similar to each other and different from the third?". An answer to this comprises a construct. Then, the participant evaluated each element in terms of the construct using a seven-point scale. For more details about the repertory grid technique refer to: The easy guide to repertory grid (Jankowitcz, 2004).

3.2.2 Repertory grid analysis

The analysis was divided into two sections: first, a content analysis to clarify the idea, meaning and purpose of each construct; and second, an analysis of the ratings assigned to both elements and constructs to validate the interpretations generated in the first section. A detailed description of the analysis can be reviewed in Appendix E.

3.2.3 Relevant points during the investigation

The majority of participants provided a list of elements sub-divided into unique, essential, and non-essential groups. The number of elements could vary among participants due to the flexibility in the protocol. In other words, participants were invited to provide from 3 to 4 unique elements, 6 to 8 essential elements, and 3 to 4 non-essential elements.

The rest of the session was used to elicit constructs and to *ladder* on each of them to clarify the meaning and function of each construct. On average, participants elicited four constructs during the one-hour interview. At the outset, the elicitation of elements took typically 30 minutes. Due to participants' lack of familiarity with the process, the first construct elicitation always took a longer time than the rest of the constructs.

3.2.4 Findings

After analyzing the constructs of the participants in the study (Appendix F), the relationship with the practices and the categories assigned, the following general characteristics in the practice of IIs were identified.

To achieve their goals successfully, IIs believe that certain resources are essential to their practice. They agree that becoming knowledgeable about the industry and its trends is necessary to provide accurate advice to clients. In addition, in order to promote innovation, they believe that it is important to: (1) Nurture a commercialization and entrepreneurial culture in a region and (2) Build a network of specialized professionals, academia, government, industry, and investors/funding sources. Additionally, IIs comprehend that businesses must clearly communicate their products/services and also encourage strong client relationships in order to achieve business goals.

They believe that their services should be tailored to suit their clients' needs. According to one of the participants, each business is unique, driven by specific expectations, and should capture specific market and business opportunities. IIs rely upon their commercialization experience to evaluate client business objectives, provide a clear overview of potential opportunities, and define a path for the commercialization of clients' technologies. They provide guidance and assist their clients in the commercialization process. This situation permits the clients learn about this process in a much more rapid manner and, in turn, hopefully make better business decisions. Further, IIs assist businesses with limited seed funds to find interested investors by connecting clients with more substantial sources of funding.

IIs are aware of their practices as providing both tangible and intangible results for their clients and supporters. The former are activities or goals that can be measured or quantified; whereas the latter are hard to express or assign a numeric value. Examples of tangible results include: overseeing that funding is properly used; formalizing relationships with professional firms; helping clients coordinate activities. On the other hand, some examples of intangible results include: community integration, adapting to clients' needs, and creating an environment that fosters collaboration and networking.

Additionally, IIs believe that while their clients may have very high technical knowledge, they lack business and/or commercialization skills which may in turn create an obstacle to business growth. Finally, IIs see their practice as a process in which new abilities and expertise are developed and acquired over time. They believe this acumen is exclusive to the activities performed by IIs, therefore new hires must complement formal training with learning by doing to gain experience and absorb the required skills to execute their functions.

3.3 Insights from the systematic review and exploratory study

The output from the literature review and the exploratory study provided valuable insights regarding the practice of IIs. Some findings from the repertory grid are consistent with what was previously reported in the literature review. In addition, new findings establish a new line to consider for describing the practice of IIs. In the following paragraphs the converging points from the literature review and exploratory study are introduced.

3.3.1 Macro and micro level techniques

IIs seem to consider two levels of activity in their practice. The first level is illustrated by the activities that center on helping a particular party. From the literature, this level is expanded with functions to validate ideas, extend firms' competencies, and provide assistance to overcome knowledge gaps. The exploratory study revealed that IIs align their services to meet clients' needs on an individual case-by-case basis because they consider that each business contains its own combination of expectations, challenges, and opportunities. On the other hand, the second level is integrated by activities that an innovation intermediary uses to observe and interact with the ecosystem. The authors of the literature explain these as functions to provide access to the resources in the network, foster new networks, and facilitate linkages between actors in the network. However, these functions imply that the innovation intermediary owns a clear vision of the whole system, distinguishes needs, and recognizes the value of the resources in the network. Nevertheless, considering that IIs are concerned about observing their industry at quite a general level seems relevant to any description of their practice. This consideration is also supported by one of the results obtained in the exploratory study: that IIs believe that comprehending their industry and trends leads to better advice for their clients.

In conclusion, these findings have prompted a line of thinking that distinguishes two levels of focus that IIs use to operate: 1) a micro level in which the intermediary focuses on assisting firms to define, assess, and improve operative processes at different stages of the venture formulation and product development process, and 2) a macro level in which the intermediary focuses on the aspects of the market and the ecosystem to understand their industry and provide a strategic position to the venture firm.

3.3.2 Use of experience and evidence

3.3.2.1 The role of experience in practice

Consistent with the literature and the findings from the exploratory study, the knowledge that IIs possess is their main tool for undertaking their functions and assisting their clients in the commercialization process. This knowledge is acquired from exposure to a variety of problems and the process preceding the provision of solutions. Therefore, IIs build expertise by connecting the learning obtained from past experiences that enables them to recognize opportunities, understand problems and make decisions to support their clients. Moreover, supported by the practitioner side, the skills required to execute the functions combine formal training and experience developed over time. Given that experience plays an important role in the practice of IIs, this study considers it to be an integral characteristic of these social actors and their activities.

Additionally, by observing at a new trend present in recent literature of entrepreneurship, new venture planning, and management, another approach was recognized, one used to validate the assumptions and support decisions. This approach has been portrayed by the use of evidence. For the purpose of this study, evidence is understood as "the body of facts or information indicating whether a belief or proposition is true or valid" (Oxford Dictionary, 2012).

In summary, we contemplate that experience and evidence are relevant for characterizing the practice of IIs. To elaborate more on the evidence side, descriptions of some evidence trends are introduced in the following paragraphs.

3.3.2.2 Trends in the use of evidence-based methods

Current authors writing about entrepreneurship, new venture planning, and management are paying special attention to the use of evidence as a means to increase startups' success rate, create sustainable businesses, and anticipate change. Transferring some notions from lean manufacturing, Ries (2011) discusses the importance of maintaining a "light" venture, operating only with those activities that add value and discarding those generating waste, through the process of new product development (NPD). He positions the use of evidence gained through scientific methods as an instrument to support decision-making, therefore increasing the likelihood of a sustainable business. Ries introduces the concepts of minimum viable product, validated learning, and pivoting. Validated learning refers to the knowledge obtained from experiments used to test the assumptions made during the NPD process. A minimum viable product is the result of validated learning and decisions made about the product/service formulation before its commercialization. Finally, pivoting is the term used

for changes in the direction of the product/service after an iteration or cycle (build-measure-learn) has been completed. In other words, when the assumptions (hypotheses) are not supported by the experiments, modifications to the original concept in both technical and strategic areas are required, thus clarifying client needs and adapting the solution offered.

Osterwalder and Pigneur (2010) discuss the process of business model creation. The authors not only explain the components involved in a business model but also provide a practical methodology to map, analyze, test assumptions, and invent or improve any business model. They maintain that business models are dynamic processes that need to be evaluated and challenged to confirm their effectiveness. In sum, the "Business Model Generation" is used as a manual to clarify the components of a business, assess its business models, define hypotheses, and make decisions to continue or change the direction of the business, thus increasing the competitiveness and sustainability of a firm. Nevertheless, the authors do not include in their work a description of processes or systematic methods that could be applied to validate the results of the model. Without them, it is hard to assess whether or not the assumptions used in the model are valid or should be modified.

Finally, the "Startup Genome" is a research project created to reveal the characteristics needed for the success of Internet startups in Silicon Valley. The project team developed a survey to collect data from more than 600 startups. The results allow them to detect patterns in entrepreneurship and innovation. Their model centers on the startup, which is defined using five dimensions: the customer, product, team, business model and financials. It considers that all dimensions should be aligned with the customers' response to a product/service concept. In the "Startup Genome Report" Marmer et al. (2011) argue that startups go through different stages of development, and these stages can be measured using milestones and thresholds. Moreover, different types of startups move through these stages or "startup life cycle" at different paces. Nevertheless, learning is a common denominator and a progress milestone required to advance the firm through the life cycle. The use of a scientific approach is evident in the "Startup Genome Report" and although the results are only applicable to the analyzed sample, it is a first attempt to present this kind of reports to a nonacademic audience. However, while this project focuses on identifying the elements that integrates startups in Silicon Valley, it fails studying the methods and tools used by the entrepreneurs to get to a certain stage or attain their goals. In other words, it only focuses on the outcome and overlooks the means to achieve them.

As described in these three examples, it appears that the traditional paradigm of entrepreneurship and innovation is shifting from being a mysterious, highly uncertain, and learn-by-doing side of the

spectrum activity into having a more structured or systematic perspective, one supported by the use of scientific tools and evidence. Consistent with recent trends, it would seem necessary to consider the use of evidence to support the commercialization process, specifically in our case by IIs.

3.3.2.3 Types of evidence

This study has discussed that use of evidence should be included as defining the practice of IIs. Nevertheless, only studying the existence of evidence in their practice would not explain its use. In addition, as highlighted before, IIs assist their clients in the commercialization process, thus they should use evidence in the whole process. Investigating the evidence side in more detail can clarify its purpose in the practice of IIs and illustrate the emphasis they give to it. According to the literature, IIs are required to report their results to maintain sponsors' support (Klerkx & Leeuwis, 2009a; Klerkx & Leeuwis, 2008b). In addition, these results also help them to maintain a reputation in the ecosystem. On the other hand, a commercialization process is not sustainable if the product or service offering is not competitive. For this reason, an innovation intermediary should also use evidence to position ventures' offerings ahead of their competitors by strategic means (Bolisani and Scarso, 2009). Finally, another type of evidence defining mechanisms to clarify the evolution of the development process and proposing changes to adapt the venture offering should be considered. This type of evidence helps the business to understand the need and reflect it in the product offering (Ries, 2011). The approach to measure the distinctions presented in this chapter (including evidence and experience) is described in Chapter 5.

In summary, this section presented two approaches applied in the practice of IIs. One through the use of experience, making use of the knowledge acquired over time and another through the use of evidence, confirming assumptions before making decisions. We consider that both approaches are important to describe the practice of IIs because they enclose how these social actors provide assistance to their clients.

3.3.3 Activities focused either on productivity or innovation

Up to now, this study has elaborated on IIs as social actors who have emerged to assist the commercialization process. To do so, IIs have to align their practices to operate in a certain direction. According to Drucker (1992), "If we apply knowledge to tasks we already know how to do, we call it 'productivity'. If we apply knowledge to tasks that are new and different we call it 'innovation'." Only knowledge allows us to achieve these two goals".

From the results in the exploratory study, one can see an interest in using internal resources efficiently. Three of the participants in the exploratory study expressed this interest. The first one elaborated on it by mentioning a prudent use of economic resources; the second one described it as a good organization of activities to offset work overload, and the third one as a mandate in the organization to help the maximum number of clients. These characteristics denote IIs' attention to increase practical efficiency by optimizing available resources. For this reason, this research recognizes productivity as an important factor influencing the practice of IIs.

On the other hand, the practice of IIs can also be influenced by modifications or changes to advance their current practices. Such modifications or innovations are supported by a change of mindset within the organization (Chesbrough, 2007). Supported on Smits and Kuhlmann (2004) and Bolisani and Scarso (2009), we observe innovation as the re-invention of practices, creating novel ways of thinking. The literature describe some functions of IIs related to fostering innovation, such as acting as a bridge, helping to identify and evaluate new applications for a technology, evaluating outcomes, and promoting innovations, among others. Thus, it is reasonable to consider that IIs should evolve their practice to meet new client expectations concerning innovation.

In summary, the practice of IIs seems to be influenced by two aspects: productivity or a structure supported on the practical efficiency of current activities, and innovation or a structure to promote changes in the activities developing new practices. Thus, this study considers that these two aspects can be of value to describe the practice of IIs.

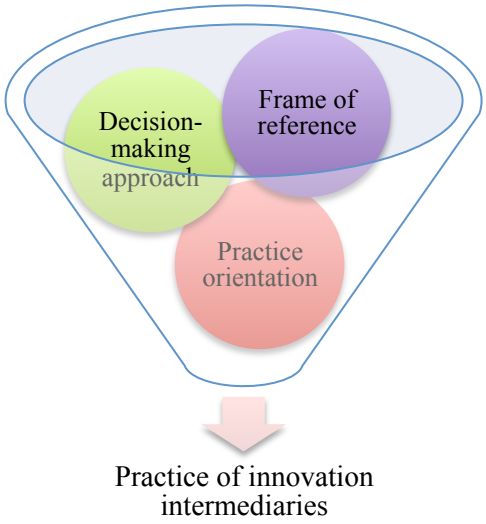
3.4 Research framework proposition

Considering the patterns obtained from the literature review and the results in the exploratory study, three important areas have been detected. First, there is an important distinction in the practice of IIs regarding how they operate in their practice. These two levels depict an interest for understanding the macro environment in which they are involved and the available opportunities in it and recognizing the particular micro conditions of a client and the needs to produce a commercial success. Second, another contrast is the approach used to make decisions. These two considerations reflect on the one hand the use of previous experiences to arrive at a conclusion, and on the other hand, the application of evidence as a means to confirm the assumptions before arriving to a conclusion. Third, a difference in the purpose of the activities to provide the services; these activities are oriented to structure a practice based on efficiency of the same activities (productivity) or transformation of the activities to produce new and better practices (innovation). Using Drucker's (1992) concepts, productivity refers

to knowledge applied to known activities, while innovation is knowledge applied to activities that are new and different.

The plan is to present these three pairs as potential attributes to represent the practice of IIs. We propose a framework to characterize their practice based on three dimensions. We consider that these dimensions co-exist to describe the practice of IIs and enable the intermediary to provide their services and assist their clients in the commercialization process. A representation of these dimensions is illustrated in Figure 4. The dimensions of the model and their attributes are presented in detail in the following sections.

Figure 4: Practice dimensions of innovation intermediaries



3.4.1 Frame of reference

According to Popp (2000), IIs have to deal with different problems and clients in volatile ecosystems acting as a stable point for their clients. In addition, Klerkx and Leeuwis (2009a) suggest that the functions of IIs are neither implemented in a linear form nor applied for a unique aggregation level. We propose that IIs consider two operational levels to deliver stability to their clients. Thus, frame of reference is the focal point applied to the techniques used by IIs to provide their services, on a macro level (MaL) and a micro level (MiL).

- *Macro level*: Activities, processes, methods and tools focused on broad challenges that consider the ecosystem or the markets.
- *Micro level*: Activities, processes, methods and tools focused on specific challenges that provide an impact at a venture or client level.

3.4.2 Decision-making approach

Hargadon and Sutton (1997) argue that IIs advance as they accumulate more experience in the industry. This dimension considers two approaches to validate the information received and support the decision-making process based on personal experience (EX) and evidence methods (EV).

- *Experience*: Activities, processes, methods and tools that rely upon recall of similar past transactions but do not require evidence to determine a position.
- *Evidence:* Activities, processes, methods and tools that determine if a position is supported based on converging evidence.

3.4.2.1 Types of evidence

To gain more insights on how IIs use evidence, we propose to go one more level in detail classifying the types of evidence according to three types of evidence described as follows: convince sponsors, refine design and position strategically.

- *Refine design (RD)*: IIs assist their clients to monitor and gather evidence to confirm configuration choice of the venture offering and identify those areas that need to be improved.
- *Position strategically (PS)*: IIs help their clients gather evidence so as to position their business ahead of their competitors and toward target markets.
- *Convince sponsors (CS)*: IIs provide evidence that attracts investors and resources to connect with their clients and to show progress against milestones.

Given that IIs can make use of all three purposes of evidence, it is important to consider additional aspects to differentiate the perceived status of each type of evidence. Thus, we propose four distinctions: use, intend to use, familiarity, and utility.

- *Use* describes an actual implementation of tools or processes to utilize a type of evidence
- *Intend to use* refers to the perceived interest for applying tools or processes to exploit a type of evidence

- *Unfamiliarity* indicates awareness of tools or processes to capitalize on a type of evidence
- *Non-utility* is the perception of benefit provided by tools or processes when using a type of evidence.

3.4.3 Practice orientation

Morgan and Crawford (1996) maintain that IIs position themselves in the market through reputation, networks of contacts, and proficiency in the industry. Practice orientation, denotes the emphasis that IIs give to their activities, methods, processes, and tools to change or reinforce their practices by means of innovation (IN) and productivity (PR).

- *Productivity*: Activities, processes, methods and tools used to adjust the status quo. Productivity focuses on doing *things right* and do not demand radical variations or modifications to resources or current practices.[3]
- *Innovation*: Activities, processes, methods and tools used to change, update, and renew the status quo. Innovation focuses on doing the *right things*, or adjusting current practices by acquiring new knowledge or using it differently.[4]

3.4.4 Framework representation

In the previous sections we have proposed to characterize the practice of IIs considering three dimensions: frame of reference, decision-making approach, and practice orientation. Examining in more detail how evidence is used in the dimension decision-making approach, we have considered three types of evidence to study the role in their practice as well as four distinctions to determine the perceived position across the types of evidence.

Figure 5 is a representation of the model to characterize the practice of IIs based on the three dimensions. We consider that all IIs possess all the attributes in the dimensions. However, they may have preferences for applying some attributes with more emphasis than others due to a perception of value-added in their practice.

[3] Adapted from Drucker (1992)
[4] Adapted from Drucker (1992)

Figure 5: Innovation intermediaries, practice model

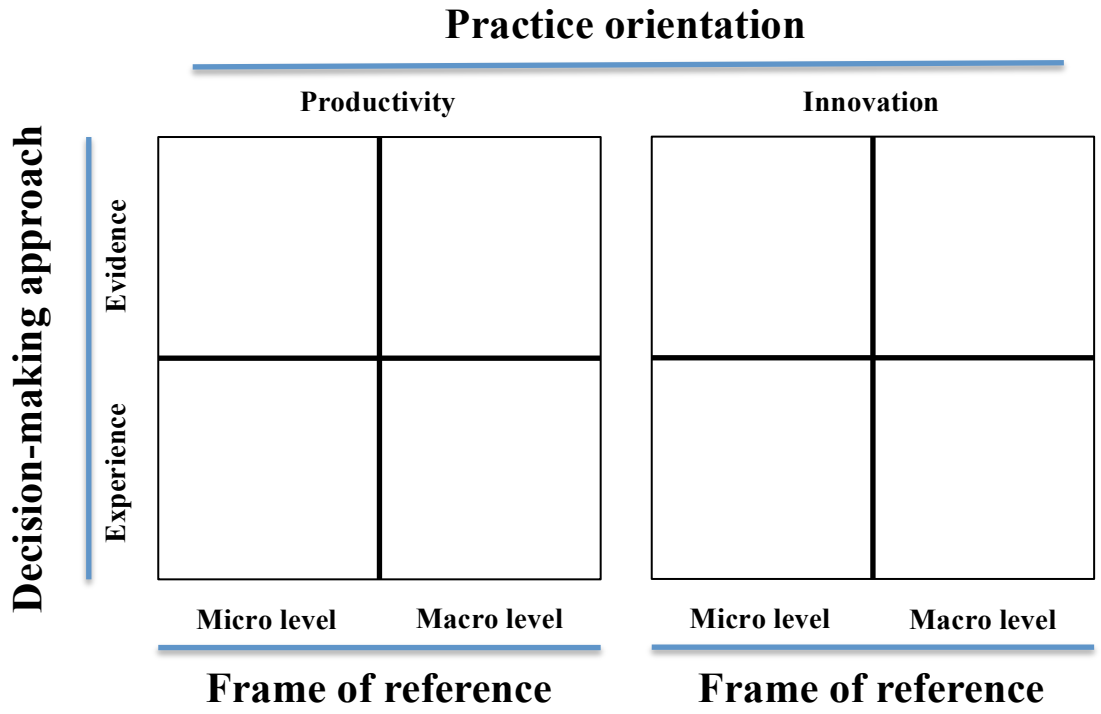
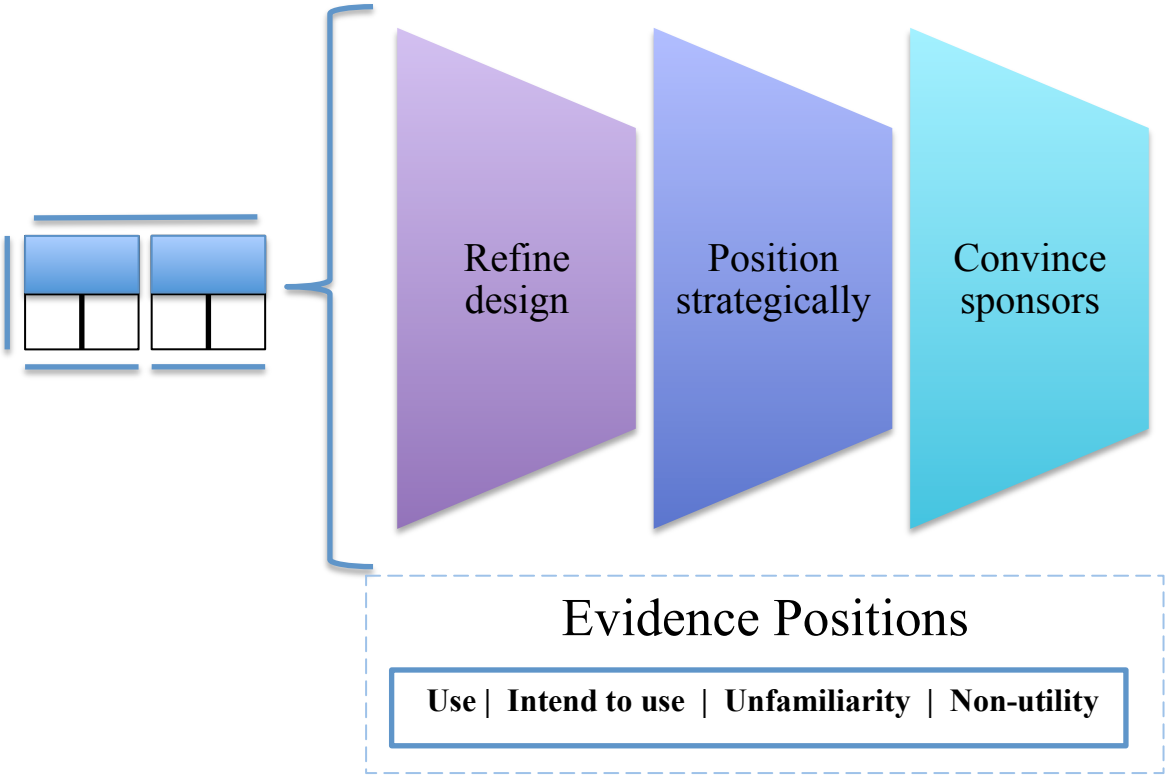


Figure 6 illustrates the types of evidence used by IIs when providing their services to their clients. To distinguish differences among the position of each type of evidence, four "evidence positions" are described under the types of evidence. These evidence positions help to differentiate whether IIs use a type of evidence, they would like to implement it, they are aware of its existence, or they perceive value in the type of evidence for their practice. Considering the framework to describe the practice of IIs, observe that the types of evidence range from a micro level to a macro level. In other words, the three types of evidence consider that IIs use evidence in activities related to refining the venture offering (operating level), identifying markets and positioning their clients ahead of competitors, and convincing sponsors of the viability of the venture offering (strategic level).

Figure 6: Types of evidence



3.5 Research hypotheses

It seems that the practice of IIs could be described by looking at key attributes of their practice instead of their functions. But, what attributes are considered more important by these social actors to execute their practice? To test their preferences using this model, three hypotheses, one for each dimension, have been proposed. In addition, to illustrate the role that evidence play in their practice and preferences in their use, we propose twelve hypotheses comparing different types of evidence and evidence positions.

3.5.1 Frame of reference

We propose that IIs find more value when focusing in their industry at a macro level as compared to a micro level, as stated in the following hypothesis.

H1: Techniques for productivity and innovation at a macro level are used/valued more than those at a micro level.

3.5.2 Decision-making

We posit that IIs find more value from similar past experiences compared to activities supported by converging evidence when supporting the commercialization process, as stated in the following hypothesis.

H2: IIs use/value their experience more than techniques requiring evidence.

3.5.2.1 Types of evidence

To clarify the role of evidence in the practice of IIs, we propose that these social actors use certain types of evidence more than others. An umbrella hypothesis for the types of evidence is:

H11: We expect that IIs find more value in tools and processes to *Convince Sponsors* when compared to *Position Strategically* or *Refine Design*.

To distinguish differences among the position of each type of evidence in the practice of IIs, twelve comparisons were proposed in the confirmatory study. The details of each comparison can be reviewed in the following chapter.

3.5.3 Practice orientation

We propose that IIs find more value on activities associated with productivity rather than innovation, as stated in the following hypothesis.

H12: Techniques for performing productivity activities are used/valued more than those for innovation.

Chapter 4
Methodology

This chapter explores the methodology used to carry out a confirmatory stage to examine the model proposed to characterize the practice of IIs and describe the use of evidence in their practice.

The confirmatory stage was directed to a broader audience of practitioners in the field by using a survey focused on investigating the practice of IIs and use of evidence to support commercialization processes. The insights obtained from the previous stages in the study supported the definition of areas and the formulation of some questions included in this study, thus creating a directed instrument shaped by formative evidence.

4.1 Design of the study

4.1.1 Participants

IIs for the confirmatory study were recruited through LinkedIn's groups (professional social network). Given that there was no specific group with the title "IIs" at the time of the group selection search, groups focused on "innovation" were selected to invite IIs to participate in the survey. The selected groups contain discussions related to open innovation, collaboration with strategic partners, identification of business opportunities, and innovation management or commercialization of technologies. In addition, their members could post new discussions and contribute on any of the discussion topics posted in the group. The groups were selected in the order provided by LinkedIn search function. In total, fifteen LinkedIn groups were selected. Table 2 illustrates the groups selected to recruit participants for the study.

The participants were invited to answer the survey using two methods. A message posted on the groups with the details of the study and a direct invitation to the participants in the groups using LinkedIn's messaging service (Appendix G). To select those participants suited to participate in the survey, their LinkedIn profile was assessed against functions and roles performed by IIs. If a member of the group performed three or more of the functions, an invitation was sent to participate in the study. To increase the participation rate, an appreciation token was offered to North American participants who were willing complete the survey. Finally, a reminder message was sent to all participants two weeks before closing the survey.

Table 2: LinkedIn groups for confirmatory study

	Name of the group
1.	Board of innovation
2.	Brightidea Innovation Experts
3.	Connect 2 Innovation
4.	Front End of Innovation
5.	Imobility: Future Vision
6.	INNOVAHUB Open Innovation and Crowdsourcing
7.	Innovation and Entrepreneurship Society
8.	Innovation Experts Network
9.	Innovation Management Group
10.	Innovation People Expert Innovators Creative Network
11.	International Society for Professional Innovation Management
12.	TRIZ and Innovation
13.	SNITTS-Swedish Network for Innovation and Technology Transfer Support
14.	Startup Specialists
15.	The Global Crowdsourcing Network

4.1.2 Materials in the confirmatory study

LinkedIn (professional social network) was used to recruit participants for the study. LinkedIn messaging service (tool to communicate with group members) was implemented to establish contact with potential participants. The survey was developed, stored and deployed using Survey Monkey (online survey service). Finally a website was designed to provide cumulative reports of the survey and a unique point of access for the participants in the study.

4.1.3 Survey design

The instrument (Appendix K) included only closed-ended questions with rating and multiple choice (single and multiple answer). Rating scale questions were used to measure the direction and intensity of attitudes, while multiple-choice questions were used to measure the frequency of the mutually exclusive categories. In addition, the option “other” was included as part of the options for the multiple answer questions. Moreover, in an attempt to prevent question order bias, the answer options were listed in alphabetical order.

The questions and the answer choices in the instrument were designed using two sources: comments from the interviews in the exploratory study and the literature review. In addition, the questions and answer choices were refined with the input of three IIs. The instrument consisted of thirteen questions. From these, Questions 1, 2, 3, 7 and 13 were designed using the input from both the literature review and participants in the exploratory study, whereas Questions 4, 5, 6, 8, 9, 10, 11, 12 were designed using the comments and opinions of the participants in the exploratory study.

The final instrument was developed in four iterations. The first three were dedicated to revising the wording and validating the options included in the answer. In addition, in order to guarantee a high level of clarity and reduce ambiguity, three IIs revised the last version of the instrument. After these corrections, the survey was presented to the participants of the study.

Before releasing the final version of the instrument, a pilot was run to anticipate and correct potential technical challenges, visual design issues and improve clarity and reduce ambiguity in the questionnaire's writing style. Finally, this study was revised and approved by the Office of Research Ethics (ORE) at the University of Waterloo.

4.1.4 Procedure

Once the participants accessed the URL provided in the invitation or LinkedIn post, they were redirected to the website in which they had to electronically sign a consent form. After the form was signed, the website redirected the participants to start answering the survey. Since all the questions in the survey were closed-ended questions, the participants only had to select the option(s) to answer the questions according to the instructions provided for each question. It is important to mention that the participants could skip one or more questions, they could navigate through the whole survey, and they had the choice to modify their answers before submitting the survey.

4.2 Research model

The model proposed describe the practice of IIs using three dimensions: the level of analysis at which they observe and operate in their industry (frame of reference), the preferred method to support their decisions (decision-making approach), and the alignment of the practice to achieve established goals (practice orientation). Expanding the study of decision-making in the practice of IIs, the use of evidence has been classified in three types and its status identified by four evidence positions expecting to clarify the role of evidence in the practice of IIs. In summary, this framework seeks to explain the practice of IIs and expose the position of evidence in their current practice.

4.2.1 Types of evidence comparisons

To distinguish differences among the position of each type of evidence in the practice of IIs, twelve comparisons were proposed.

H3a: We expect that the IIs 'use' the tools and processes more for the purpose of *Convince Sponsors* than for *Refine Design*.

H3b: We expect that the IIs 'use' the tools and processes more for the purpose of *Convince Sponsors* than for *Position Strategically*.

H4a: We expect that the IIs 'intend to use' the tools and processes more for the purpose of *Convince Sponsors* than for *Refine Design*.

H4b: We expect that the IIs 'intend to use' the tools and processes more for the purpose of *Convince Sponsors* than for *Position Strategically.*

H5a: We expect that the IIs see as 'unfamiliar' the tools and processes for the purpose of *Refine Design* as compared to *Convince Sponsors*.

H5b: We expect that the IIs see as 'unfamiliar' the tools and processes for the purpose of *Position Strategically* as compared to *Convince Sponsors*.

H6a: We expect that the IIs perceive as 'not useful' the tools and processes for the purpose of *Refine Design* as compared to *Convince Sponsors*.

H6b: We expect that the IIs perceive as 'not useful' the tools and processes for the purpose of *Position Strategically* as compared to *Convince Sponsors.*

H7: We expect that the IIs 'now use' the tools and processes more for the purpose of *Position Strategically* than for *Refine Design*.

H8: We expect that the IIs 'intend to use' the tools and processes more for the purpose of *Position Strategically* than for *Refine Design*.

H9: We expect that the IIs see as 'unfamiliar' the tools and processes for the purpose of *Refine Design* as compared to *Position Strategically*.

H10: We expect that the IIs perceive as 'not useful' the tools and processes for the purpose of *Refine Design* as compared to *Position Strategically.*

Chapter 5
Results and findings

In this chapter, a report of the findings from the confirmatory study is presented. First a summary of the preparation of the data for analysis is presented, followed by a description of the statistical analysis, and the interpretation of the results in the context of IIs' practices.

5.1 Survey structure

The survey included thirteen closed-ended questions, from which twelve were multiple-choice questions and one rating question. Some questions were designed to focus on a specific area. For instance, Question 1 was targeted to gather information regarding types of evidence. In addition, Questions 12 and 13 were designed as self-assessments for the IIs. Finally, Question 4 targeted the perceived barriers to apply scientific methods in the practice of IIs.

5.2 Data organization

To test the hypotheses in the study and assist the interpretation of the results, the answer options (items) were organized in sets. The sets correspond to each dimension's attribute in the framework described in Chapter 3. The logic behind this arrangement is that each participant can obtain a score for each of the attributes in the framework. As described in the previous section, Questions 4, 12, and 13 were targeted to obtain specific information, for this reason these questions were not considered to integrate the sets.

Question 1 was used to integrate the sets for the types of evidence (CS, RD, PS). The definition of the types of evidence allowed the classification of each item in one of the three types. In total, eight items per set embody the types of evidence.

Questions 2 to 11 were used to integrate the attributes of the three dimensions in the framework. The definition of the attributes allowed the classification of each item in one of the two sets per dimension. For the dimensions *Frame of reference* and *Practice orientation*, Question 4 was excluded because the question's items are not related to the attributes in the dimensions. In total, twenty-two items integrate each attribute of the dimension *Practice orientation*, twenty-six items integrate each attribute of the dimension *Frame of reference*, and thirty-six items integrate each attribute of the dimension *Decision-making approach*. Refer to Appendix I for the list of items per attribute set.

5.2.1 Item combination

To maintain an equal number of items per attribute set (for ease of comparison), some items were merged into one item. The criteria to combine items consisted of grouping those with the same name and meaning or those described with different names, but intended to serve a related purpose (refer to Appendix H for the list of items combined per dimension). For instance, in the set *productivity* (Practice orientation), the items *inventories of new intellectual property* and *inventories of dormant intellectual property* were merged into one item named *inventories of intellectual property*. Moreover, the combination of items also included the integration of the answer choices to produce an aggregated answer. It is important to remember that the values of the answers are binary, 1 if the answer choice was selected, or 0 if the answer choice was not selected. Thus, an OR gate truth table (Table 3) was used to produce the aggregated answer of the combined item.

Table 3: "OR" gate truth table

Item A	Item B	Output
0	0	0
1	0	1
0	1	1
1	1	1

Note. The same logic is applicable for three or more items

5.2.2 Score calculation

To aid in the interpretation of the data collected, eighteen scores per participant were calculated. Six scores represent the attribute dimensions per participant, while twelve scores characterize the types of evidence per participant. The process to create the scores is presented in the following sections.

5.2.2.1 Types of evidence score

To distinguish relevant differences in the types of evidence, Question 1 was originally divided into four evidence positions (subset): "use" (C1), "intend to use" (C2), "unfamiliarity" (C3), and "non-utility" (C4). As illustrated in Table 4, these positions were integrated in each of the three types of evidence sets to produce four scores per type of evidence.

Table 4: Partial representation of the scores per type of evidence and participant

	RD				PS				CS			
	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4
P01	3	5	3	1	6	1	4	1	6	4	1	1
P02	3	4	4	1	4	3	4	1	4	5	2	1
P03	7	1	3	1	6	1	3	2	6	2	3	1
P04	5	5	1	1	2	6	3	1	4	4	3	1
P05	3	5	3	1	2	6	3	1	8	2	1	1

Note. The rows represent the scores obtained per participant (P)

The scores were calculated adding the answer choices of the items in the subset. For instance, Table 5 illustrates the answer choices of participant one (P01) in *Refine design* and evidence position *C1*. To avoid scores with 0, a transformation was used. It consisted of adding +1 to the final score per participant. In this example P01 selected I3 and I5 for the evidence position *C1*, so the score for C1 = 2 + 1 = 3.

Table 5: Example of answer choices for refine design and evidence position "C1"

	Refine design (RD) – C1							
	I1	I2	I3	I4	I5	I6	I7	I8
P01	0	0	1	0	1	0	0	0

Note. The columns represent the items (I) of the set. The answer choices correspond to the values for C1.

The score per evidence position is interpreted as follows: a low score for evidence positions "use" or "intend to use" (C1 and C2) means that the participant does not use or is interested in the methods and tools described in the answer choices. In contrast, a high score means that the participant is actually using or interested in using the methods and tools described in the answer choices. A low score for evidence positions "unfamiliarity" and "non-utility" (C3 and C4) means that the participant is familiar or finds useful the methods and tools described in the answer choices. On the other hand, a high score means that the participant is not familiar or does not find useful the methods and tools described in the answer choices.

5.2.2.2 Dimension scores

Two scores per dimension were calculated per participant. The scores were calculated by adding up the answer choices (binary values) in the set. Given that all the scores obtained a value above zero, no transformation was required. Refer to Appendix J to review the scores obtained per participant and attribute set.

5.2.3 Statistical analysis

A paired t-test (confidence interval 95%) was selected as the statistical tool to run the analysis and test the hypotheses. Paired t-test is a suitable method to test the hypotheses because it allows the comparison between attribute dimensions and evidence positions across types of evidence, providing differences in the means and the direction of the effect. In addition, the paired differences are very close to normal distributions preferred to use this method.

As multiple t-test comparisons were used in this analysis, it is important to acknowledge that:

- When executing multiple comparisons, the probability of finding significant differences in the analysis by chance increases (Type I error).

5.2.3.1 Tools used for the analysis

The analysis was executed using Excel spreadsheets (version 2011) and Statplus (version 2009). Excel was used to codify the data and create descriptive statistics, whereas Statplus was used to execute t-tests comparisons.

5.3 Points to note in the study

The sample was collected from November 22nd to December 31st 2011. On average, participants answered the survey in nine minutes. In total, sixty-five participants submitted the survey, but some participants failed to complete the survey entirely. To increase the likelihood of a valid analysis, the incomplete surveys were dropped from the analysis when either Question 1 was not answered or more than 50% of this question was not completed. In addition, surveys were also dropped if more than four questions (Questions 2-13) were not answered. In the end, fifty-five participants were included for analysis.

5.4 Results

The results of the confirmatory study provide evidence not only to clarify the practice of IIs but also to reveal present gaps in their practice. These gaps indicate that IIs are concentrated on activities that do not actually support their purpose, producing an image of effectiveness but failing to deliver some aspects of value to their clients.

To explain how IIs focus their practice and where these gaps are evident, this section starts by presenting their own perception about the practice and the results obtained per dimension, recognizing attributes that appear to have more value for them, showing a different story from the one depicted by these social actors. Then, it will explore in more detail what types of evidence are more important for their practice and identify a tendency that seems to limit the benefits clients derive from their services. Finally, the unsupported results in the study are described.

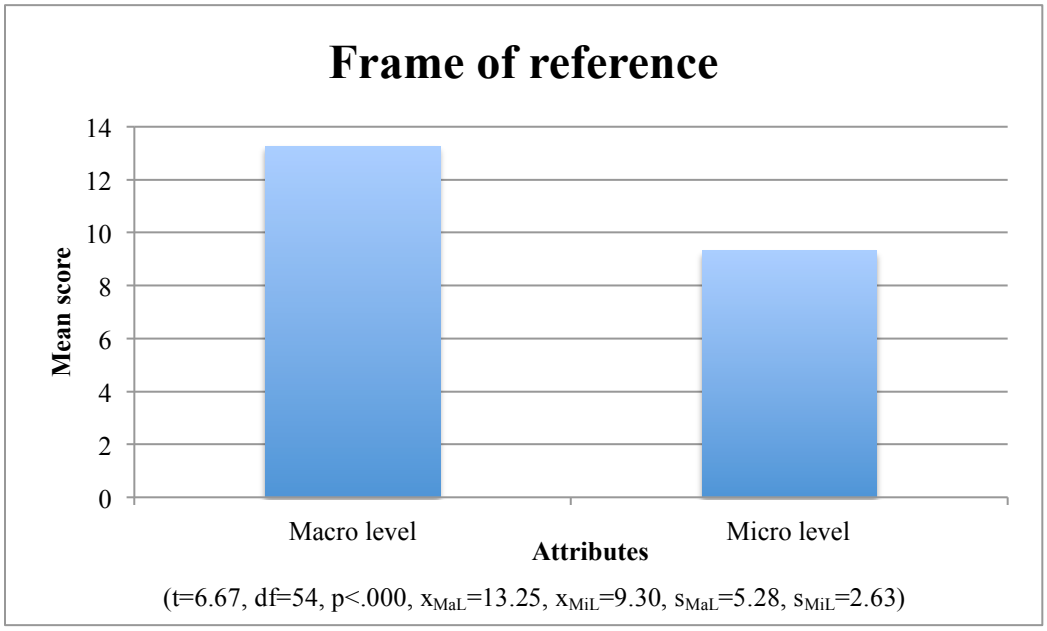
5.4.1 Perception of their practice and barriers to implement scientific methods

Questions 12 and 13 were designed as self-assessment for the participants in the study. The results show that IIs have a positive perception about their practice. They see themselves as improving their practice and challenging the status quo. When addressing the perceived barriers to implementing scientific methods in their practice, they believed that the main reasons for IIs to operate without sufficient scientific evidence are that such evidence is time consuming, has a low accessibility of methods, and is uneconomical.

5.4.2 Frame of reference

Recalling section 3.4.1, *Frame of reference* is the focal point applied to the techniques used by IIs to provide their services considering the processes of the client firm (micro level) and the potential markets, trends in the industry and the ecosystem (macro level). As expected in the hypothesis, the frame of reference at which IIs find more value for their practice is a macro level, focused on the industry, markets, and ecosystem. These actors envisioned a position in which observing trends, identifying markets, and interacting with their environment is of greater significance than focusing on the particular needs and requirements of their clients or venture offerings, MaL > MiL ($t=6.67$, $df=54$, $p<.000$, $\bar{x}_{MaL}=13.25$, $\bar{x}_{MiL}=9.30$, $s_{MaL}=5.28$, $s_{MiL}=2.63$). Figure 7 illustrates the mean scores of the participants per attribute in the dimension *Frame of reference*.

Figure 7: Frame of reference attributes comparison

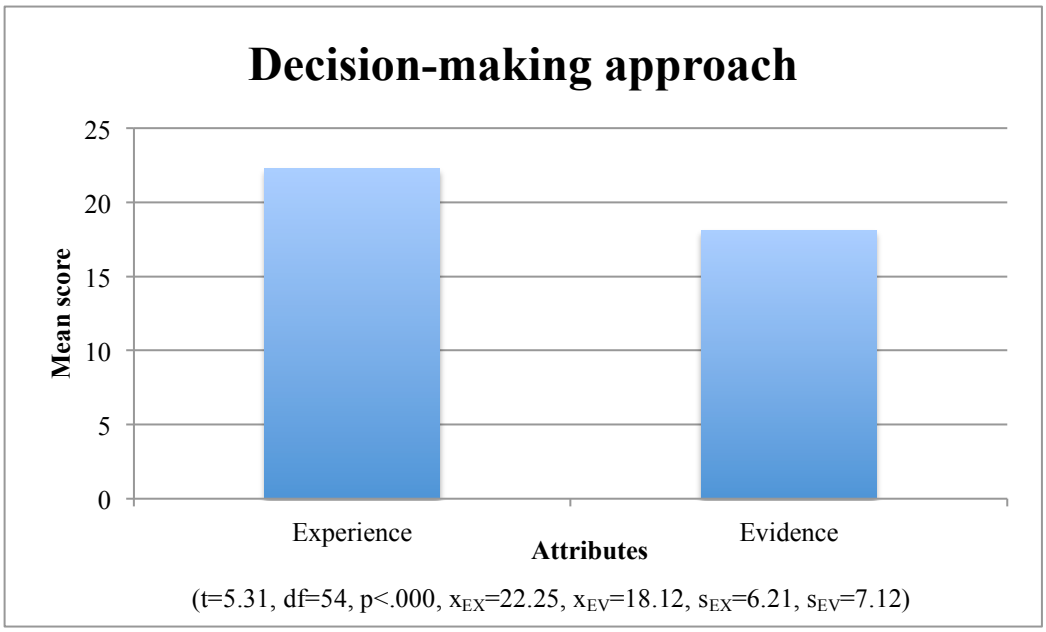


Note. Mean score represents the score of the 55 participants in the study. The scores for MaL varied from 4 to 23 and MiL from 1 to 13.

5.4.3 Decision-making approach

Recalling the section 3.4.2, *Decision-making approach* is the method used to support decisions before they are made. The assumptions in the decision can be validated by using methods requiring evidence or by referring to past experiences. The results reveal that IIs use/value their experience more than the techniques that make use of evidence, EX > EV ($t=5.31$, $df=54$, $p<.000$, $\bar{x}_{EX}=22.25$, $\bar{x}_{EV}=18.12$, $s_{EX}=6.21$, $s_{EV}=7.12$) as shown in Figure 8. Although they use different tools and sources of information to inform their decisions, they rely on their experience when assisting their clients in the commercialization process and not on methods that can help to confirm what they assume to be the most appropriate for their venture and its offering to the market.

Figure 8: Decision-making approach attributes comparison



Note. Mean score represents the score of the 55 participants in the study. The scores for EX varied from 9 to 36 and EV from 5 to 35

The results from this comparison, reflect to us a preference in their practice. Nevertheless, IIs make use evidence. So, what is the purpose of evidence in their practice? To answer this question and provide more details about their practice, an analysis focused on the use of evidence was implemented.

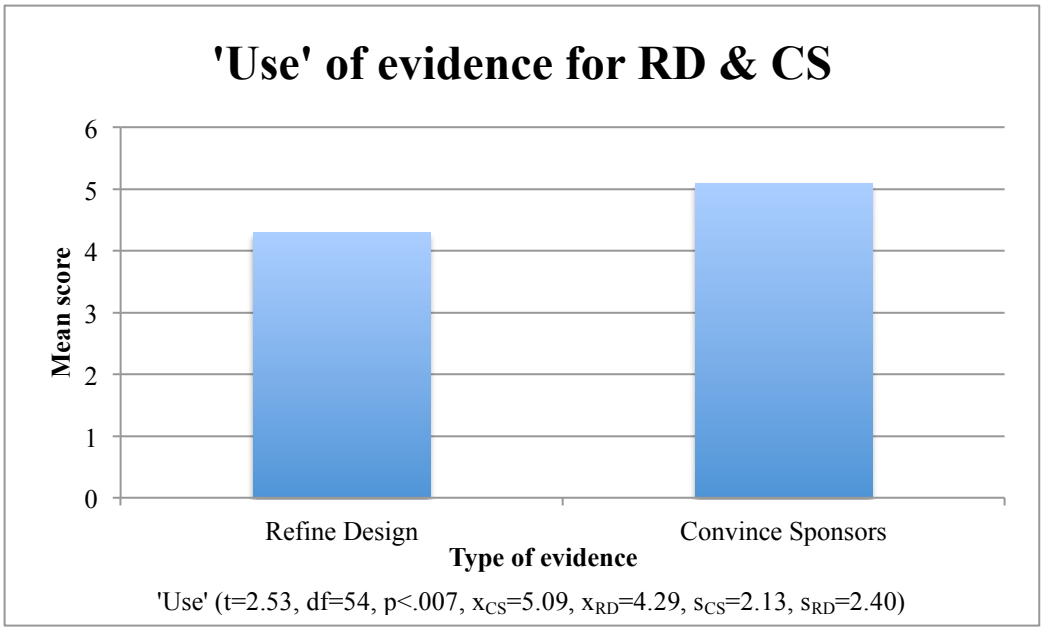
5.4.3.1 Evidence status in the practice of innovation intermediaries

The results of the study indicate that IIs use some types of evidence more than others. To distinguish differences between types of evidence, four evidence positions were considered in the analysis (use, intend to use, familiarity, utility).

Recall from Section 3.4.2.1 that *Refine design* (RD) is the type of evidence used by IIs to assist their clients to monitor and gather evidence to confirm configuration choice of the venture offering and identify those areas that need to be improved; *Position strategically* (PS) is used by IIs to help their clients gather evidence so as to position their business ahead of their competitors and toward target markets; finally *Convince sponsors* (CS) is the type of evidence to attract investors and resources to connect with their clients and to show progress against milestones.

When comparing types of evidence that are currently implemented by the IIs (use), IIs find more important in their practice to *Convince sponsors* when compared to *Refine design*. In other words, they use evidence to attract new resources and to persuade investors to collaborate with their clients rather than focusing on helping their clients to improve processes such as details in the configuration of the offering that have a direct impact on the products or services the expect to commercialize. 'Use' CS > RD ($t=2.53$, $df=54$, $p<.007$, $\bar{x}_{CS}=5.09$, $\bar{x}_{RD}=4.29$, $s_{CS}=2.13$, $s_{RD}=2.40$) as shown in Figure 9 the evidence to *Convince sponsors* is used more than that for *Refine design*.

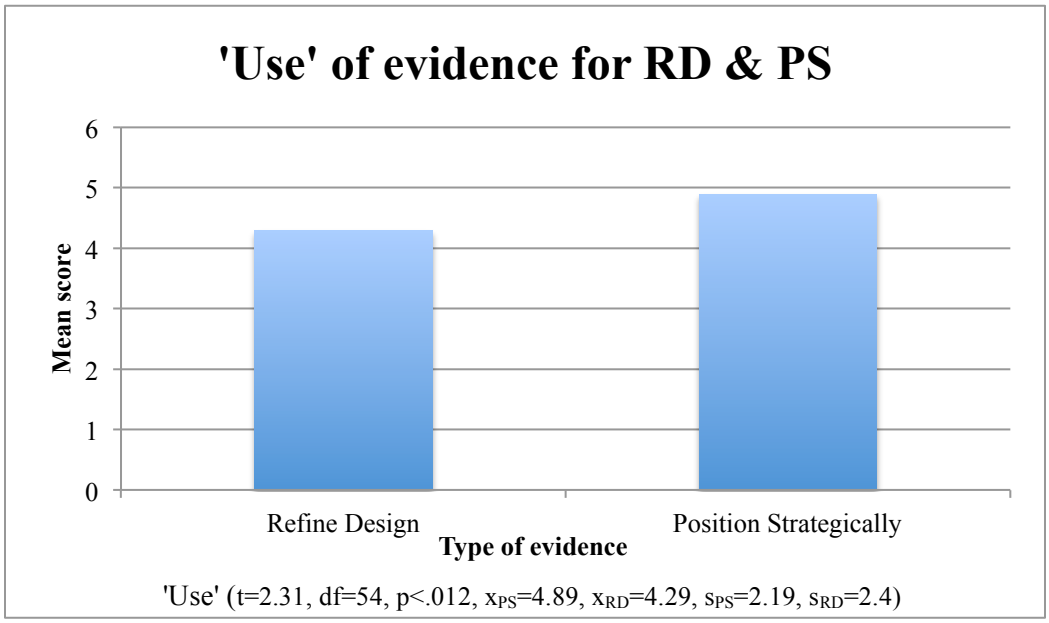
Figure 9: Type of evidence comparison RD & CS - evidence position 'use'



Note. Mean score represents the score of the 55 participants in the study. The scores for RD varied from 1 to 9 and CS from 1 to 9

A similar result was obtained when comparing the evidence for acting upon the venture to *Position strategically* and *Refine design* of the venture offering. It was discovered that IIs make use of evidence to help their clients to position their businesses ahead of their competitors, however they are less attentive to the processes to appropriately formulate and revise product or service offerings, that is 'use' PS > RD ($t=2.31$, $df=54$, $p<.012$, $\bar{x}_{PS}=4.89$, $\bar{x}_{RD}=4.29$, $s_{PS}=2.19$, $s_{RD}=2.4$) as shown in Figure 10, *Position strategically* appears with a higher score when compared to *Refine design*.

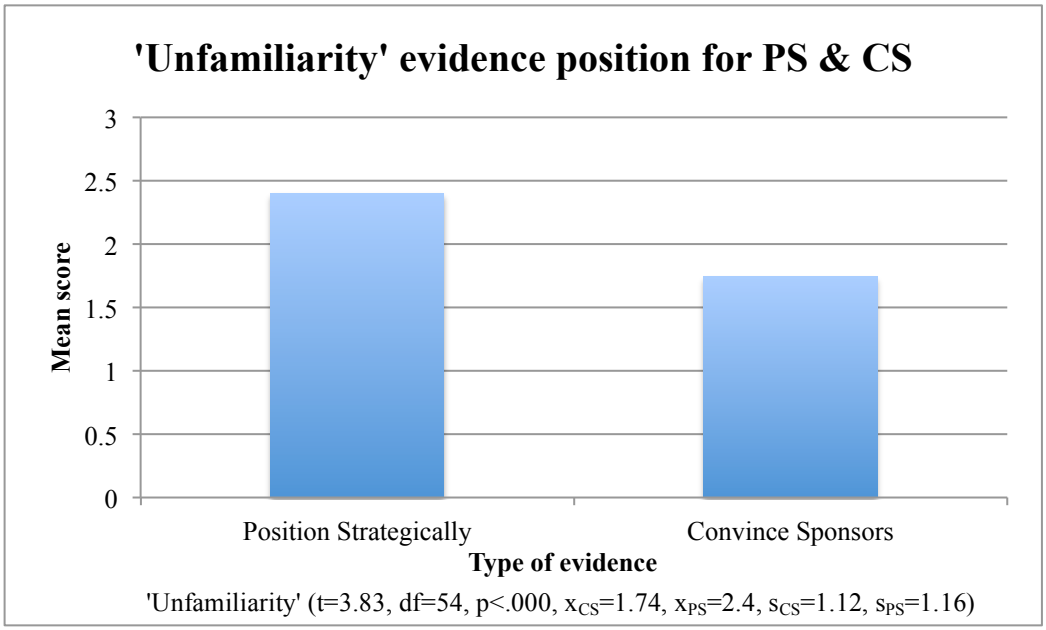
Figure 10: Type of evidence comparison RD & PS - evidence position 'use'



Note. Mean score represents the score of the 55 participants in the study. The scores for RD varied from 1 to 9 and PS from 1 to 9

Next we observe at the level of awareness IIs have regarding the three types of evidence. It was discovered that they have a better understanding of the evidence as used to *Convince sponsors* of the viability and progress of the venture investment than the evidence for the purpose of acting upon the venture to *Position strategically*. 'Unfamiliarity' CS < PS ($t=3.83$, $df=54$, $p<.000$, $\bar{x}_{CS}=1.74$, $\bar{x}_{PS}=2.4$, $s_{CS}=1.12$, $s_{PS}=1.16$). Recall from Section 5.2.2.1 that in 'unfamiliarity', a high score should be interpreted as highly unfamiliar, whereas a low score should be interpreted as slightly unfamiliar, as shown in Figure 11.

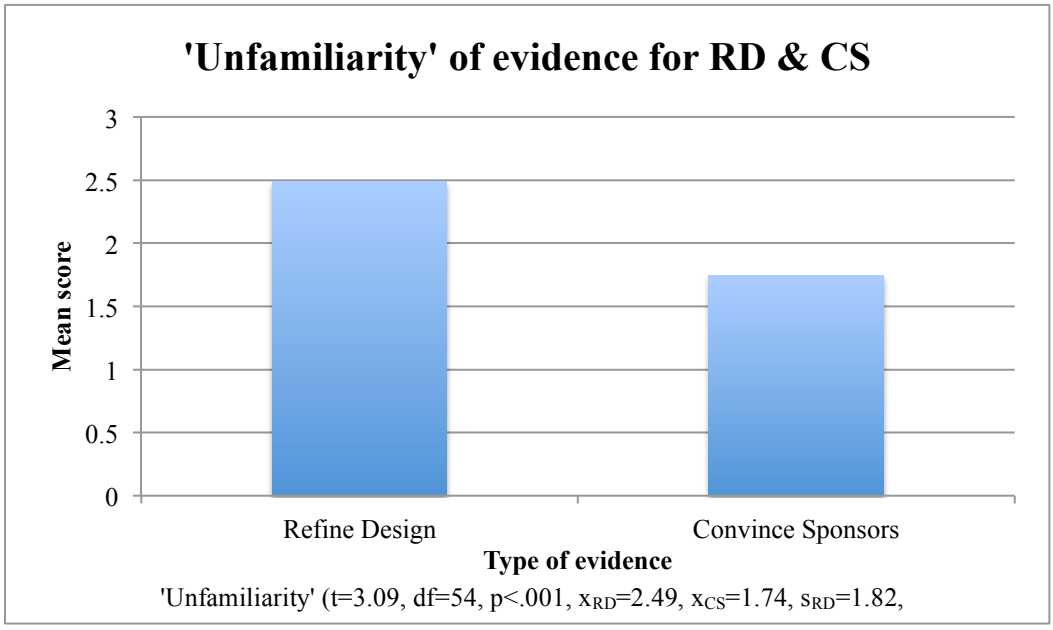
Figure 11: Type of evidence comparison PS & CS - evidence position 'unfamiliarity'



Note. Mean score represents the score of the 55 participants in the study. The scores for RD varied from 1 to 9 and CS from 1 to 9

In addition, when comparing the level of familiarity between the evidence to attract supporters and the evidence to improve the venture offering, the results show that IIs have a better comprehension of evidence to *Convince sponsors* of the viability of the venture investment than the evidence to formulate and revise the venture offering or *Refine Design*. Consistent with the previous comparison, it seems that IIs assign more value to the evidence for attracting supporters. 'Unfamiliarity' CS < RD ($t=3.09$, $df=54$, $p<.001$, $\bar{x}_{RD}=2.49$, $\bar{x}_{CS}=1.74$, $s_{RD}=1.82$, $s_{CS}=1.12$). Recall from Section 5.2.2.1 that in 'unfamiliarity', a high score should be interpreted as highly unfamiliar, whereas a low score should be interpreted as slightly unfamiliar, as shown in Figure 12.

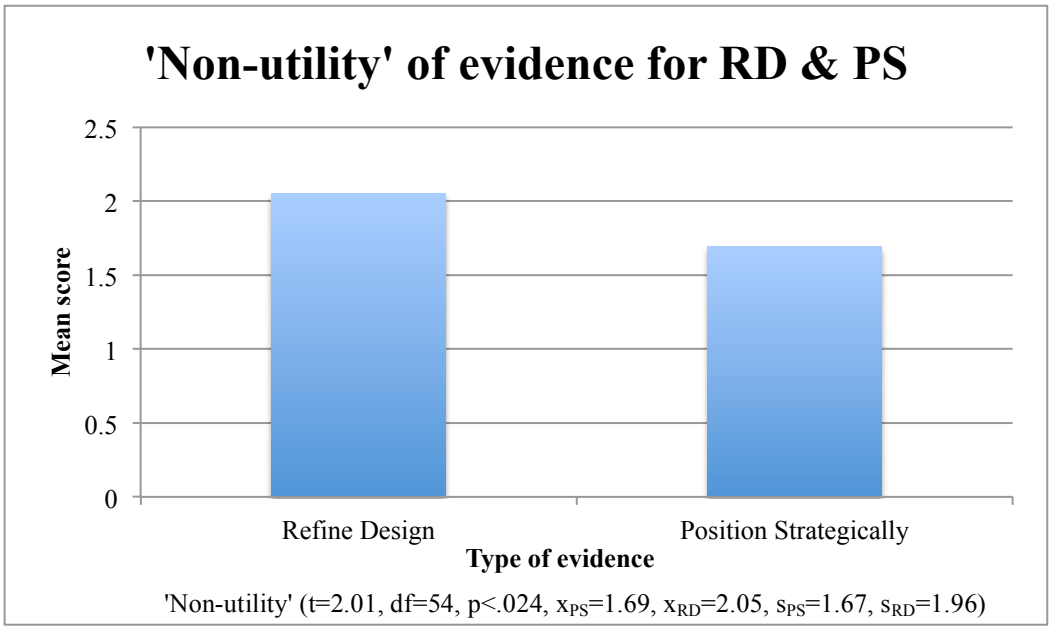
Figure 12: Type of evidence comparison RD & CS - evidence position 'unfamiliarity'



Note. Mean score represents the score of the 55 participants in the study. The scores for RD varied from 1 to 8 and CS from 1 to 6

Finally, when observing the value that IIs perceive when comparing the three types of evidence, they consider that the evidence to clarify and improve processes necessary for the development of products or services is less important than the evidence for position their clients ahead of their competitors, as reflected in, 'utility' PS < RD ($t=2.01$, $df=54$, $p<.024$, $\bar{x}_{PS}=1.69$, $\bar{x}_{RD}=2.05$, $s_{PS}=1.67$, $s_{RD}=1.96$). Recall from Section 5.2.2.1 that in 'non-utility', a high score should be interpreted as non-useful, whereas a low score should be interpreted as slightly non-useful, as shown in Figure 13.

Figure 13: Type of evidence comparison RD & PS - evidence position 'non-utility'



Note. Mean score represents the score of the 55 participants in the study. The scores for RD varied from 1 to 9 and PS from 1 to 9.

5.4.4 Unsupported results

Some of the results in the study were not supported by the analysis. It was proposed that IIs orientate their practice to embrace *Productivity* rather than *Innovation* (H12), however the difference between the two variables was not significant (PR > IN, $\bar{x}_{PR}=15.58$, $s_{PR}=4.87$, $\bar{x}_{IN}=15.12$, $s_{IN}=4.94$).

In addition, six types of evidence comparisons across evidence positions were not supported in the analysis. Table 6 shows the evidence position comparisons that did not indicate a significant mean difference.

Table 6: Types of evidence, unsupported results

Evidence position	Comparison	Results			
		Convince Sponsors (CS)		**Position Strategically (PS)**	
		Mean	**Std. Dev.**	**Mean**	**Std. Dev.**
Use	CS > PS	5.09	2.13	4.89	2.19
Intend to use	CS > PS	2.85	1.32	2.83	1.75
		Convince Sponsors (CS)		**Refine Design (RD)**	
		Mean	**Std. Dev.**	**Mean**	**Std. Dev.**
Intend to use	CS > RD	2.85	1.32	2.89	1.47
Non-utility	CS < RD	2.2	1.9	2.05	1.96
		Position Strategically (PS)		**Refine Design (RD)**	
		Mean	**Std. Dev.**	**Mean**	**Std. Dev.**
Intend to use	PS > RD	2.83	1.75	2.89	1.47
Unfamiliarity	PS < RD	2.4	1.16	2.49	1.82

Finally, a comparison did show a significant difference between the two variables but the effect is opposite in direction of what was originally expected. It was expected that IIs considered more useful the evidence for interesting supporters of the viability of the venture (*Convince sponsors*) than the evidence for positioning the venture ahead of their competitors (*Position strategically*), PS > CS (expected). However, it seems that the value of positioning a venture to IIs is in fact greater than the value of attracting supporters PS < CS (found).

This result does not contradict what was found in the study. It actually supports what it has been presented by shaping the position that evidence has in the practice of IIs.

Table 7 illustrates the evidence position comparison with a significant difference but effect in opposite direction.

Table 7: Evidence position comparison with effect in opposite direction

Evidence position	Expected comparison	Results										
					Convince Sponsors (CS)				Position Strategically (PS)			
		t-score	df	p	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Non-utility	CS < PS	3.53	54	0.000	2.2	1.9	1	9	1.69	1.67	1	9

Chapter 6
Discussion and conclusions

The purpose of this research study has been to characterize the practice of IIs and expose the extent of use of evidence when delivering their services in ways that unintentionally limit their effectiveness. Through examining the literature through a systematic literature review, identifying general characteristics of their practice through an exploratory study using repertory grid, and exploring additional literature to complement the learning acquired, a framework to describe the practice of IIs has been formulated. Proposing three dimensions, this framework explains the level of operation used in IIs' practice, how decisions are supported, and what position is taken as they perform their activities. Moreover, concentrating on the use of evidence, three types of evidence (convince sponsors, position strategically, and refine design) were acknowledged and four distinctions (use, intend to use, familiarity, and utility) were included to identify differences in the observations. To determine the value of the framework, a confirmatory study was carried out, collecting data from fifty-five IIs around the world through an online survey. The results reveal important characteristic in the practice of IIs. This study, however, detected weaknesses during the intervention in commercialization processes, gaps produced by the emphasis that IIs assign within their current practice. We believe these gaps may harmfully affect their role in the commercialization process, limiting the value provided to their clients.

6.1 Frame of reference

In the current practice of IIs, they are preoccupied with a focus on strategic problems, observe industry trends, identify potential markets, and establish connections in the ecosystem. This focus could be attributed to a perceived role in compensating for gaps in clients' knowledge. Such gaps are normally attributed to clients' deficiencies in business skills and in understanding their businesses' potentials. The motivation of these social actors is therefore to find a fit for the venture offering in the market and package it according to the opportunities visualized for a particular case. However, this approach is limited and does not guarantee that the product or service is going to be a commercial success because it assumes that the venture offering is "right first time". Conversely, if IIs consider the venture offering not only to understand the product, value proposition, or expectations, but also to help their clients to develop mechanisms to assess the product formulation and development process in combination with factors at a macro level, their intervention could have an emergent impact on the commercialization process. By mechanisms, we are not referring to the use of standard metrics used to describe an apparent status of the business such as revenue or number of clients. Instead, we

suggest observing the venture through a different lens, one in which the variables that affect guesses can be described, measured, and counted. Since each venture is unique, the mechanisms in place must differ but the insights obtained from them are likely to be of great value in advancing the product in the commercialization process.

6.2 Decision-making approach

IIs find the use of previous experience more significant in supporting their decisions than evidence that could be used to validate their conclusions. This finding may not be surprising given the context in which IIs exist. On the one hand, their role has sometimes been defined as a guide to commercialize products or services, but the approach to do so has been underestimated or misinterpreted. In this process, there are many decisions to make and some of them are only made by the knowledge creator (inventor) while others are supported on the expertise of an innovation intermediary. Those decisions assigned to the firm are related to the "technical" side of the product, while those related to the commercialization are often entrusted to the innovation intermediary. As mentioned in the previous point, IIs prefer to operate at a level that clarifies market opportunities and trends. Thus, when they get involved in the particular situation of a venture they seem to recognize patterns as a result of what they know and have learned from being exposed to various other cases and numerous sources of information. This information leads them to conclude a course of action assuming that what has been anticipated is correct. By contrast, corporate innovation has adopted tools that presumably are sufficient to support decisions at all stages of development. Again, it may be that IIs would be more helpful if they were to recommend courses of action based on the information provided by these tools and the interpretation given to these values.

6.2.1 Use of evidence

Nevertheless, IIs do use evidence in their practice; so by exploring the motivation for using different types of evidence and the status of these types of evidence, they work with a list of priorities in their practice, as reflected by the tools and processes in place to produce such evidence, awareness of its existence, or the perceived value to their practice. IIs consider that the evidence used to verify the venture offering (Refine design) is the least important for their practice. Instead, the first concern in their practice is the evidence to attract investors or supporters (Convince sponsors) and to position their clients ahead of their competitors (Position strategically). Confirming these results, IIs showed more awareness of the value of evidence for persuading supporters of the viability of a venture (Convince sponsors) than for positioning their clients in the market (Position strategically) and improving the venture offering (Refine design). Moreover, they find more value in the evidence for

positioning the venture (Position strategically) than for assessing and improving the venture offering (Refine design).

6.3 Practice orientation

Although it was not possible to identify a preference among the methods, processes or tools to support a particular direction in the practice of IIs, it is possible to appreciate some patterns that need further attention. For instance, overall, the practices implemented in the field and those described in the literature are enduring. In the literature, of roughly the last twenty years, the practices have been described with different names or using the same name but different meanings, but there have been few disruptive changes over time. In practice, IIs are more interested in executing their activities in an efficient manner rather than transforming or modifying what they do. The motives for refining productivity as a more suitable approach to restructuring their practice might be related to an obligation to demonstrate results to their stakeholders, results that can be measured in terms of an effective use of resources. Howells (2006) argues that IIs offer other services in addition to those associated with their core purpose. They do so because the functions related to innovation do not deliver results in the short-term. For this reason, it is possible to think that they may actually change the priorities of their practice. On the other hand, what if their purpose has not been understood in the same way as the literature portrays these actors? If there is a difference, then what is mediated in the interaction with their clients? The structure of the current practice of IIs may need to be modified; continuing with this present approach only diverts the attention to activities that do not generate the full range of value to clients and eventually could result in a perception of IIs ineffectiveness, which ultimately could lead to the definition of new alternative actors to support the commercialization process.

6.4 Value for innovation intermediaries

This study reveals evidence to support that the current practices of IIs need to change. The practices are intended to serve clients' needs; however, current practices seem necessary but not sufficient. Maintaining the status quo, IIs may not be able to fully assist their clients in the commercialization process, nor be able to develop their stronger role as catalysts of innovation. Thus, this study intends to make IIs aware that their current status quo needs to be modified and stimulate a discussion about required steps to implement necessary changes. This discussion can be opened by suggesting potential scenarios depicting possible future practice of IIs.

6.5 Possibilities for change

6.5.1 Scenario A. IIs as lean consultants

IIs could transform their practices by focusing their attention on clients' product formulation and development cycle, defining mechanisms to support the build, measure, learn approach (Ries, 2011). This change demands that IIs adjust their current practices, playing a more active role in the product formulation and development process, developing new skills and acquiring new knowledge. To start with, perhaps IIs should be trained to develop knowledge of statistical data analysis, design of experiments, and innovation accounting as they relate to their work. Thus, IIs would use evidence to support their decision-making process at every stage of the product development, creating metrics that reflect the actual position of the venture offering.

By changing the way evidence is used, IIs could now concentrate on helping their clients to refine the venture offering in a continuous cycle, prioritizing changes and validating the direction for commercial success. In this scenario, IIs have access to tangible results from their intervention in the commercialization process, reporting real impact to their sponsors, which can also increase their likelihood of maintaining sponsors' support and even increase their commitment. Moreover, by focusing IIs services on the venture offering, positioning the venture offering in the market will become more of a byproduct of a successful refinement in the product and not a separate activity as it is considered now, consuming both time and resources. With this change in approach, IIs should not be so concerned about justifying their existence by optimizing their resources and generating an image as effective facilitators. On the contrary, they can focus their attention to enhance their practices as a result of the data collected from the interventions with their clients and discover methods to accelerate commercial success. However, as mentioned before, the implementation of evidence-based methods will also have an impact in the time IIs require per client to provide their services, on the number of clients helped, and cost per client in the commercialization process (from beginning to end). This scenario will also require a change of mindset from the supporters, primarily government, regarding the expectation of these social actors as catalysts for economic development and economic resources required to implement this scenario.

6.5.2 Scenario B. IIs as product managers

This scenario portrays IIs as overseers of the product formulation and development process. Their role in this scenario is more as inspectors who continuously monitor the product offering but without controlling the results from the activities implemented. This scenario requires that IIs change the currently implemented practices to focus more on the venture offering at a micro level. As described in the previous scenario, such a change will enable the IIs to use evidence to support their clients and not to please other stakeholders. The development of new skills and expertise is required for both the entrepreneurs and the IIs. However, the venture owner will be responsible for developing the statistics, experiment design, and accounting innovation skills, whereas the IIs should know how to interpret the data obtained from the experiments, anticipate challenges, advise on adjustments required, and validate the mechanisms proposed by the entrepreneurs to measure the progress in the offering. This dynamic could lead new ventures to structure their teams to include a new member to manage these activities. A professional with these skills could include an individual trained in the use of research methods, understanding of experiment designs, and statistics. On the other hand, the innovation intermediary will require the use of tools to integrate and organize the information from each client to effectively monitor progress. In this scenario, the intervention of the IIs is moderate, reducing the dependency of the entrepreneur through the process. As a result of strengthening this role, IIs would be able to increase the number of ventures that are monitored more than in the previous scenario. By defining and validating progress metrics both the entrepreneur and the innovation intermediary can suggest or implement courses of action that will directly have an impact in the commercialization of the venture offering.

6.5.3 Scenario C. IIs as channels to connect with experts in Lean Product Development

A last image of IIs reflects these social actors supporting much the same practices as they are now but identifying the need to establish a new link in the ecosystem, a new actor who can implement, monitor, and regulate the evidence-based activities previously mentioned. In this scenario, IIs are the glue to establish collaboration between their clients and these new "evidence" professionals and their intervention in determining commercial success is primarily monitoring. By delegating this function to a different party, IIs will transform their role to bridging connections in the ecosystem and managing different types of relationships with the actors involved in the commercialization process. They may also offer services at other levels; for instance, their preference for being involved at a market level might lead them to operate as scanners of trends in a particular industry. This is a similar role to the one provided by organizations such as Gartner Group but accessible to entrepreneurs and SMEs. Given their abilities to foster and maintain networks, these social actors can more fully direct their attention to identifying clients that could use their data. This in turn, will change the objective of an innovation intermediary to an information provider. In this scenario, IIs may eventually stop existing as facilitators of commercialization processes and could be replaced by other actors that could execute this role implementing a different set of practices and methods to achieve goals.

6.6 Limitations of the study

For the purpose of this study, IIs have been considered as a unique group of social actors facilitating the commercialization process between creators and users of knowledge. However, to distinguish fine differences in the practice of different IIs and potential differences in evidence use, categories of IIs should be considered. Doing so can establish particular characteristics of each type and clarify activities that are not useful in their practice.

Participation in the study was made available to IIs around the world. Due to differences in the economic, legal and social conditions per region or country, it is logical to conclude that the approaches used to assist the commercialization process differ. For this reason, grouping IIs across similar contexts could expose new insights that may not be generalized to all IIs.

In this study, the practice of IIs and the use of evidence have been portrayed and analyzed using nine comparisons. Given the nature of the study and absence of previous quantitative studies in this field, all the differences supported by the analysis have been considered as significant. Nevertheless, determining which results are representative for describing the practice of IIs using a similar approach can help to advance the practice of IIs.

6.7 Possibilities for future work

To close the gaps identified in this study, it is proposed that IIs change their practices and get training to develop new skills such as evidence-based methods. A continuation of this study could be the analysis of different evidence based-methods and their contribution to the practices of IIs. In other words, which methods are more suitable to provide these social actors with the level of detail required in their practice? In addition, this study can contemplate a classification of tools to enhance their practices and contribution in the commercialization process.

There is a need for new metrics to evaluate the performance of IIs. The framework proposed in this study has considered three dimensions; however, we consider that more attributes can be considered to do a comprehensive analysis of the practice of IIs. Thus, an extension of this study could focus on distinguishing more attributes to depict in more detail the activities executed by IIs. Therefore, generating metrics to evaluate their performance and contribution to the commercialization process should be useful.

This study has observed IIs as a potential player in the commercialization process. Nevertheless, it will be of relevance to study and compare commercialization processes without the intervention of IIs. By doing so, it may be possible to clarify other elements impacting commercial success and determine whether IIs can support the process in new forms or conversely should not get involved in certain activities.

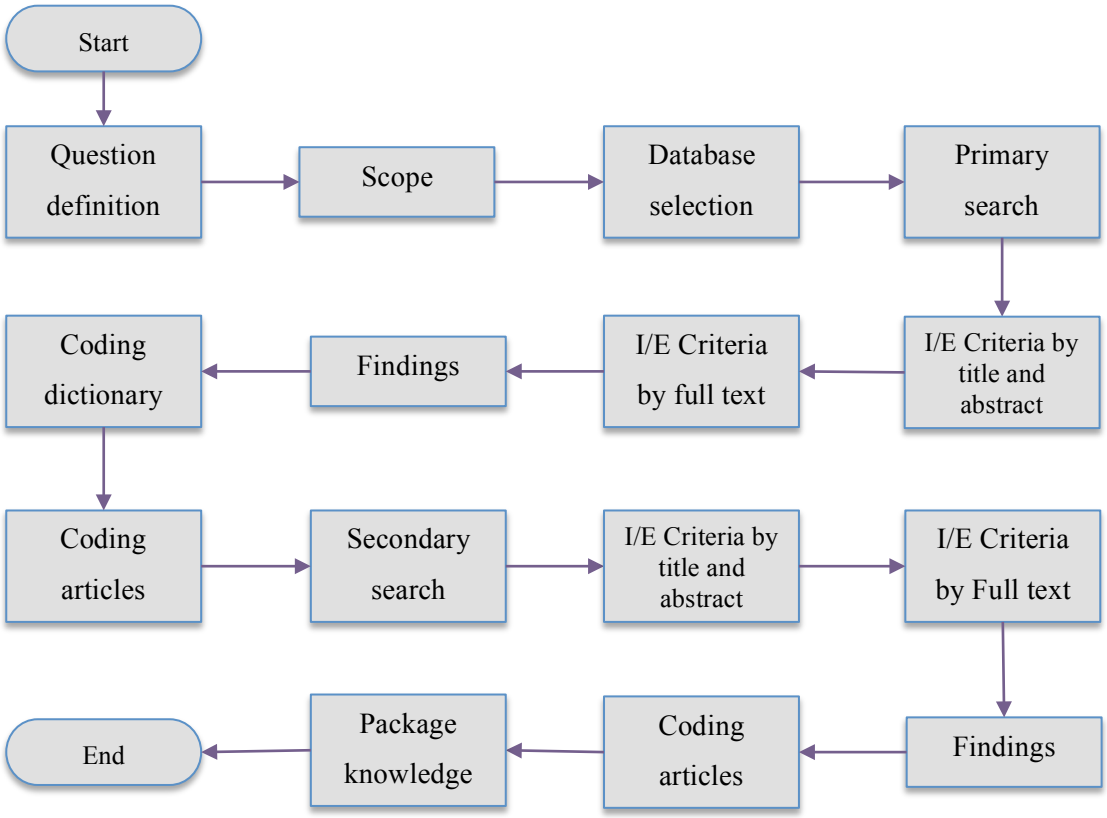
One of the contributions of this study is its quantitative form. It offers the basis for designing metrics to benchmark and refine the practice of IIs. So far, metrics to define or evaluate their practice are nonexistent, limiting their capacity to measure, compare, learn, confirm, and improve their services and consequently increase the success rate of the commercialization process. For this reason, the continuation of this line of research is of benefit for both IIs and policy makers.

Appendix A

Systematic literature review process

Figure 14 shows the stages of the process in the systematic literature review. The search process was divided into two phases, a primary search using a query to search for articles in electronic databases and a secondary search using the reference section of the articles selected in the primary search. For this reason, the stages I/E criteria, findings and codification of articles are present twice in the process.

Figure 14: Flow chart systematic literature review



Appendix B

Functions and characteristics of innovation intermediaries

Table 8 illustrates the functions described in the literature from the systematic review on IIs. It considers the focus of the functions on the venture and/or on the system, reference to previous experiences and the methods to carry out the functions, the outcome delivered to clients considering efficiency and innovation, and whether or not the benefits provided by IIs are described.

Table 8: Classification of the functions attributed to innovation intermediaries

Year	Reference		Focuses		Refers		Delivers		
		Functions	Venture	System	Experience	Methods	Efficiency	Innovation	Benefits
1989	Gould, R. V., & Fernandez, R. M. (1989). Structures of mediation: A formal approach to brokerage in transaction networks. Sociological Methodology, 19, pp. 89-126.	5	●	●					●
1996	Morgan, E. J., & Crawford, N. (1996). Technology broking activities in Europe - A survey. International Journal of Technology Management, 12(3), 360-367.	5	●	●	●				●
1997	Hargadon, A., & Sutton, R. I. (1997). Technology brokering and innovation in a product development firm. Administrative Science Quarterly, 42(4), 716-749.	4	●		●	●		●	●
1998	Hargadon, A. B. (1998). Firms as knowledge brokers: Lessons in pursuing continuous innovation. California Management Review, (3), 209-227.	2	●	●	●			●	
1998	Bryant, T. A., & Reenstra-Bryant, R. A. (1998). Technology brokers in the North American software industry: Getting the most out of mismatched dyads. International Journal of Technology Management, 16(1-3), 281-290.	8	●	●				●	●
2000	Popp, A. (2000). "Swamped in information but starved of data": Information and intermediaries in clothing supply chains. Supply Chain Management, 5(3), 151-161.	5		●		●			
2002	Hargadon, A. B. (2002). Brokering knowledge: Linking learning and innovation. Research in Organizational Behavior, 24, 41-85	5	●		●	●		●	●
2006	Howells, J. (2006). Intermediation and the role of intermediaries in innovation. Research Policy, 35(5), 715-728.	10	●	●		●		●	
2007	Winch, G. M., & Courtney, R. (2007). The organization of innovation brokers: An international review. Technology Analysis and Strategic Management, 19(6), 747-763.	8	●	●	●		●	●	●

Year	Reference		Focuses		Refers		Delivers		
		Functions	Venture	System	Experience	Methods	Efficiency	Innovation	Benefits
2007	Sapsed, J., Grantham, A., & DeFillippi, R. (2007). A bridge over troubled waters: Bridging organizations and entrepreneurial opportunities in emerging sectors. Research Policy, 36(9), 1314-1334.	4		●				●	●
2008	Lichtenthaler, U., & Ernst, H. (2008). Intermediary services in the markets for technology: Organizational antecedents and performance consequences. Organization Studies, 29(7), 1003-1035.	6	●	●	●			●	●
2008	Klerkx, L., & Leeuwis, C. (2008). Balancing multiple interests: Embedding innovation intermediation in the agricultural knowledge infrastructure. Technovation, 28(6), 364-378.	6	●	●				●	●
2008	Klerkx, L., & Leeuwis, C. (2008). Matching demand and supply in the agricultural knowledge infrastructure: Experiences with innovation intermediaries. Food Policy, 33(3), 260-276.	3		●	●			●	●
2008	Stewart, J., & Hyysalo, S. (2008). Intermediaries, users and social learning in technological innovation. International Journal of Innovation Management, 12(3), 295-325.	3	●	●	●			●	
2008	Boon, W. P. C., Moors, E. H. M., Kuhlmann, S., & Smits, R. E. H. M. (2008). Demand articulation in intermediary organizations: The case of orphan drugs in the Netherlands. Technological Forecasting and Social Change, 75(5), 644-671.	1	●		●	●		●	
2008	Johnson, W. H. A. (2008). Roles, resources and benefits of intermediate organizations supporting triple helix collaborative R&D: The case of PRECARN. Technovation, 28(8), 495-505.	5	●	●			●	●	●
2008	Mahnke, V., Wareham, J., & Bjorn-Andersen, N. (2008). Offshore middlemen: Transnational intermediation in technology sourcing. Journal of Information Technology, 23(1), 18-30.	4	●		●	●	●		●
2009	Klerkx, L., & Leeuwis, C. (2009). Establishment and embedding of innovation brokers at different innovation system levels: Insights from the Dutch agricultural sector. Technological Forecasting and Social Change, 76(6), 849-860.	3	●	●				●	
2009	Klerkx, L., Hall, A., & Leeuwis, C. (2009). Strengthening agricultural innovation capacity: Are innovation brokers the answer? International Journal of Agricultural Resources, Governance and Ecology, 8(5-6), 409-438.	3	●	●			●	●	●

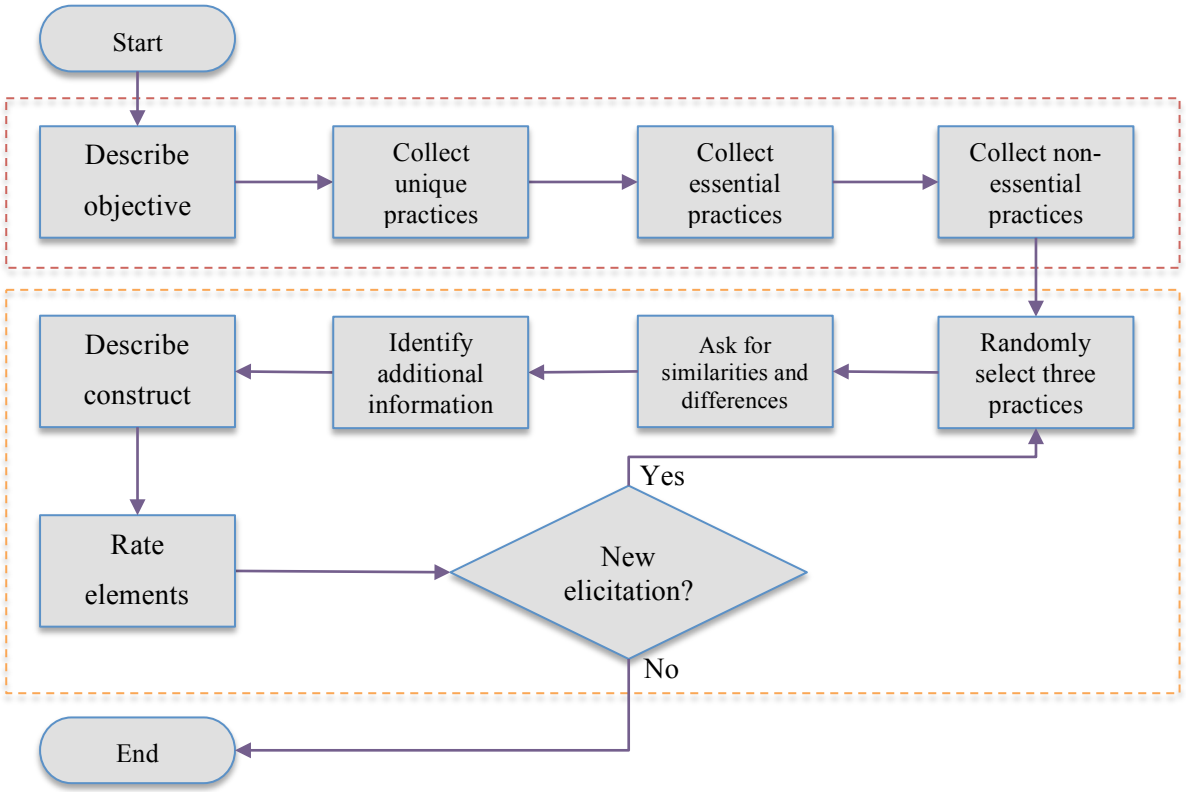
Year	Reference		Focuses		Refers		Delivers		
		Functions	Venture	System	Experience	Methods	Efficiency	Innovation	Benefits
2009	Bolisani, E., & Scarso, E. (2009). The role of KIBS in the technological renovation of local economies. Evidence from the computer services sector. International Journal of Entrepreneurship and Innovation Management, 9(1-2), 29-46.	4	●		●			●	
2009	Klerkx, L., & Leeuwis, C. (2009). Shaping collective functions in privatized agricultural knowledge and information systems: The positioning and embedding of a network broker in the Dutch dairy sector. The Journal of Agricultural Education and Extension, 15(1), 81-105.	10		●		●		●	●
2010	Batterink, M. H., Wubben, E. F. M., Klerkx, L., & Omta, S. W. F. (2010). Orchestrating innovation networks: The case of innovation brokers in the agri-food sector. Entrepreneurship and Regional Development, 22(1), 47-76.	3		●	●			●	
2010	Kirkels, Y., & Duysters, G. (2010). Brokerage in SME networks. Research Policy, 39(3), 375-385.	3	●	●	●		●	●	
2010	Sieg, J. H., Wallin, M. W., & von Krogh, G. (2010). Managerial challenges in open innovation: A study of innovation intermediation in the chemical industry. R and D Management, 40(3), 281-291.	4	●	●		●		●	●
2010	Gianiodis, P. T., Ellis, S. C., & Secchi, E. (2010). Advancing a typology of open innovation. International Journal of Innovation Management, 14(4), 531-572.	3		●				●	●
2010	Lo, Y., Liu, W., & Wen, C. (2010). The value added capability of innovation intermediaries in technology transaction markets. 516-521.	4		●			●		●
2011	Tran, Y., Hsuan, J., & Mahnke, V. (2011). How do innovation intermediaries add value? Insight from new product development in fashion markets. R and D Management, 41(1), 80-91.	4	●	●			●	●	●
2011	Roxas, S. A., Pirolic, G., & Sorrentinod, M. (2011). Efficiency and evaluation analysis of a network of technology transfer brokers. Technology Analysis and Strategic Management, 23(1), 7-24.	4		●			●		

Appendix C

Exploratory study process

Figure 15 describes the process in the exploratory study using the repertory grid technique. The process can be divided into two stages. First the element elicitation stage (top dashed rectangle) and second the elicitation of constructs (bottom dashed rectangle). The second stage of the process was repeated as many times as possible in the time assigned for the interview.

Figure 15: Flow chart repertory grid



Appendix D
Exploratory experiment protocol

Protocol used during the interviews to identify exemplary practices of innovation intermediaries

Dear (Name),

Thank you for agreeing to participate in this study. Before we start the interview I would like to remind that this session would not take more than an hour and fifteen minutes in total. Nevertheless, you can stop the process at any time if you decide to do so.

The objective of the study is to identify exemplary practices from the functions performed by (innovation) intermediaries that contribute to the realization of established goals.

I want you to understand the term "practice" as an established behavior or action.

First, you will be asked to think of and write down unique characteristics, essential elements, and obstacles of your role as intermediary. Next, you will be asked to compare these elements and rate them using a seven-point scale. The process will be repeated several times.

- First, think of 3 to 4 elements that are unique or different compared to other intermediaries. Think of those things that are appreciated by your clients or recognized by other intermediaries. Feel free to take your time.
- Next, think of 6 to 8 elements that are essential/required in your role as intermediary. Write them down on a piece of paper. Feel free to take your time.
- Finally, think of 3 to 4 elements that you consider as obstacles/barrier that if they were not present it will benefit your work/functions. Write them down on a piece of paper. Feel free to take your time.

Could you now please provide me those unique/different elements?

Could you now please provide me the essential elements?

Could you now please provide me the obstacles/barriers?

Next, I will randomly select three elements one from each set provided.

Think how two of them are similar contributing to the realization of your goals as intermediary and different from the third?

Could you tell me how element A and B are similar? What is the bipolar dimension?

Why is this important for the realization of your goals as intermediary?

Now, using a scale from 1 to 7, where 1 means (left pole) and 7 means (right pole), where do you think element D is located?

Using the same scale where do think element E is located? (continue asking the same question for every element in the list).

Repeat the process from the beginning of this page.

The process will stop when the participant decides to do so, or when the time is up, or when the answers provided are very similar or repetitive.

Appendix E
Repertory grid analysis

7.1 Content analysis procedure

Based on Jankowicz (2004), a content analysis was undertaken to classify, synthesize, and interpret the constructs and elements collected in the interviews. This analysis was conducted for each participant in the study. It consisted of transcribing each pole of the construct and its description by utilizing the interview recording and documenting the information on a coding sheet. Next, the original explanation was summarized into a few sentences and captured on the coding sheet. Finally, based on the interpretation of the construct, a theme for each pole of the construct was chosen and coded. An alphanumeric code was assigned to the participants in order to associate their results and preserve anonymity.

7.2 Rating analysis procedure

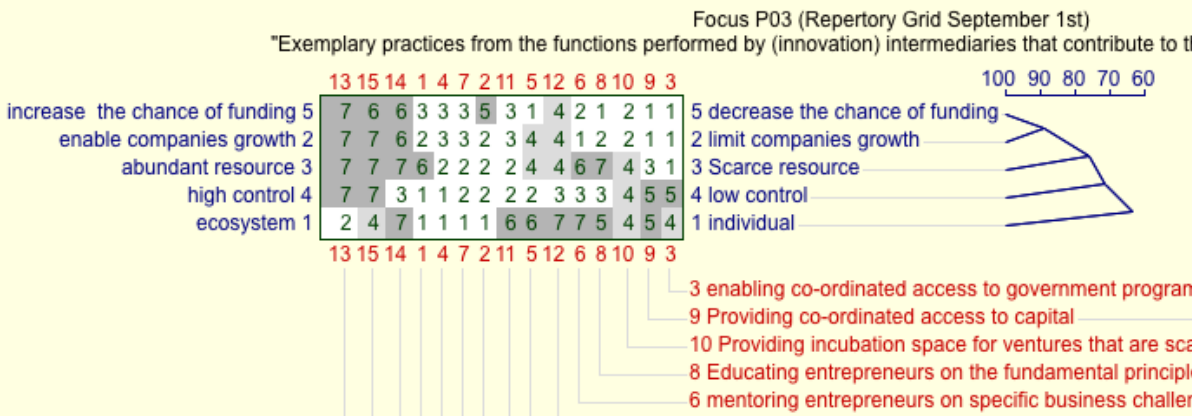
The rating analysis consisted of observing the ratings and patterns of both elements and constructs provided by the participants (Jankowicz, 2004). Two reports were generated per participant using RepGrid V software: the grid ratings, and the principal component graphic. These reports elucidated the interpretations of the constructs, the main topics in the interviews, and the relationship between constructs and elements derived from the ratings (Fransella et al., 2004). Given the number of participants and constructs elicited per session, all the constructs and elements were considered in the analysis.

The grid rating illustrates the distribution of the ratings by elements and constructs. In this report is possible to appreciate two things, the ratings assigned to each construct/element and the similarity among elements and constructs. This similarity echoes the relevance of a construct for the participant identifying a similar relationship with different elements and highlighting the significance of the construct for the participant. Figure 16 displays a partial grid report. The constructs are represented in blue and the elements in red. Note that the constructs are organized into two columns. The left column integrates the poles of the construct with ratings between one and three, while the right column integrates the poles of the construct with ratings between five and seven. Observe the difference in colors, creating clusters based on the ratings assigned to the elements.

Note that on the right side of the report there is a scale and lines connecting the constructs. These lines represent the similarity in the ratings. Observe the similarity between construct five and two and the similarity with the construct three.

From this report it is possible to validate the interpretation of the construct from the interview data by looking at the ratings assigned to the construct and refer back to them to clarify the perception of the participant during the rating process. Moreover, this report also helps to identify related constructs, which can be interpreted as more important for the participant or parts of a core construct that may or may not be present in the constructs elicited during the interview.

Figure 16: Grid report example

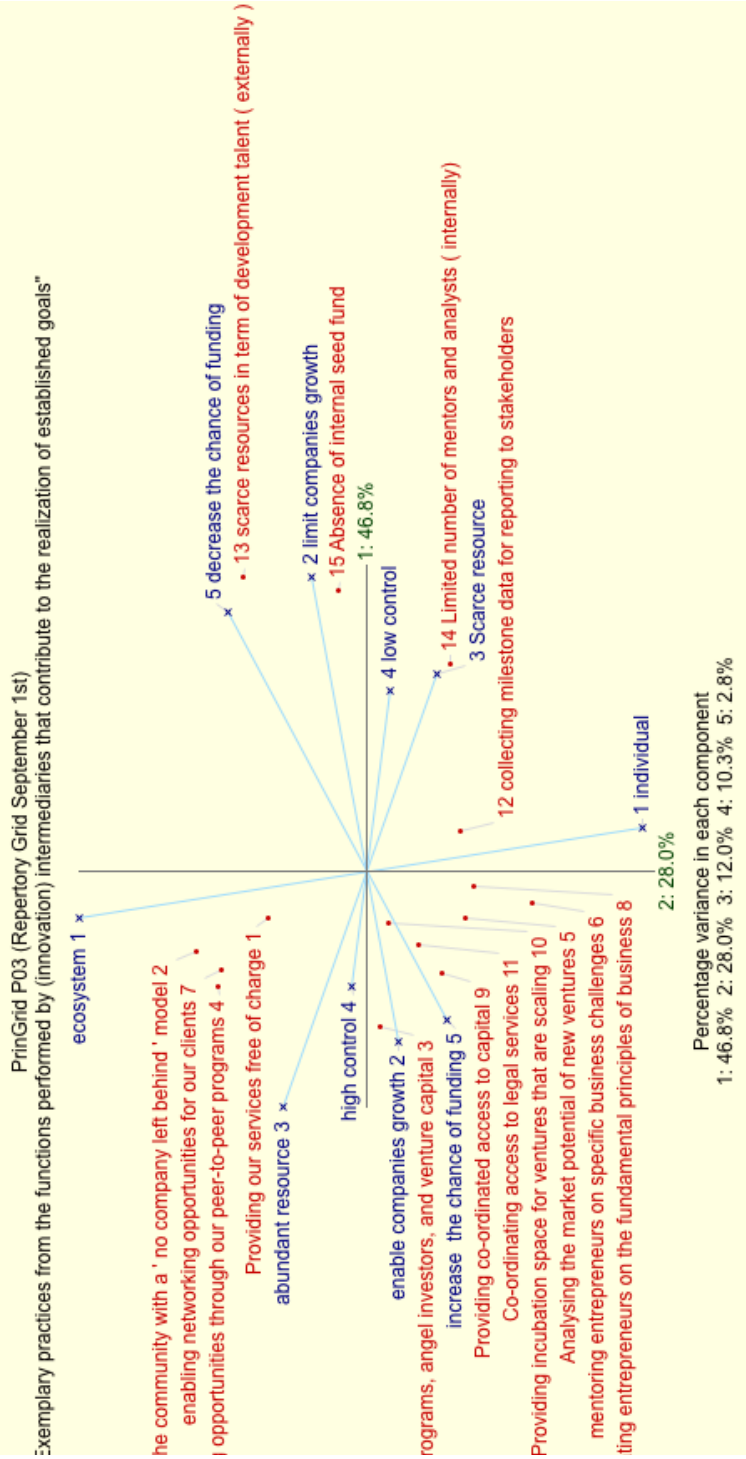


The principal component is a graphical representation of the elements and constructs elicited during the session. It illustrates the position of the constructs and elements with respect of the two components. The distribution of the construct illustrates a level of expertise of the participant in the topic while the distribution of the elements tells us how the participants perceive their practice. Given that the elements were separated into three sets (unique, essential, and non-essential), it is possible to appreciate a separation between non-essential and unique or essential elements. When the distance between non-essential and unique or essential is large, the participant considers the non-essential elements slightly related or external to his functions. On the contrary, when the distance between elements is small, we can interpret that the participant considers the non-essential elements related or part of her practice. Figure 17 illustrates an example of this report.

Elements 13,14, and 15 are non-essential elements. Observe how far they are from the rest of the elements. Moreover, note that the constructs are related to the elements located in this region. Also observe the dispersion of the constructs (lines in blue), which illustrates a level of expertise from the

participant in the topic. The ratings' tables and the graphs generated for each participant in the study are included in Appendix H.

Figure 17: Principal component example



Appendix F

Characteristics of innovation intermediaries' practices

A classification of the practices and their characteristics per participant was generated integrating both, the content analysis and the results from the reports generated with RepGridV. This classification includes six categories to clarify the meaning and the relationship of the construct with the practices executed by the participant. *ID* is the participant's identifier, *Construct* is the name assigned by the participant to the polar term of the construct, *Construct interpretation* is the explanation of the construct after the content analysis. The classification explains if the construct is related with practices focused on the *Ecosystem/Mkt.* and/or the *Client*, whether the construct refers to practices that contribute to increase the *Efficiency* of participants' internal operations or the *Development* or improvement of their practices, and finally if *Procedures*/methods or previous *Experiences* were referenced as prerequisite to implement the practice. *Elements* describe those practices related to this construct based on the ratings assigned by the participant.

Table 9: Characteristics of innovation intermediaries' practices

				Category						
No	**ID**	**Construct**	**Construct Interpretation**	**Ecosystem/Mkt.**	**Client**	**Efficiency**	**Development**	**Procedure**	**Expertise**	**Elements**
1	P01	Informal process	Part of the environment in which the intermediary & clients exist	●	●					7,3,16,11
2	P01	Formal process	Define, promote, monitor, and control	●		●			●	15,4,2,1,8,5,10,9,13,14,6
3	P01	Operational efficiency	Ensure that founding is used efficiently/effectively to run the operations in our organization			●			●	15,4,2,8,5,9,10,13,12,6
4	P01	Creative effectiveness	Network in place for clients to collaborate, get feedback and new knowledge	●					●	1,11,16,3
5	P01	Quantitative	Measure progress and required resources in monetary terms			●			●	15,5,9,10,13

No	ID	Construct	Construct Interpretation	Category						Elements
				Ecosystem/Mkt.	Client	Efficiency	Development	Procedure	Expertise	
6	P01	Qualitative	Non-quantifiable outcome (value). Result of interactions with other people	●	●	●				12,6,11,16,3,7
7	P01	Internally focused resources	Tools and people used to operate the organization			●		●		9,10,13,14,12,6
8	P01	Externally focused resources	Skillset to communicate with the clients, integrate and link them with the community	●				●		4,2,1,8,5,11,16,3,7
9	P01	Outsourced partners	Partner with specialized firms to provide specific services	●	●	●		●		1,8,5,9,10,12,6,11,16,3
10	P01	In-house expertise	Focus on core services to have an impact on the clients	●		●		●	●	15,4,2,7
11	P02	High personal engagement	Understand the specific characteristics of the client's situation, thus provide an appropriate solution		●	●		●	●	2,5,8,9,7,6,10
12	P02	Low personal engagement	It does not require me to get involved since it is objective or it is not part of my functions	●		●				3,15,13,14
13	P02	Impact	Complement their lack of knowledge, prevent and solve problems		●	●			●	4,8,9,1,7,6,10
14	P02	No impact	Can't affect, things emerge as a consequence of having no impact	●		●		●		12,3,15,13,14
15	P02	Control	In the scope of his role		●	●			●	4,2,5,8,9,1,7,6,10,11
16	P02	Non control	Out of the scope of his role	●		●		●		12,3,15,13,14
17	P02	Influence	Educate clients and guide them in the right direction		●	●		●	●	4,2,5,8,9,1,7,6,10,12,3

No	ID	Construct	Construct Interpretation	Category						Elements
				Ecosystem/Mkt.	Client	Efficiency	Development	Procedure	Expertise	
18	P02	No influence	I can't provide better specialized professionals.	●						15,13,14
19	P02	Subjective	Use of previous experiences and personal skills to better communicate with persons and/or clients		●			●	●	4,5,8,9,1,7,6,10,11
20	P02	Objective	No influence. It is verifiable.	●				●		12,3,15,13,14
21	P02	Inputs	Match professionals with clients (professional & personal qualities)	●	●			●	●	1,7,6,10,3,15,13,14
22	P02	Outcomes	Results based on the inputs						●	4,2,5,8,9,11,12
23	P03	Individual	Address issues on a case by case basis providing services that adjust to firm's business challenges.	●	●	●		●	●	11,5,12,6,8,14,9
24	P03	Ecosystem	Activities to strengthen the ecosystem (KW) and help to identify the talent companies need to grow (government funding, strategic partners and allies, engagement of bigger companies)	●		●		●		1,4,7,2,13
25	P03	Enable companies growth	Help companies to start and progress through the life cycle (discovery, validating concept, become more efficient on their business processes, and scaling) as quickly and fluidly as possible considering a controlled scaling.	●	●	●		●	●	3,9,8,6,10,1,4,7,2,11
26	P03	Limit companies growth	Obstacles that impede company's growth	●		●				13,15,14

No	ID	Construct	Construct Interpretation	Category						Elements
				Ecosystem/Mkt.	Client	Efficiency	Development	Procedure	Expertise	
27	P03	Scarce resource	Lack of qualified talent, entrepreneurs with business and commerce skills to execute the good ideas, and seed funding.	●		●				6,8,13,14,15
28	P03	Abundant resource	People willing to start new ventures, good ideas and concepts, later stage resources for companies requiring growth capital	●				●		4,7,2,11,3,9
29	P03	High control	Connecting to the required resources to start/grow a business (to which we have access to)	●		●		●		14,1,4,7,2,11,5,12,6,8
30	P03	Low control	Connection that is hard to create for early stage companies because there is no much control over it	●						13,15,9,3
31	P03	Increase the chance of funding	Necessary steps or activities for companies to get funded (investment readiness, connection with investors)	●	●			●		1,4,7,11,5,6,8,10,9,3
32	P03	Decrease the chance of funding	Scarce resource that limits the number of companies being funded	●		●		●		2,13,15,4
33	P04	Direct support to the entrepreneur	Help the entrepreneur to understand, in a client-specific basis, the business and market potential of his/her technology	●	●			●	●	9,4,3,8,7,5,2,6,1,10
34	P04	Indirect support to the entrepreneur	Build an ecosystem in support of the entrepreneur	●				●	●	11,13,15,14,12
35	P04	Internal	Assessment of each technology's business opportunity	●	●			●	●	9,4,3,8,7,5,2

No	ID	Construct	Construct Interpretation	Category						Elements
				Ecosystem/Mkt.	Client	Efficiency	Development	Procedure	Expertise	
36	P04	External	Assessment looking at the environment to determine if the technology/business plan its on the right track (and bring resources when needed)	●				●	●	11,13,15,14,12
37	P04	Strategic	Provides the entrepreneur a plan to understand how to commercialize the technology	●				●	●	10,11,13,15,14,12
38	P04	Tactical	Provides the entrepreneur milestones and measures of success for the business concept focusing on the key elements of the business	●	●			●	●	9,4,3,8,7,5,2,6,1
39	P04	Client specific	Identify the particular characteristics of the technology to develop an ad-hoc business opportunities using different business support activities	●	●			●	●	9,4,3,8,7,5,2,6,1
40	P04	Non client specific	Understand the general characteristics around a technology expanding knowledge acumen as technologies and markets change	●				●	●	10,11,15,13,14,12
41	P05	Client specific	Help the entrepreneur to articulate their business models maintaining a good understanding about industry trends	●	●			●	●	9,12,11,5,8,10,4,1,6,3
42	P05	Network specific	Implement business processes, policies and tools to improve services to the entrepreneurs as part of the commercialization network	●		●		●		7,16,15,2,13,14

No	ID	Construct	Construct Interpretation	Category						Elements
				Ecosystem/Mkt.	Client	Efficiency	Development	Procedure	Expertise	
43	P05	Easier to influence	Have mechanisms in place to collect information, understand opportunities, define a baseline, and track clients' progress and profits more effectively.	●	●	●		●		9,12,11,5,8,10,3,7
44	P05	Harder to influence	There are resources in which we have low control or it is hard to influence.	●	●					16,15,2,13,14
45	P05	Targeted services	Services provided to clients according to their needs.	●	●	●		●	●	11,5,8,10,4,1,6,3
46	P05	Capacity building	Nurturing an entrepreneurial culture which will potentially lead to more startups created in the region strengthening the economy.	●		●		●		7,16,15,2,13,14
47	P05	Strategic issues	Considering the bigger picture in a plan that defines how to achieve the objectives with the available resources	●		●				15,2,13,14
48	P05	Tactical issues	Pre-defined set of steps to achieve an outcome	●	●			●	●	16,9,12,11,5,8,10,4,1,6,3
49	P06	Internal	Knowledge and expectations driving the process of commercialization	●		●		●	●	15,13,3,1,10,2,6,8
50	P06	External	Company's contract with University driving the problems to be solved	●				●		11,14,9,4,12
51	P06	Technology transfer	Transferring research knowledge to society through commercialization, copyrights, trademarks and events, not through publications	●				●		3,1,10,2,9,8,4,12
52	P06	Scientific research	Traditional research knowledge from faculty	●				●		15,11,14
53	P06	Managing resources	Identify strategic techniques to better utilize the available resources	●		●		●	●	10,2,6,7,14,9,8,12

No	ID	Construct	Construct Interpretation	Category						Elements
				Ecosystem/Mkt.	Client	Efficiency	Development	Procedure	Expertise	
54	P06	Managing expectations	Separate great scientific discoveries from their commercialization potential/opportunity		●			●	●	15,13,3,16,11,4
55	P06	Creating a culture of commercialization	Establish a commercialization culture with faculty and students creating benefit/impact to society/public		●	●		●	●	15,13,3,1,10,2,6,12
56	P06	Running events	Create awareness and build relationships in the environment	●				●		14,9,8,4
57	P07	Policy oriented	Understanding and communicating IP policy, thus give proper advice for commercialization to inventors	●	●	●		●	●	14,7,1,2,11
58	P07	Non policy oriented	IP Policy not always plays a major role when making decisions	●		●		●	●	8,10,3,15,4,13,16,6,5
59	P07	Policy influence on networking approach	Connecting with academics to offer services based on policy	●	●			●	●	14,7,1,2,11,8
60	P07	No policy influence on networking approach	Connecting industry with academics based on other incentives no policy	●		●		●	●	6,5,3,15,4,13,16,9
61	P07	Direct contribution to Research $	The role of the intermediary is regarding the management of resources that improves access research and creates development	●		●		●	●	11,8,10,3,15,4,13,16,9
62	P07	Indirect contribution to research $	Their services do not really affect R&D but provides income that benefits University and provides resources	●	●	●		●	●	6,5,12,14,7,1,2
63	P08	Applied knowledge	Develop entrepreneurs through learning by doing	●	●			●	●	11,9,2,3,6,10,8,14

No	ID	Construct	Construct Interpretation	Category						Elements
				Ecosystem/Mkt.	Client	Efficiency	Development	Procedure	Expertise	
64	P08	Business capacity	Contribute to the development of businesses as part of a system	●				●		1,7,5,4,12,13
65	P08	Service affordability	Services at no economic cost but that generates value to the entrepreneur	●	●			●	●	1,7,5,11,9,2,3,6,8,4,12
66	P08	Impact	Having impact and being able to measure it	●		●		●		13,14
67	P08	Raising money	Find and provide access to investors willing to provide capital for early stage companies.	●	●			●	●	1,7,5,11,9,2,3,6,8,4,12,13
68	P08	Measures of success	Measure success			●		●		14
69	P08	Links to resources	Connect clients with professionals to complement their skillset, thus grow their company	●	●			●	●	1,7,5,11,9,2,3,6
70	P08	Gap in financing	A sustainable business requires flow of capital	●	●			●		10,8,4,12

Appendix G
LinkedIn groups invitation message

LinkedIn recruitment messages; the first message was used to invite participants through a post in the group, the second and third messages were used to invite specific members of the group to participate in the survey.

LinkedIn Post

Subject:

What tools, methods and sources of information do innovation intermediaries use to support the commercialization process among their clients/stakeholders?

Body:

I am investigating the role of innovation intermediaries in the commercialization process. This is a survey as part of my master's thesis.

Are you an intermediary?

In other words, an individual or organization in between two or more parties, who establishes relations, facilitates collaboration and supports innovation; some intermediaries collaborate with entrepreneurs, established ventures, government, policy makers, industrial partners and academia.

Do you know what tools other intermediaries around the world are using today to support their clients? Your contribution in this survey will serve to answer this question.

- This is a 15-minute survey
- Your participation is completely anonymous

URL

LinkedIn Message 1

Subject:

Innovation intermediaries' study

Body:

Dear (name),

My name is Rodrigo Eng and I am a member of the group (group's name).

I am investigating the role of innovation intermediaries to support commercialization processes and I would like to include your insights and comments in my study regarding the tools, methods and processes used in your organization to support your clients.

This survey will not take you more than 15 minutes and your participation is completely anonymous.

If you decide to participate, you can access the survey at:

URL

I really appreciate your contribution in this study

LinkedIn Message 2

Subject:

Innovation intermediaries' study

Body:

Dear (name),

My name is Rodrigo Eng and I am a member of the group (group's name) on LinkedIn.

I am investigating the role of innovation intermediaries to support commercialization processes and I would like to include your insights and comments in my study regarding the tools, methods, processes, and mediation techniques as used in your organization to support your clients.

This survey will take you about 35 minutes to complete and your participation is voluntary and anonymous.

As an expression of our appreciation, a $20 CDN Amazon electronic gift card will be provided to those participants who complete the survey.

In addition, if you are interested in the results of the survey, you can access periodically updated results through my research website.

If you decide to participate, please access the following link:

URL

I appreciate your contribution in this study.

Appendix H
Item combination

The following lists describe the items combined to maintain the same number of items in the dimension sets.

Practice orientation & Frame of reference

1. Inventories of new intellectual property and inventories of dormant intellectual property. New element: Inventories of intellectual property.
2. Promote services to new potential clients and maintain transparency with current clients.
3. Adhere to accountability expectations and build credibility with investors
4. Specialized experts and strategic partner collaboration with professional services.
5. Providing real estate space, offering training in business creation and development, and helping manage their resources.
6. Providing access to capital and improving access to funding.
7. ROI analyses, financial statements/ratios/projections.
8. Make decisions regarding product usability/quality.
9. Set priorities on feature selection, make product design choices, and visualize UX.
10. Provide and improve mentoring services to clients
11. Personal experience element was considered only once.
12. Scientific journals element was considered only once.

Decision-making approach

1. Providing access to capital and improve access to funding. New element: Provide and improve access to funding/capital.
2. Providing mentorship and improve mentorship services to clients. New element: Provide and improve mentoring services to clients.
3. Personal experience element was considered only once.
4. Scientific journals element was considered only once.

Appendix I

Attribute sets

The following tables illustrate the items assigned to each set.

Table 10: Items assigned to the types of evidence sets

Refine design (RD)	Position strategically (PS)	Convince sponsors (CS)
Aesthetics test (i.e. appealing, attractive, pleasing)	Market trend analysis	Milestone progress review
Feature trade-off test	Market intelligence analysis	Balanced scorecard
Partner scan (Identifying potential collaborators)	Secondary sources on trends (e.g. Forrester reports)	Financial statement review
Technology trend analysis	Business model generation canvas	Gantt charts reviews
Value proposition with advantage test (Validates business model)	Competitive advantage test	Business plan reviews
Product performance technical analysis	Startup genome compass	Journal publications on best practices
Usability test	Competitor scan (Identifying existing or potential competitors)	Demographics trend analysis
User experience quality analysis	Third party reports on commercialization	PERT charts review (Critical path)

Table 11: Items assigned to the attributes of the dimension practice orientation

Productivity	Innovation
Benchmark performance against other intermediaries	Publish new learning in scholarly outlets
Formal competitor intelligence	Scientific journals
Inventories of new and dormant intellectual property	Industry trend analyses
Specialized industry publications	Original scientific studies
Technical journals	Benchmarks (against other venture's business models)
Newspapers	Twitter
Magazines	LinkedIn groups
Industry reports	Regular meetings with other experts in your field
Blogs	Informal networking
Trusted web searches	Conversations with experts
Trade associations	Observing existing players
Community associations	Market trends
Newsletters	Professional social networks
Promote services to new potential clients and maintain transparency with current clients	Provide and improve mentoring services to clients
Adhere to accountability expectations and build credibility with investors	Informal exchanges of ideas
Personal experience	Connecting with potential collaborators
Specialized experts and strategic partner collaboration with professional services	Connecting with experts in different areas
Peers and colleagues expertise	Proof of concept assessment
Providing real estate space, offering training in business creation and development, and helping manage their resources	Pilot tests
Providing access to capital and improving access to funding	Consumer research probes
Product feasibility tests	Business model generation canvas
SWOT analysis	Experimental validation
ROI analyses, financial statements/ratios/projections	Beta versions
Word of mouth testimonials	Focus groups and interviews
Make decisions regarding product usability/quality	Surveys
Set priorities on feature selection, make product design choices, and visualize UX	Business process management

Table 12: Items assigned to the attributes of the dimension decision-making approach

Experience	Evidence
	Benchmark performance against other intermediaries
Promote services to new potential clients	Publish new learning in scholarly outlets
Build credibility with investors	Adhere to accountability expectations
Maintain transparency with clients	Scientific journals
Provide and improve access to funding/capital	Technical journals
Provide and improve mentoring services to clients	Formal competitor intelligence
Specialized experts consulted	Inventories of new intellectual property
Personal experience	Inventories of dormant intellectual property
Strategic partner collaboration with professional services	Original scientific studies
Peers and colleagues expertise	Specialized industry publications
Professional social networks	Proof of concept assessment
Informal exchanges of ideas	Pilot tests
Offering training in business creation and development	Consumer research probes
Helping them manage their resources	Product feasibility tests
Providing real estate space	Industry trend analyses
Connecting with potential collaborators	Benchmarks
Connecting with experts in different areas	Financial statements
Return on investment analyses	Financial ratios
Financial projections	Business process management
SWOT analysis	Community associations
Business model generation canvas	Trade associations
Trusted web searches	Newsletters
Blogs	Magazines
Twitter	Industry reports
LinkedIn groups	Newspapers
Regular meetings with other experts in your field	Communities of experts
Informal networking	Reference from experts
Conversations with experts	Market trends
Reference from colleagues	Experimental validation
Online reputation	Surveys
Common sense	Focus groups
Reference from clients	Make decisions regarding product usability
Personal evaluation criteria	Make decisions regarding product quality
Word of mouth testimonials	Visualize user experience
Interviews	Make product design choices
Beta versions	Set priorities on feature selection
Observing existing players	

Table 13: Items assigned to the attributes of the dimension frame of reference

Macro level	Micro level
Benchmark performance against other intermediaries	Promote services to new potential clients and maintain transparency with current clients
Formal competitor intelligence	Adhere to accountability expectations and build credibility with investors
Inventories of new and dormant intellectual property	Personal experience
Specialized industry publications	Specialized experts and strategic partner collaboration with professional services
Technical journals	Peers and colleagues expertise
Newspapers	Providing real estate space, offering training in business creation and development, and helping manage their resources
Magazines	Providing access to capital and improving access to funding
Industry reports	Product feasibility tests
Blogs	SWOT analysis
Trusted web searches	ROI analyses, financial statements/ratios/projections
Trade associations	Word of mouth testimonials
Community associations	Make decisions regarding product usability/quality
Newsletters	Set priorities on feature selection, make product design choices, and visualize UX
Publish new learning in scholarly outlets	Provide and improve mentoring services to clients
Scientific journals	Informal exchanges of ideas
Industry trend analyses	Connecting with potential collaborators
Original scientific studies	Connecting with experts in different areas
Benchmarks (against other venture's business models)	Proof of concept assessment
Twitter	Pilot tests
LinkedIn groups	Consumer research probes
Regular meetings with other experts in your field	Business model generation canvas
Informal networking	Experimental validation
Conversations with experts	Beta versions
Observing existing players	Focus groups and interviews
Market trends	Surveys
Professional social networks	Business process management

Appendix J

Data analysis score results

Scores obtained from the classification of methods and tools per evidence position on each type of evidence

Table 14: Scores per participant and evidence position

	Refine design (RD)				**Position strategically (PS)**				**Convince sponsors (CS)**			
	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4
P01	3	5	3	1	6	1	4	1	6	4	1	1
P02	3	4	4	1	4	3	4	1	4	5	2	1
P03	7	1	3	1	6	1	3	2	6	2	3	1
P04	5	5	1	1	2	6	3	1	4	4	3	1
P05	3	5	3	1	2	6	3	1	8	2	1	1
P06	4	4	3	1	4	3	2	3	5	3	1	3
P07	2	4	5	1	8	1	2	1	7	2	2	1
P08	2	1	8	1	3	3	5	1	3	3	5	1
P09	8	1	1	2	8	2	1	1	3	3	1	5
P10	5	4	2	1	5	3	3	1	5	3	3	1
P11	4	5	2	1	7	3	1	1	6	4	1	1
P12	3	3	2	4	6	2	3	1	5	4	1	2
P13	1	2	8	1	2	7	2	1	3	6	2	1
P14	7	3	1	1	8	2	1	1	7	3	1	1
P15	7	2	2	1	8	2	1	1	6	4	1	1
P16	4	4	3	1	6	1	4	1	7	3	1	1
P17	6	1	4	1	7	1	3	1	6	4	1	1
P18	4	3	4	1	6	1	4	1	6	2	3	1
P19	4	3	1	4	7	2	2	1	6	3	1	2
P20	1	3	3	4	1	5	5	1	1	5	4	2
P21	5	4	2	1	3	7	1	1	7	3	1	1
P22	6	3	1	1	7	1	3	1	7	3	1	1
P23	9	1	1	1	9	1	1	1	9	1	1	1
P24	2	4	5	1	4	4	3	1	8	2	1	1

	Refine design (RD)				Position strategically (PS)				Convince sponsors (CS)			
	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4
P25	4	5	2	1	6	4	1	1	8	2	1	1
P26	7	2	1	2	6	2	3	1	6	2	1	3
P27	4	1	5	2	5	4	2	1	5	2	1	4
P28	7	2	1	2	7	1	3	1	7	1	2	2
P29	4	5	2	1	4	4	1	1	5	4	1	1
P30	2	2	7	1	2	6	3	1	5	2	2	3
P31	7	3	1	1	5	4	1	1	6	4	1	1
P32	2	5	4	1	6	3	1	2	5	4	1	2
P33	8	2	1	1	8	2	1	1	8	2	1	1
P34	2	2	3	5	3	3	5	1	4	5	2	1
P35	8	1	2	1	7	1	2	2	8	1	2	1
P36	1	4	2	5	2	5	1	4	2	4	3	3
P37	1	1	1	9	1	1	2	8	3	1	1	7
P38	9	1	1	1	6	1	4	1	8	1	1	2
P39	6	4	1	1	6	2	3	1	8	1	1	1
P40	5	2	1	1	1	6	1	1	2	4	3	1
P41	5	5	1	1	4	4	3	1	4	4	1	3
P42	2	2	2	2	6	2	2	1	6	2	1	3
P43	2	5	2	3	2	6	2	2	2	2	4	4
P44	1	1	1	9	1	1	1	9	1	1	1	9
P45	4	1	5	2	6	2	3	1	6	1	2	3
P46	1	3	1	1	3	2	3	1	5	2	2	2
P47	8	2	1	1	7	1	2	2	4	6	1	1
P48	1	5	1	5	2	3	1	6	1	2	1	8
P49	4	2	1	5	6	4	1	1	6	3	1	2
P50	3	5	1	3	6	3	2	1	5	2	3	1
P51	1	4	5	2	4	4	3	1	4	4	2	2
P52	8	2	1	1	7	2	2	1	6	4	1	1
P53	3	1	1	7	4	1	3	4	2	1	2	7
P54	6	1	4	1	4	2	3	3	1	2	6	3
P55	5	3	3	1	3	2	3	4	2	3	2	5

Scores obtained per attribute dimension and participant

Table 15: Scores per participant and attribute dimension

	Practice orientation		**Decision-making approach**		**Frame of reference**	
	Productivity	Innovation	Experience	Evidence	Macro	Micro
P01	13	10	15	14	12	5
P02	16	14	24	14	10	11
P03	13	14	20	13	12	7
P04	16	18	27	19	13	12
P05	13	14	18	15	10	9
P06	17	17	22	18	13	11
P07	12	12	12	16	10	6
P08	21	16	27	20	17	13
P09	18	18	27	18	14	10
P10	19	16	33	16	19	10
P11	10	5	11	9	6	6
P12	11	18	22	17	15	6
P13	16	14	21	16	12	10
P14	17	15	21	23	13	10
P15	13	12	20	12	8	10
P16	18	15	22	23	11	12
P17	22	20	28	27	22	10
P18	17	17	29	20	15	11
P19	20	16	27	21	20	10
P20	13	6	18	9	5	11
P21	20	21	24	28	17	12
P22	20	20	31	25	20	10
P23	26	26	36	35	26	13
P24	16	15	19	25	14	10
P25	20	19	29	25	16	12
P26	21	12	21	19	14	11
P27	13	16	28	10	11	10

	Practice orientation		Decision-making approach		Frame of reference	
	Productivity	Innovation	Experience	Evidence	Macro	Micro
P28	16	21	25	26	14	11
P29	11	11	18	10	5	9
P30	14	15	23	13	10	10
P31	13	8	20	14	7	10
P32	10	10	14	10	8	7
P33	23	23	32	32	21	12
P34	20	17	30	19	19	11
P35	22	25	32	30	23	11
P36	15	11	14	18	13	8
P37	7	10	16	7	4	5
P38	19	20	23	30	17	11
P39	17	20	23	24	16	11
P40	2	8	11	6	5	0
P41	18	17	28	16	16	10
P42	19	15	26	18	14	11
P43	9	8	18	6	6	8
P44	22	22	23	29	23	10
P45	17	21	21	25	19	9
P46	5	11	12	9	6	4
P47	19	21	25	26	19	11
P48	13	6	11	17	13	5
P49	12	19	26	18	13	7
P50	12	13	21	14	9	9
P51	17	17	23	21	13	11
P52	14	13	20	15	9	9
P53	4	6	9	5	4	3
P54	17	16	22	19	13	10
P55	19	12	26	13	15	11

Appendix K

Use of evidence survey

The following pages display the survey used in the confirmatory study.

Use of evidence to inform commercialization decisions

1. From the following list, please indicate which processes and tools you use, you would like to use, you are not familiar with, or are not useful to you as an innovation intermediary for monitoring clients' progress (Check one option per row)

	We now use	We would like to use	Unfamiliar to us	Not useful to us
Aesthetics test (i.e. appealing, attractive, pleasing)	○	○	○	○
Balanced scorecard	○	○	○	○
Business model generation canvas	○	○	○	○
Business plan review	○	○	○	○
Competitive advantage test	○	○	○	○
Competitor scan (Identifying existing or potential competitors)	○	○	○	○
Demographics trend analysis	○	○	○	○
Feature trade-off test	○	○	○	○
Financial models test (Pre-revenue generating clients)	○	○	○	○
Financial statement review (Revenue generating clients)	○	○	○	○
Gantt charts review	○	○	○	○
Journal publications on best practices	○	○	○	○
Market intelligence analysis	○	○	○	○
Market trend analysis	○	○	○	○
Milestone progress review	○	○	○	○
Partner scan (Identifying potential	○	○	○	○

Use of evidence to inform commercialization decisions				
collaborators)				
PERT charts review (Critical path)	○	○	○	○
Product performance technical analysis	○	○	○	○
Secondary sources on trends (e.g. Forrester reports)	○	○	○	○
Startup genome compass	○	○	○	○
Technology trend analysis	○	○	○	○
Third party reports on commercialization	○	○	○	○
Usability test	○	○	○	○
User experience quality analysis	○	○	○	○
Value proposition with advantage test (Validates business model)	○	○	○	○

Other (please specify if you have used it or you would like to use it)

2. What are the main reasons to report your performance as an innovation intermediary to your supporters? (Check all that apply)

- ☐ **Adhere to accountability expectations**
- ☐ **Benchmark performance against other intermediaries**
- ☐ **Build credibility with investors**
- ☐ **Improve access to funding**
- ☐ **Improve mentoring services to clients**
- ☐ **Maintain transparency with clients**
- ☐ **Promote services to new potential clients**
- ☐ **Publish new learning in scholarly outlets**

Other (please specify)

Use of evidence to inform commercialization decisions

3. Which of the following evidence resources have you used to support your clients in the commercialization process? (Check all that apply)

- ☐ Formal competitor intelligence
- ☐ Informal exchanges of ideas
- ☐ Inventories of dormant intellectual property
- ☐ Inventories of new intellectual property
- ☐ Original scientific studies
- ☐ Peers and colleagues expertise
- ☐ Personal experience
- ☐ Professional social networks
- ☐ Scientific journals
- ☐ Specialized experts consulted
- ☐ Specialized industry publications
- ☐ Strategic partner collaboration with professional services
- ☐ Technical journals

Other (please specify)

4. The main reasons for innovation intermediaries to operate without scientific (empirical and measurable evidence) methods in their commercialization practice are: (Check all that apply)

- ☐ Hard to use
- ☐ Lack of validity
- ☐ Low accessibility
- ☐ Low proficiency
- ☐ Low reliability
- ☐ Not compatible with current methods
- ☐ Time consuming
- ☐ Uneconomical

Other (please specify)

Use of evidence to inform commercialization decisions

5. How do you help your clients to create a sustainable business? (Check all that apply)

- [ ] Connecting with experts in different areas
- [ ] Connecting with potential collaborators
- [ ] Helping them manage their resources
- [ ] Offering training in business creation and development
- [ ] Providing access to capital
- [ ] Providing mentorship
- [ ] Providing real estate space

Other (please specify)

6. Which methods do you use to assess if a product is likely to become a commercial success? (Check all that apply)

- [ ] Consumer research probes
- [ ] Financial projections
- [ ] Industry trend analyses
- [ ] Pilot tests
- [ ] Product feasibility tests
- [ ] Proof of concept assessment
- [ ] Return on investment analyses
- [ ] SWOT analysis

Other (please specify)

Use of evidence to inform commercialization decisions

7. Which tools do you use to examine the viability of a business model? (Check all that apply)

- [ ] Benchmarks
- [ ] Business model generation canvas
- [ ] Business process management
- [ ] Financial ratios
- [ ] Financial statements
- [ ] Personal experience

Other (please specify)

8. What sources of information do you use most often to stay up to date with technology trends in your industry? (Check all that apply)

- [ ] Blogs
- [ ] Community associations
- [ ] Conversations with experts
- [ ] Industry reports
- [ ] Informal networking
- [ ] LinkedIn groups
- [ ] Magazines
- [ ] Newsletters
- [ ] Newspapers
- [ ] Regular meetings with other experts in your field
- [ ] Scientific journals
- [ ] Trade associations
- [ ] Trusted web searches
- [ ] Twitter

Other (please specify)

Use of evidence to inform commercialization decisions

9. How do you decide which sources of information to trust? (Check all that apply)

- [ ] Common sense
- [ ] Communities of experts
- [ ] Online reputation
- [ ] Personal evaluation criteria
- [ ] Reference from clients
- [ ] Reference from colleagues
- [ ] Reference from experts

Other (please specify)

10. How do you test the assumptions made by your clients about their products or services? (Check all that apply)

- [ ] Beta versions
- [ ] Experimental validation
- [ ] Focus groups
- [ ] Interviews
- [ ] Market trends
- [ ] Observing existing players
- [ ] Surveys
- [ ] Word of mouth testimonials

Other (please specify)

Use of evidence to inform commercialization decisions

11. What decisions are made together with your clients to test assumptions about their product plans? (Check all that apply)

- ☐ Make decisions regarding product quality
- ☐ Make decisions regarding product usability
- ☐ Make product design choices
- ☐ Set priorities on feature selection
- ☐ Visualize user experience
- ☐ Our clients make all the decisions themselves

Other (please specify)

12. Using the following statements, how would you rate your organization? (Check one option per row)

	Priority Low 1 2 3 4 5 6 7 High
Determined to improve the current practice of innovation intermediaries	○ ○ ○ ○ ○ ○ ○
Prepared to attempt new methods for providing services to clients	○ ○ ○ ○ ○ ○ ○
Concerned to obtain better feedback for me and my clients	○ ○ ○ ○ ○ ○ ○
Disposed to build standardized processes and metrics for our supporters	○ ○ ○ ○ ○ ○ ○
Interested in collaborating with other innovation intermediaries	○ ○ ○ ○ ○ ○ ○

13. What characteristics best describes you as an Innovation Intermediary? (Check up to 3)

- ☐ I foster development of new competencies to meet industry's requirements
- ☐ I make reference to industry reports and specialized publications for understanding market and industry trends
- ☐ I make use of clients and collaborators feedback to improve my role as intermediary
- ☐ I seek implementation of new practices to provide value added to clients' business
- ☐ I use evaluation of tools to optimize operating processes
- ☐ I use personal experience to respond to clients' challenges

Bibliography

Batterink, M., Wubben, E., Klerkx, L., & Omta, S. (2010). Orchestrating innovation networks: The case of innovation brokers in the agri-food sector. *Entrepreneurship & Regional Development, 22*, 47-76.

Boland, R., & Tenkasi, R. (1995). Perspective making and perspective in communities of knowing. *Organization Science, 6*, 350-372.

Barczak, G., Griffin, A., & Kahn, K. (2009). Perspective: Trends and drivers of success in NPD practices: Results of the 2003 PDMA best practices study. *Product Innovation Management* (26), 3-23.

Bolisani, E., & Scarso, E. (2009). The role of KIBS in the technological renovation of local economies. Evidence from the computer services sector. *International Journal of Entrepreneurship and Innovation Management, 9*, 29-46.

Boon, W. P., Moors, E. H., Kuhlmann, S., & Smits, R. E. (2008). Demand articulation in intermediary organisations: The case of orphan drugs in the Netherlands. *Technological Forecasting and Social Change* (75), 644-671.

Bouchikhi, H. (1993). A constructivist framework for understanding entrepreneurship performance. *Organization Studies, 14* (4), 549–570.

Brass, D., Galaskiewicz, J., Greve, H., & Tsai, W. (2004). Taking stock of networks and organizations: A multilevel perspective. *Academy of Management Journal, 47*, 795-817.

Braun, V., & Herstatt, C. (2008). The freedom-fighters: How incumbent corporations are attempting to control user-innovation. *International Journal of Innovation Management, 12* (3), 543-572.

Bryant, T. A., & Reenstra-Bryant, R. A. (1998). Technology brokers in the North American software industry: Getting the most out of mismatched dyads. *International Jounal Technology Management, 16*, 281-290.

Burt, R. S. (2005). *Brokerage and closure: An introduction to social capital.* New York: Oxford University Press.

Burt, R. S. (1992). *Structural holes: The social structure of competition.* Cambridge: Harvard University Press.

Carayannis, E., & 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 process. *Technovation, 25*, 95-110.

Chesbrough, H. (2006a). *Open Business Models: How to thrive in the new innovation landscape.* Boston, MA: Harvard Business School Press.

Chesbrough, H. (2003a). The governance and performance of Xerox's technology spin-off companies. *Research Policy, 32*, 403-421.

Chesbrough, H. W. (2003b). A better way to innovate. *Harvard Business Review*, 12-13.

Chesbrough, H. W. (2006b). *Open innovation: Researching a new paradigm.* New York: Oxford University Press.

Chesbrough, H. W. (2003c). The era of open innovation. *MIT Sloan Management Review*, 35-41.

Chesbrough, H. W., Vanhaverbeke, W., & West, J. (2006). *Open Innovation: Researching a new paradigm.* Oxford: Oxford University Press.

Chesbrough, H. (2007). Why companies should have open business models. *MIT Sloan Management Review, 48*, 22-28.

Cohen, W., & Levinthal, D. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly, 35*, 128-152.

Colbert, C., Adkins, D., Wolfe, C., & LaPan, K. (2010). *Best practices in action. Guidelines for implementing first-class business incubation programs* (Revised 2nd edition ed.). Saline, MI, USA: McNaughton & Gunn.

Crowne, M. (2002). Why software product startups fail and what to do about it. Evolution of software product development in startup companies. *Engineering Management Conference, 2002. IEMC '02. 1*, pp. 338-343. Cambridge: IEEE International.

Cummings, T. G., & Huse, E. F. (1989). *Organzation development and change* (4th ed.). St. Paul, MN: West Publishing.

Dalziel, M. (2010). Why do innovation intermediaries exist? *Druid summer conference 2010* (pp. 1-23). London: Druid.

Den Hertog, P. (2000). Knowledge-intensive business services as co-producers of innovation. *International Journal of Innovation Management, 4*, 491–528.

DiMaggio, P. (1997). Culture and cognition. *Annual Review of Sociology, 23*, 263-287.

DiMaggio, P. (1992). *Nadel's paradox revisited: Relational and cultural aspects of organizational structure.* Boston: Harvard Business School Press.

Dogson, M., Gann, D., & Salter, A. (2006). The role of technology in the shift towards open innovation: The case of Procter & Gamble. *R&D Management, 36*, 333-346.

Drucker, P. F. (1992). Managing for the future. New York: Harper Collins.

Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of Management Review, 14* (4), 532-550.

Erzurumlu, S. (2010). Collaborative product development with competitors to stimulate downstream innovation. *International Journal of Innovation Management, 14* (4), 573-602.

Flyvbjerg, B. (2006). Five misunderstandings about case-study research. *Qualitative Inquiry, 12* (2), 219-245.

Fransella, F., Bell, R., & Bannister, D. (2004). *A manual for repertory grid technique.* Chichester, England: John Wiley & Sons Ltd.

Gelderen, M., Thurik, R., & Bosma, N. (2006). Success and risk factors in the pre-startup phase. *Small Business Economics* (26), 319-335.

Gianiodis, P., Ellis, S., & Secchi, E. (2010). Advancing a typology of open innovation. *International Journal of Innovation Management, 14*, 531-572.

Gould, R. V., & Fernandez, R. M. (1989). Structures of mediation: A formal approach to brokerage in transaction networks. *Sociological Methodology, 19*, 89-126.

Grassmann, O., Enkel, E., & Chesbrough, H. W. (2010). The future of open innovation. *R&D Management*, 213-221.

Grimaldi, R., & Grandi, A. (2005). Business incubators and new venture creation: An assessment of incubating models. *Technovation, 25*, 111-121.

Hargadon, A. B. (2002). Brokering knowledge: Linking learning and innovation. *Research in Organizational Behavior, 24*, 41-85.

Hargadon, A. B. (1998). Firms as knowledge brokers: Lessons in pursuing continuous innovation. *California Management Review, 40* (3), 209-227.

Hargadon, A. B., & Sutton, R. I. (1997). Technology brokering and innovation in a product development firm. *Administrative Science Quarterly*, 716-749.

Hartwich, F., & Tola, J. (2007). Public–private partnerships for agricultural innovation: Concepts and experiences from 124 cases in Latin America. *International Journal of Agricultural Resources, Governance and Ecology, 6*, 240-255.

Howells, J. (2006). Intermediation and the role of intermediaries in innovation. *Research Policy*, 715-728.

Jankowicz, D. (2004). *The easy guide to repertory grids.* Chichester, West Sussex, UK: John Wiley & Sons Ltd.

Johnson, W. (2008). Roles, resources and benefits of intermediate organizations supporting triple helix collaborative R&D: The case of PRECARN. *Technovation, 28*, 495-505.

Kirkels, Y., & Duysters, G. (2010). Brokerage in SME networks. *Research Policy, 39*, 375-385.

Klein Woolthuis, R., Lankhuizen, M., & Gilsing, V. (2005). A system failure framework for innovation policy design. *Technovation, 25*, 609-619.

Klerkx, L., & Leeuwis, C. (2008a). Balancing multiple interests: Embedding innovation intermediation in the agricultural knowledge infrastructure. *Technovation, 28*, 364-378.

Klerkx, L., & Leeuwis, C. (2009a). Establishment and embedding of innovation brokers at different innovation system levels: Insights from the Dutch agricultural sector. *Technological Forecasting & Social Change, 76*, 849-860.

Klerkx, L., & Leeuwis, C. (2008b). Matching demand and supply in the agricultural knowledge infrastructure: Experiences with innovation intermediaries. *Food Policy, 33*, 260-276.

Klerkx, L., & Leeuwis, C. (2009b). Shaping collective functions in privatized agricultural knowledge and information systems: The positioning and embedding of a network broker in the Dutch diary sector. *The Journal of Agricultural Education and Extension, 15*, 81-105.

Klerkx, L., Hall, A., & Leeuwis, C. (2009). Strengthening agricultural innovation capacity: Are innovation brokers the answer? *International Journal of Agricultural Resources, Governance and Ecology, 8*, 409-438.

Kline, D. (2003). Sharing the corporate crown jewells. *MIT Sloan Management Review* (44), 89-93.

Kolk, A., & Püümann, K. (2010). Co-development of open innovation strategy and dynamic capabilities as a source of corporate growth. *Journal of Economic Literature*, 73-83.

Lazzarotti, V., & Manzini, R. (2009). Different modes of open innovation: A theoretical framework and an empirical study. *International Journal of Innovation Management, 13* (4), 615-636.

Lichtenthaler, U., & Ernst, H. (2008). Intermediary services in the markets for technology: Organizational antecedents and performance consequences. *Organization Studies, 29*, 1003-1035.

Lichtenthaler, U., & Ernst, H. (2009). The role of champions in the external commercialization of knowledge. *The Journal of Product Innovation Management*, 371-387.

Lo, Y.-J., Liu, W.-Y., & Wen, C.-T. (2010). The value added capability of innovation intermediaries in technology transaction markets. *PICMET '10 - Portland International Center for Management of Engineering and Technology, Proceedings - Technology Management for Global Economic Growth*, (pp. 516-521). Portland.

Mahnke, V., Wareham, J., & Bjorn-Andersen, N. (2008). Offshore middlemen: Transnational intermediation in technology sourcing. *Journal of Information Technology, 23*, 18-30.

Matt, M., & Tang, M. (2010). Management of university incubators in China and in France: A comparative analysis. *International Journal Entrepreneurship and Innovation Management, 11*, 282-300.

Meyer, H. (2010). Catching Up: The role of state science and technology policy in open innovation. *Economic Development Quarterly, 24* (3), 195-209.

Mian, S. (1997). Assessing and managing the university technology business incubator: An integrative framework. *Journal of Business Venturing, 12*, 251-285.

Morgan, E. J., & Crawford, N. (1996). Technology broking activities in Europe - a survey. *International Journal of Technology Management*, 360-367.

Nooteboom, B., Van Haverbeke, W., Duysters, G., Gilsing, V., & Oord, A. (2007). Optimal cognitive distance and absorptive capacity. *Research Policy, 36*, 1016-1034.

Osterwalder, A., & Pigneur, Y. (2010). *Business model generation.* Hoboken: John Wiley & Sons, Inc.

Oxford Dictionaries (2012). Evidence. Retrieved January 5, 2012, from http://oxforddictionaries.com/definition/evidence

Popp, A. (2000). "Swamped in information but starved of data": Information and intermediaries in clothing supply chains. *Supply Chain Management: An International Jounal, 5* (3), 151-161.

Porter, M. E., & Kramer, M. R. (2011). Creating shared value. *Harvard Business Review, 89* (1), 62-77.

Ries, E. (2011). *The lean startup.* New York: Crown Publishing Group.

Roxas, S., Piroli, G., & Sorrentino, M. (2011). Efficiency and evaluation analysis of a network of technology transfer brokers. *Technology Analysis & Strategic Management, 23*, 7-24.

Sapsed, J., Grantham, A., & DeFillippi, R. (2007). A bridge over troubled waters: Bridging organisations and entrepreneurial opportunities in emerging sectors. *Research Policy* (36), 1314-1334.

Sieg, J., Wallin, M., & Krogh, G. (2010). Managerial challenges in open innovation: A study of innovation intermediation in the chemical industry. *R&D Management, 40*, 281-289.

Smits, R., & Kuhlmann, S. (2004). The rise of systemic instruments in innovation policy. *International Journal of Foresight and Innovation Policy, 1*, 4-32.

Snow, C. C., Miles, R. E., & Coleman, H. J. (1992). Managing 21st century network organizations. *Organizational Dynamics, 20* (3), 5-20.

Stewart, J., & Hyysalo, S. (2008). Intermediaries, users and social learning in technological innovation. *International Journal of Innovation Management, 12* (3), 295-325.

Swidler, A. (1986). Culture in action: Symbols and strategies. *American Sociological Review, 51* (2), 273-286.

Swink, M. (2006). Building collaborative innovation capability. *Research · Technology management*, 37-47.

Teece, D. J. (2000). *Managing intellectual capital: Organizational, strategic, and policy dimensions.* New York: Oxford University Press Inc.

Tran, Y., Hsuan, J., & Mahnke, V. (2011). How do innovation intermediaries add value? Insight from new product development in fashion markets. *R&D Management, 41*, 80-90.

Winch, G. M., & Courtney, R. (2007). The organization of innovation brokers: An international review. *Technology Analysis & Strategic Management, 19*, 747-763.