Exploring Innovation as a Determinant to Internationalization

in Small Knowledge-Intensive Business Services

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ABSTRACT

Exploring Innovation as a Determinant to Internationalization in Small Knowledge-Intensive Business Services

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This study tests the underlying assumption that innovation is a necessary condition for internationalization in small firms. Specifically, I ask whether a knowledge-intensive business service (KIBS) firm's service innovation influences its propensity and intensity of internationalization. Two sub-questions are posed in relation to this broader question. First, are certain innovation results or combinations thereof associated with internationalization? And second, are certain configurations of innovation inputs and results associated with internationalization?

I use both traditional statistical techniques as well as set-theoretic methods to assess how the results garnered from contrasting methodological approaches differ from one another. The results from the logistic regressions and fractional logistic regressions echo the findings from previous studies: they suggest that there is a positive relationship between service innovation and internationalization. Given the assumptions of linearity and symmetry, results from the traditional statistical analyses support the notion that service innovation is positively related to internationalization; that internationalization is unlikely without service innovation. The results from the QCA lend an alternate view to the one proposed by the traditional statistical analyses, suggesting that there can be internationalization without service innovation. The crisp and fuzzy set QCAs suggest there are multiple pathways of innovation attributes a firm may adopt, but very few paths lead to the consistent result of internationalization. While there are few consistent configurations that explain internationalization propensity or intensity, there are many more that explain remaining in the firm's domestic market.

Overall, the findings from the study point to the strength of using alternative methodological perspectives to test theoretical models and nuance the current understanding of the role played by innovation as a driver of internationalization. They also point to the importance of allowing for asymmetry in explaining the presence and the absence of internationalization. Improper generalizations may be made when inferring that the absence of innovation implies the absence of internationalization. Moreover, they suggest that the import of a broader definition of innovation, including activities that

precede an innovation result as well as external knowledge sourcing, offers insightful additions in understanding the behaviours adopted by firms that have internationalized.

RÉSUMÉ

L'innovation comme déterminant à l'internationalisation des petites entreprises à haute intensité de savoir-faire

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L'objectif de l'étude est de vérifier l'hypothèse sous-jacente selon laquelle l'innovation est une condition nécessaire à l'internationalisation dans deux théories contemporaines en entrepreneuriat international. L'étude est encadrée par la question de recherche suivante : est-ce que l'innovation de service d'une entreprise du secteur des services à forte intensité de savoir-faire (KIBS) influence sa propension et son intensité d'internationalisation ? Deux sous-questions plus spécifiques sont aussi posées. Premièrement, est-ce que certains résultats d'innovation, ou plutôt leurs combinaisons, sont associés à l'internationalisation ? Et deuxièmement, est-ce que certaines configurations d'intrants et de résultats d'innovation sont associées à l'internationalisation ?

J'adopte deux perspectives méthodologiques contrastantes, l'une provenant des statistiques traditionnelles et l'autre de la théorie des ensembles, afin d'évaluer comment les résultats des deux approches diffèrent entre-elles. Les résultats de la régression logistique et de la régression logistique fractionnaire font écho aux conclusions des études précédentes : ils suggèrent qu'il existe une relation positive entre l'innovation de service et l'internationalisation. Étant donné les suppositions de linéarité et de symétrie imposées aux analyses statistiques traditionnelles, ces résultats s'alignent à l'idée que l'innovation de service a une relation positive avec l'internationalisation ; que l'internationalisation est improbable sans innovation de service. Les résultats de la QCA offrent une différente perspective que celle proposée par les analyses statistiques traditionnelles, suggérant au lieu qu'il peut y avoir l'internationalisation sans innovation de service. Plus spécifiquement, les QCA suggèrent que les entreprises adoptent de multiples configurations en matière d'innovation, mais très peu de voies conduisent de façon consistante au résultat d'internationalisation. Bien que peu de configurations expliquent la propension ou l'intensité d'internationalisation, de nombreuses autres captent des comportements liés au maintien d'une portée géographique domestique.

Dans l'ensemble, les conclusions de l'étude démontrent que l'utilisation de perspectives méthodologiques différentes de celles souvent adoptées pour tester des modèles théoriques nuancent la

compréhension du rôle joué, ici, par l'innovation en tant que moteur d'internationalisation. Ils soulignent également l'importance de permettre l'asymétrie dans les analyses afin d'expliquer la présence et l'absence d'internationalisation. Des généralisations incorrectes peuvent être faites lorsque l'on déduit que l'absence d'innovation implique l'absence d'internationalisation. En outre, les résultats suggèrent que l'importance d'une compréhension plus large de l'innovation, y compris les activités qui précèdent un résultat d'innovation ainsi que l'approvisionnement de connaissances externes, offre des informations utiles pour comprendre les comportements adoptés par les entreprises qui se sont internationalisées.

Mots clés : internationalisation, innovation, KIBS, qualitative comparative analysis, régression logistique fractionnaire

DEDICATION

To my grandmother, Germaine Robert, who instilled in me the curiosity and courage to undertake such a project, and who would have loved and cherished every minute of pursuing graduate studies, had she been afforded such an opportunity.

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You have brains in your head.
You have feet in your shoes.
You can steer yourself in any direction you choose.

- Dr. Seuss (Oh, the Places You'll Go!)

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TABLE OF ACRONYMS

Acronym[1]	Explanation
C-KIBS	Creative knowledge-intensive business services
CIS	Community innovation survey
CRIQ	Centre de recherche industrielle du Québec
csQCA	Crisp set qualitative comparative analysis
DC	Dynamic capability
fsQCA	Fuzzy set qualitative comparative analysis
FSTS	Foreign sales to total sales (ratio)
GATS	General Agreement on Trade in Services
IB	International business
ICT	Information and communication technology
IE	International entrepreneurship
INV	International new venture
KBV	Knowledge-based view
KIBS	Knowledge-intensive business service
MNE	Multinational enterprise
NAICS	North American Industrial Classification System
OECD	Organisation for Economic Co-operation and Development
P-KIBS	Professional knowledge-intensive business services
QCA	Qualitative comparative analysis
R&D	Research and development
RBV	Resource-based view
SME	Small and medium-sized enterprise
T-KIBS	Technological knowledge-intensive business services
WTO	World Trade Organization

[1] For acronyms used in the QCA analyses, please refer to Table 39 and Table 40.

CHAPTER 1   INTRODUCTION

1.1   *Study Context*

Small firm internationalization has long forged an important research stream within the international business literature. The study of this phenomenon is embedded within the now well-defined literature on international entrepreneurship, found at the intersect of entrepreneurship and international business (McDougall & Oviatt, 2000). In the last decade, the field has begun converging around central topics and themes of interest. Among these many themes, one research avenue examines the various factors that influence internationalization (Jones, Coviello, & Tang, 2011). This thesis positions itself within that research stream, and more specifically within its subset of studies on knowledge resources in small firm internationalization. As this is a large subset of the literature, the focus of my attention is on the role played by innovation in the internationalization of small firms, particularly in knowledge-intensive business services (KIBS).

Innovation continues to hold a prominent place in the international entrepreneurship literature, as empirical studies observe that innovation is a determinant promoting the internationalization of SMEs (Cassiman & Golovko, 2011; Castaño, Méndez, & Galindo, 2016; Shearmur, Doloreux, & Laperrière, 2015; Veglio & Zucchella, 2015). Indeed, the Uppsala model of internationalization as well as the International New Venture (INV) perspective, both central theories in international entrepreneurship, build upon the concept of innovation, often explicitly as a source of competitive advantage and sometimes implicitly as a change agent for organizational adaptation in foreign markets.

The topics of service internationalization and innovation in services have both been of interest since the mid-1980s, primarily brought on by changes in multinational trade policies and the growing rise of service industries throughout developed economies. Although it was noted in the early 2000s that the international business literature largely ignored advancements made in the innovation literature (Miozzo & Miles, 2002, p. 16), there has yet to be any substantial import from the innovation literature to inform and refine existing theories on the internationalization of small firms.

Per Organisation of Economic Co-operation and Development, innovation is defined as the implementation of a new or significantly improved product (good or service) or process, a new marketing

method, or a new organizational method in business practices, workplace organizations, or external relations (OECD, 2005). It is a complex phenomenon. Among the many factors that have been identified as determinants of innovation, technical knowledge resources, internal and external communication (Damanpour, 1991), as well as the firm's ability to learn (Lam, 2005) are integral. Moreover, innovation is embodied and embedded in social practices that transcend multiple levels of the firm and make use of tacit knowledge shared between individuals (Crossan & Apaydin, 2010). Firms innovate as a means for organizational change and adaptation, often in conditions of intense competition and rapidly changing markets and customer demand (Jansen, Van Den Bosch, & Volberda, 2006; Stieglitz, Knudsen, & Becker, 2016; Tripsas & Gavetti, 2000). As change and adaptation are two essential mechanisms driving a firm's internationalization process (Autio, Sapienza, & Almeida, 2000; Johanson & Vahlne, 2009; Jones & Coviello, 2005) fittingly, then, it becomes interesting to explore how innovation influences the internationalization of small firms.

Indeed, the relationship between innovation and internationalization has received considerable empirical examination since the mid-1980s. Ample support exists for a positive and significant relationship (Altomonte, Aquilante, Békés, & Ottaviano, 2013; Cassiman & Golovko, 2011; Higón & Driffield, 2011). While scholars have used an extensive array of independent variables to model this relationship, operationalization of innovation often gravitates toward a technological understanding of the construct, capturing mostly the introduction of product—and to a lesser extent, process—innovations, as well as R&D intensity (e.g., Becker & Egger, 2013; Caldera, 2010; Lejpras, 2015; Love, Roper, & Zhou, 2016).

Four issues arise, of which two are theoretical and two methodological. First, an overwhelming majority of studies only examine product innovation, and to a lesser extent, product and process innovations concurrently. Moreover, there is still a reliance on R&D intensity as a measure of innovation, which emphasizes the importance of technological innovations. Other innovation types, such as marketing and managerial, are often neglected. Yet, previous work shows it is the combination of different types of innovations rather than one type in isolation that is associated with a firm's propensity to enter export markets (Guan & Ma, 2003; Lewandowska, Szymura-Tyc, & Gołębiowski, 2016). Second, little attention is given to the innovation inputs and activities that precede innovation outcomes. By operationalizing innovation as an outcome only, much of the complexity surrounding the construct is lost.

Third, the relationship between innovation and internationalization—or export, as it is often captured—is one that is inherently plagued by problems of endogeneity. This problem is well documented (Jean, Deng, Kim, & Yuan, 2016), yet only a small percentage of studies examining this relationship

address the difficulty inferring causality, both theoretically and empirically. A fourth issue is in the assumption of necessity, which is often implied in how the relationship between innovation and internationalization is modelled. Necessary conditions are proverbial bottlenecks: without X, there can be no Y. Sufficient conditions, on the other hand, produce the outcome. By assuming that innovation is a prerequisite for internationalization, the theoretical stance adopted is one of necessity: there can be no internationalization without innovation.

1.2 Problem Statement and Research Questions

Two gaps are identified in the literature concerning how innovation is theorized and modelled as a driver of internationalization in contemporary international entrepreneurship theories. The first is theoretical and stems from a misalignment in the understanding of the innovation construct between the international entrepreneurship subfield and the broader innovation research community. To address this gap, I propose to broaden the conceptualization of innovation and inform the conversation of innovation as a driver in small firm internationalization by bridging in concepts from three distinct themes in the innovation literature:

- *innovation in services*, and the study of innovation from a synthesis approach;
- the *open innovation paradigm*, and the use of external information sources as inputs into the innovation process;
- and, *innovation modes*, and the likelihood of equifinal innovation patterns.

The second gap identified is methodological and stems from a disconnect between theory and model testing. Management theories have long used conventional statistical techniques such as multiple regression analyses to test the underlying relationships between their core constructs. The predominant use of these conventional correlation-based techniques has forged how we, as a community, examine and think about these constructs and relationships (Woodside, 2013). The ways by which we construct and test our hypotheses impacts, often implicitly though sometimes explicitly, how we reconcile theory testing with its statistical application (Fiss, 2007; Woodside, 2014, 2016).

On this topic, scholars are now directing attention towards the perverse and persistent effects such widely adopted practices bore on the advancement of knowledge and the improvement of theories, alike. The use of Qualitative Comparative Analysis (QCA) allows for the alleviation of some of these problems. Fiss (2007, 2011), Ragin (2000, 2008) and others who champion the adoption of set-theoretic methods center their narrative on the need to depart from the restrictive assumptions brought on by variance-based

analyses. Though much theorizing builds on the premise that configurations of attributes lead to different outcomes depending on how they are coupled—thus implying nonlinearity, synergistic effects, and equifinality—empirical research predominantly makes use of statistical models which imply the very opposite: linearity, additive effects, and unifinality (Fiss, 2007, p. 1181).

To address this methodological gap, I adopt a comparative research design, contrasting the results of the study's hypotheses using traditional statistical analysis, specifically logistic regression and fractional logistic regression, to those of set-theoretic methods, namely crisp set and fuzzy set Qualitative Comparative Analysis.

The overarching research question that frames this thesis is as follows: *Does a small knowledge-intensive business service firm's innovation influence its internationalization propensity and intensity*? Two more specific research questions break down this broader question. The first explores innovation in service firms. It asks whether certain types of innovations—technological ones such as service and process innovations, and non-technological ones such as organizational and marketing innovations—or combinations thereof are associated with internationalization. This is an important contribution to the international entrepreneurship literature, as much of the findings are contextualized to manufacturing and high-technology sectors, where technological innovation is predominant. I compare the theoretical foundations of the Uppsala model and the INV perspective and question whether the two internationalization theories are driven by similar or different 'change mechanisms,' as captured by types of innovation. I first question if service innovation—an analog to product innovation in manufacturing and high-technology firms—is a necessary condition for internationalization. I then question whether it is the combination of innovation types that drive a firm's internationalization. In so doing, I move beyond the limited operationalization of innovation in the international entrepreneurship literature, which principally examines product innovations only. Thus, innovation is studied from the viewpoint of innovation in services, which emphasizes the importance of both technological (product or service, and process) and non-technological (organizational and marketing) innovations.

The second research question seeks to examine the influence of various innovation patterns on small firm internationalization. These innovation patterns capture both innovation inputs and results and characterize the firm's openness to external information sources. Both theoretical and empirical studies have determined the importance of innovation as a key determinant in the internationalization of small and medium-sized firms. Yet studies in international business and international entrepreneurship have predominantly examined innovation as a result only, often paying little attention to the complexities that ensue when we consider the various ways by which firms may differ in their innovation activities. In this

respect, I suggest moving beyond a strict understanding of innovation as a result only. Departing from this type of modelling acknowledges advancements in the open innovation paradigm and takes into consideration innovation activities related to the external sourcing of information and collaboration which extend beyond the boundaries of the firm.

What is more, I propose to explore this question by using the concept of 'innovation modes.' They capture multiple dimensions of the innovation construct, including internal innovation activities, external information sources, and innovation results. By adopting a more holistic perspective of innovation, I also build on the open innovation literature that examines the influence of coupling internal investments in the firm's innovation activities with those related to knowledge sourcing, and the firm's openness towards integrating external information into its knowledge base.

Taken together, these three distinct perspectives (e.g., innovation in services, open innovation paradigm, and innovation modes) move beyond the predominant operationalization of innovation in the international entrepreneurship literature. I thus seek to address nuances that may exist in the relationship between innovation and internationalization, as it is currently captured in mainstream international entrepreneurship theories.

1.3   Theoretical Framework

I frame this study in the resource-based view (RBV) of the firm (Barney, 1991; Helfat & Peteraf, 2003; Maritan & Peteraf, 2011; Peteraf, 1993) and its complementary branches of dynamic capabilities (Al-Aali & Teece, 2014; Eisenhardt & Martin, 2000; Teece, 2007; Teece, Pisano, & Shuen, 1997) and the knowledge-based view of the firm (Grant, 1991, 1996a, 1996b; Kogut & Zander, 1996). I supplement this internal perspective to the firm with social network theory (Dyer & Singh, 1998; Kilduff & Brass, 2010; Lavie, 2006) to address how a firm interacts with other actors in its environment.

Several assumptions in line with these theories are posed at the onset of the study. First, the firm requires resources and capabilities to innovate that are heterogeneously distributed across firms in a given sector (Barney, Wright, & Ketchen Jr., 2001; Helfat & Peteraf, 2003; Teece, 2007). Moreover, the firm's bundles of resources and capabilities are influential to the firm's strategy formulation (Grant, 1991); the firm's resources and capabilities provide direction for its strategy. More specifically, with respect to small firms operating in foreign markets, it is thought that the development of new products and technologies contributes positively to the firm's competitive advantage in foreign markets (Basile, 2001; Dhanaraj & Beamish, 2003; Lewandowska et al., 2016).

Knowledge and information as well as the firm's ability to integrate new knowledge into its own existing knowledge base are critical resources and capabilities to the firm's ability to innovate (Cohen & Levinthal, 1990; Lichtenthaler & Lichtenthaler, 2009). Relatedly, the development of innovation is most often completed with information and knowledge inputs that are external to the firm's boundaries. Firms may gain access to knowledge through network relationships (Dahlander & Gann, 2010). Network relationships are the outcome of generative rules of coordination and impute value to participating firms by imparting them capabilities such as greater response or speed to market (Kogut, 2000). Moreover, social networks provide actors with opportunities and constraints that affect behavior and outcomes, with social ties acting as conduits of information (Ellis, 2011).

1.4   Aim and Scope of Thesis

The primary aim of this study is to test an underlying assumption in contemporary international entrepreneurship theories that innovation is a driver for internationalization. I offer an alternative perspective with which to test this assumption by importing a novel method, Qualitative Comparative Analysis (QCA), from other streams of social sciences. The use of QCA allows to test whether innovation is a 'necessary' condition for internationalization, as stated using set-theoretic terminology, and to further disentangle the complex relationship between innovation and internationalization.

Toward this first objective, I also broaden the definition of innovation to incorporate advances made in the field pertaining to three themes: innovation in services, the open innovation paradigm, and innovation modes. By doing so, I widen the understanding of innovation to capture both technological and non-technological innovations while also acknowledging the role of innovation inputs and the firm's openness towards external information sources. Broadening the definition of innovation to encompass multiple types of innovation results and by considering the influence of innovation activities that precede an innovation outcome may help further disentangle and nuance how innovation acts as a change or adaptive mechanism in theories of small firm internationalization.

The secondary aim of this study is to comment on how the results garnered from models tested using contrasting methodological approaches differ from one another. The objective is to compare and contrast how modelling the relationship between innovation and internationalization is viewed through the lens of both probabilistic and set-theoretic approaches. I examine the established relationship between innovation and internationalization using a novel method that builds on Boolean algebra and principles of necessary and sufficient conditions. Doing so facilitates a commentary on how configurations of

condition variables related to innovation influence the propensity and intensity of internationalization in small KIBS firms, and thus provides new insight by way of a novel methodological lens.

The scope of this thesis is thus bound to examining how innovation is associated with small firm internationalization while taking into consideration contemporary advancements made in the innovation literature. Empirical testing is limited to three sets of hypotheses, developed to answer the two research questions identified above. These hypotheses are tested using an original sample population, that of small KIBS firms. These firms differ quite strikingly from those that are most often examined in international entrepreneurship studies, most notably manufacturing and high technology firms. I offer new insight by testing these hypotheses using contrasting methodological approaches. I compare the results of traditional statistical analyses using logistic regression and fractional logistic regression to those of set-theoretic methods using fuzzy set and crisp set QCA.

Four assumptions made in QCA make it fundamentally different from conventional statistical analyses: (1) an assumption of causal asymmetry, (2) the use of measurement calibration to external standards, (3) an examination of cases as configurations of causes and conditions, and (4) the analysis of causal complexity rather than net effects (Ragin, 2000, 2008). Taken as a whole, this new perspective provides fresh insight into a question that has received ample empirical attention, yet leaves many questions under-examined, particularly concerning which dimensions of the innovation construct work together in conjunction with one another to explain internationalization as an outcome.

1.5   Contribution

With this study I strive to make three types of contributions to international entrepreneurship. The first is theoretical, as I widen the innovation construct within the context of contemporary small firm internationalization theories by bridging advances made in innovation research outside the field of international entrepreneurship. Moreover, rather than assuming innovative firms are most likely to internationalize, the objective of the empirical work is to characterize ways by which innovation activities and results influence the internationalization of small firms. The thesis strives to provide a theoretical contribution to internationalization theories concerning the broader role of innovation activities that precede innovation results, the different configurations of innovation types that affect a firm's internationalization, and the plurality of equifinal innovation patterns a firm may adopt to achieve similar internationalization outcomes.

The second contribution is methodological, as I propose to depart from traditional statistical analyses to test an underlying assumption in contemporary small firm internationalization theories. I suggest examining the data using a new lens to look for complementarity in the results garnered using both traditional statistical analyses and set-theoretic methods. Fundamentally, I propose comparing the results from probabilistic, inferential techniques to ones that are ultimately case based. From these results, it is possible to devise a secondary line of questioning pertaining to how the results from each camp differ from one another, and how a comparison between methodological lenses enriches theoretical modelling. Particularly of interest are how the assumptions of linearity, symmetry and unifinality (Fiss, 2007), present when testing theoretical models using traditional correlation-based techniques, give way to a different view when they are taken away using Qualitative Comparative Analysis as the analytical tool.

The third contribution is managerial, as I offer insight into the different paths a firm may take with respect to its innovation pattern to attain a certain internationalization outcome. These suggestions are proposed within the mindset that innovation is costly and surrounded by risk and uncertainty. I frame the idea to CEOs and managing partners of small KIBS firms looking to venture abroad that service innovation may not be necessary for them to successfully internationalize, and that there are substitutable configurations of innovation patterns that may fit better with their strategic objectives and resource endowments. I thus offer the perspective of alternate pathways to internationalization as I explore what it means for a firm to have equifinal paths to innovate and internationalize.

CHAPTER 2   LITERATURE REVIEW

2.1 Chapter Overview

What follows are reviews of three literature streams that cross between the fields of strategic management, entrepreneurship, and international business. I first begin by theoretically framing this thesis. I build on contemporary theories in strategic management, most notably the resource-based view (RBV), the dynamic capabilities (DC) perspective, and the knowledge-based view (KBV). As the RBV and its extensions offer an incomplete view of relationships outside the firm's boundaries, I further supplement these theories by also building upon the relational view.

Second, I review the literature on small firm internationalization which predominantly resides in the international entrepreneurship (IE) literature. I compare the two most prominent theories that explain small firm internationalization: the Uppsala model of gradual internationalization and the International New Venture perspective. I then provide an overview of indicators used to characterize a firm's internationalization trajectory.

Third, I review the literature on innovation, which has historically been an important topic of discussion in the fields of entrepreneurship, international business, and strategic management. I discuss three distinct perspectives in the innovation literature, namely innovation in services, open innovation, and innovation modes. Keeping the theoretical grounding of these three perspectives in mind, I re-examine the two theories of small firm internationalization and highlight the influence of innovation as a driving factor of this phenomenon.

Finally, I conclude the literature review by contextualizing these topics to knowledge-intensive business services (KIBS), a relevant sample of choice for the study of such topics as they demonstrate continued growth in foreign trade.

2.2 International Entrepreneurship from Different Theoretical Perspectives

As will be discussed in greater detail in the review of empirical studies, it is important to acknowledge that much of the empirical work that examines the link between innovation and internationalization grounds itself in economic-based theories. Rather than adopting a strictly economic

perspective, much like others who have recently come before me (D'Angelo, Majocchi, Zucchella, & Buck, 2013; Filipescu, Prashantham, Rialp, & Rialp, 2013; Oura, Zilber, & Lopes, 2016; Raymond, St-Pierre, Uwizeyemungu, & Le Dinh, 2014; Zucchella & Siano, 2014), I build on a contemporary theoretical framework informed by behavioral and evolutionary theories of organization. These are now discussed in greater detail.

2.2.1   *Resource-Based View and Dynamic Capabilities*

This study first grounds itself in the resource-based view (RBV). Scholars have demonstrated that a firm's principal source of competitive advantage and strategy formulation comes from its resource and capability endowment (Barney, 1991; Peteraf, 1993). Economic rents are secured with valuable, rare, inimitable, and non-substitutable resources that are bundled together, often within the boundaries of the firm (Barney, 1991). These resources are necessary for the firm to implement its strategy to the extent where it can create and gain a competitive advantage that cannot be easily duplicated by competing firms in the market (Barney, 1991; Peteraf, 1993). Thus, bundles of resources and capabilities are influential to the firm's strategy formulation (Grant, 1991).

Following Helfat and Peteraf (2003, p. 999), "resources refers to an asset or input to production (tangible or intangible) that an organization owns, controls, or has access to on a semi-permanent basis. An organizational capability refers to the ability of an organization to perform a coordinated set of tasks, utilizing organizational resources, for the purpose of achieving a particular end result." Firms develop their resource base through mechanisms of acquisition (e.g., purchase; Barney, 1986) and accumulation (e.g., creation; Dierickx & Cool, 1989) which, taken together, explicate how firms may come to have heterogeneous resource positions (Maritan & Peteraf, 2011).

To overcome the RBV's static view of the firm's competitive advantage, Teece and colleagues (1997) introduce the concept of dynamic capabilities (DC). These are defined as "processes that use resources—specifically the processes to integrate, reconfigure, gain and release resources—to match and even create market change" (Eisenhardt & Martin, 2000, p. 1107). They may be decomposed into "the capacity (1) to sense and shape opportunities and threats, (2) to seize opportunities, and (3) to maintain competitiveness through enhancing, combining, protecting, and, when necessary, reconfiguring the business enterprises intangible and tangible assets" (Teece, 2007, p. 1319).

Taken together, the RBV and DC framework offer a useful lens with which to observe both innovation (den Hertog, van der Aa, & de Jong, 2010; Weerawardena, O'Cass, & Julian, 2006; West,

Salter, Vanhaverbeke, & Chesbrough, 2014) and internationalization (Dhanaraj & Beamish, 2003; Peng, 2001; Ruzzier, Hisrich, & Antoncic, 2006; Villar, Alegre, & Pla-Barber, 2014) in the SME context. As a point of departure, consider that the development of new products and technologies is thought to contribute positively to the firm's competitive advantage in foreign markets (Basile, 2001; Dhanaraj & Beamish, 2003; Lewandowska et al., 2016). By theoretically grounding this study in the RBV and DC framework, I build on the notion that the firm requires resources and capabilities to innovate that are heterogeneously distributed across firms in a given sector (Barney et al., 2001; Helfat & Peteraf, 2015; Teece, 2007). Moreover, I assume that over time, the choices made by the firm in resource and capability investments—whether built, accumulated or acquired—affect its ability to sense and seize opportunities and to maintain its competitive advantage (Eisenhardt & Martin, 2000; Teece, 2007). Yet, given that many of the resources and capabilities upon which the firm relies to innovate and internationalize are intangible in nature and often related to knowledge and organizational learning, the RBV and DC perspectives are best extended by the knowledge-based view, addressed in the following section.

2.2.2   *Knowledge-Based View*

This thesis is also informed by the knowledge-based view of the firm (KBV), an extension of the RBV and DC. As knowledge is embedded at the core of both innovation (Nonaka & von Krogh, 2009) and internationalization (Casillas, Moreno, Acedo, Gallego, & Ramos, 2009; Fletcher & Harris, 2012; Westhead, Ucbasaran, & Binks, 2004), it is crucial to acknowledge the influence of intangible knowledge-related resources and capabilities on the firm's ability to obtain and sustain competitive advantage. Notably, the KBV lends support in explaining the mechanisms used by the firm to integrate knowledge and create capabilities that allow it to maintain its competitive position (Grant, 1996b).

A few definitions are in order. First, knowledge differs from information, though the two are often used interchangeably. Whereas information relates to "data that give meaning by reducing ambiguity, equivocality, or uncertainty, or when referring to data which indicate that conditions are not as presupposed," knowledge relates to "more complex products of learning, such as interpretations of information, beliefs about cause-effect relationships, or, more generally, know-how" (Huber, 1991, p. 89). Knowledge is then understood as 'justified true belief' (Nonaka & Takeuchi, 1995) and encompasses both explicit knowledge, that which can be written down, and tacit knowledge, that which cannot (Grant, 1996b). It is a reducible and transferable construct that differs from knowing, as the latter is the function association with processing information (Eisenhardt & Santos, 2002). Second, knowledge is also related to the concept of organizational learning. Huber (1991, p. 98) states that "an entity learns if, through its

processing of information, the range of its potential behaviors is changed." Thus, organizational learning is a process embedded in a given social context which is highly dependent upon the actors which partake in knowledge acquisition, the systems in place which allow for information to be distributed, the maps and schema shared among individuals that allow for information to be interpreted, and the organizational memory embodied in routines and processes which act as repositories for knowledge (Huber, 1991).

An important assumption is derived from this stream of theory: the firm's resources and capabilities provide direction for its strategy. A competitive advantage relies on resources that are idiosyncratic, thus scarce, and difficult to transfer or replicate (Grant, 1991). Among all resources, the KBV posits knowledge is the most valuable to the firm, as advantageous resource and capability benefits are likely derived from the firm's superior access to and integration of specialized knowledge (Grant, 1996b). A core function of the firm is to integrate specialized knowledge embedded in individuals and apply it to new products and services by way of various integration mechanisms such as direction and routines. An important limit is, therefore, that of coordination (Grant, 1996b). In dynamic environments, the value of the firm's proprietary knowledge may erode quite quickly; rather, it is the tacit knowledge embedded in the firm's individuals that may become the basis of competitive advantage due to its uniqueness and relative immobility (Eisenhardt & Santos, 2002). Thus, efficiency, scope, and flexibility of knowledge integration are integral to the firm's ability to obtain and sustain a competitive advantage. What is more, knowledge may be integrated from beyond the firm's boundaries by way of network relationships (Grant, 1996a; Kogut & Zander, 1996). This important tenet of the KVB extends to the next theory in which I ground this study, social network theory.

2.2.3 *Relational View and Social Network Theory*

The RBV and its previously discussed extensions offer an incomplete view of relationships outside the firm's boundaries. The relational view stands in contrast: whereby the RBV and its extensions assume that competitive advantage is found within the firm, the relational view suggest sustained competitive advantage may instead arise from relationships between firms. A firm's valuable resources may be found beyond its boundaries, embedded in interfirm routines and processes, and need not adhere to the assumption of propriety by the firm (Lavie, 2006). Valuable resources may be directly shared between partnered firms, and benefits of resources may be indirectly transferred as well. Competitive advantage stemming from interfirm relationships may then emanate from: (1) relation-specific assets, (2) knowledge-sharing routines, (3) complementary resources/capabilities, and (4) effective governance. These sources of long lasting 'relational rents,' a term coined by Dyer and Singh (1998), may then be

sources of sustainable competitive advantage. Relational rents are defined as "a supernormal profit jointly generated in an exchange relationship that cannot be generated by either firm in isolation and can only be created through the joint idiosyncratic contributions of the specific alliance partners" (Dyer & Singh, 1998, p. 662). Networks of relationships between firms play a greater role than the diffusion of innovation or the access to information (Kogut, 2000). Rather, they are the outcome of generative rules of coordination, and impute value to participating firms by imparting them capabilities such as greater response or speed to market.

Central tenets of the relational view are often used in conjunction with social network theory. Social network theory builds on four core ideas (Kilduff & Brass, 2010) surrounding the concepts of social relations, embeddedness, structural patterning, and the utility of network connections. At its core, this theoretical perspective studies a set of network actors—individuals, groups, or firms—and the relationships that join and divide them. Actors are embedded within a network; a social context that may foster or facilitate economic transactions (Granovetter, 1985). A mark of embeddedness in a network is an actor's preference for repeated transactions with other network members (Uzzi, 1996). By way of these actions, actors may forge, review, and extend social ties (Gulati & Gargiulo, 1999). Parallel to the idea of embeddedness is that of structural patterning. Theorists suggest that enduring patterns of connectivity underlie the complex social relationships of a network; these patterns may help explain the existence and absence of ties between actors as well as outcomes at different levels of analysis (Burkhardt & Brass, 1990; Gulati, 1995). Lastly, social networks provide actors with opportunities and constraints that affect behavior and outcomes. The term social capital is often used as a means to capture the idea of economic returns that may result from an actor's exploitation of its network position (Kilduff & Brass, 2010).

Taken together, social network theory and the relational view provide additional insight into how firms interact with one another through the development of network ties as a means to directly and indirectly exchange and transfer valuable resources. Both have been applied as theoretical frameworks in the international entrepreneurship and innovation literature.

With respect to small firm internationalization, the relational view provides greater insight into how the firm may access important sources of knowledge and information necessary in maintaining and building its competitive advantage. These sources extend beyond the boundaries of the firm (Coviello, 2006) and can mitigate perceived uncertainties associated with the firm's activities, for example when operating in foreign markets (Lamb & Liesch, 2002; Steen & Liesch, 2007). Network ties have also been found to influence decisions on the execution of growth strategies, having, for example, an effect on

market selection, foreign market entry, and choice of partner (Belso-Martínez, 2006; Coviello, 2006; Sharma & Blomstermo, 2003).

Recent empirical work has also examined how ties in an entrepreneur's social network may serve as conduits of information about new opportunities (Ellis, 2011). As social networks are idiosyncratic, opportunity recognition is then contingent upon the individual's network structure and its position within the network. Johanson and Vahlne (2009) build upon the concept of information and knowledge acquisition via network ties. They suggest that firms may suffer from 'liability of outsidership' should they lack market-specific business knowledge—or access to such sources—about targeted foreign markets. Similarly, Yli-Renko and colleagues (2002) suggest that SMEs may expand their social capital and capitalize on external knowledge by forming alliances with larger organizations and joining networks in foreign markets. Indeed, the development of network relationships in foreign markets is often cited as an important policy to encourage SME export (Wright, Westhead, & Ucbasaran, 2007).

With respect to innovation in small firms, increased attention is given to the relational view as firms make greater use of network ties as sources of information and knowledge, particularly within an open innovation paradigm. Indeed, in their foundational work on absorptive capacity, Cohen and Levinthal (1990) argue that a firm's ability to exploit external knowledge is integral to its innovative performance. Building upon their work, Laursen and Salter (2006) elucidate that firms experience a curvilinear relationship between their efforts in external search breadth and depth and their innovative performance. Thus, though network ties are important sources of knowledge and information in the firm's innovation process, the costs associated with managing these relationships and integrating the acquired resources are subject to decreasing returns.

Beyond the importance of external knowledge and information search, the locus of innovation may be found in networks of learning rather than in individual firms (Powell, Koput, & Smith-Doerr, 1996). In industries where knowledge is distributed amongst several types of actors, competitive advantage may be found in the strength of a firm's network of interorganizational R&D relationships. In these instances, external knowledge search is not only indispensable, but the development of routines to foster and manage partnerships is also necessary. More generally, the relational view has also been applied to the generation of innovation. Firms that are members of networks with high information transmission capacity, as enabled by clustering, and with a high quantity and diversity of information, as captured by reach, benefit from greater innovation (Schilling & Phelps, 2007).

2.3 Research on Small Firm Internationalization

2.3.1 Defining Small Firm Internationalization

This thesis examines determinants of internationalization in the context of small knowledge-intensive business service (KIBS) firms. Small firms are entities with less than 100 employees; they represent 97.9% of all business in Canada (Innovation, Science and Economic Development Canada, 2019). More than half are in the provinces of Ontario and Quebec, and 12 percent are labeled under the NAICS 54 Code of Professional, scientific and technical services, the subject population under examination in this thesis. Though greater attention will be given in a later section on characteristics of KIBS firms and why they are an important context in which to examine the phenomenon under observation, suffice to say their sheer weight in the Canadian economy should not be overlooked.

The study of this phenomenon is embedded within a now well-defined literature on international entrepreneurship, found at the intersect of the entrepreneurship and international business disciplines (McDougall & Oviatt, 2000). The interest of studying small firm internationalization is in the potential they hold as future players in the international trade ecosystem, particularly small new ventures that penetrate the global marketplace not long after inception. Knight (2015, p. 5) suggests that this "phenomenon implies the emergence of a global environment in which any firm, regardless of age, experience, and tangible resources, can be an active participant in global trade and investment."

Thus, I concentrate my research on the internationalization of small firms, a firm-level phenomenon defined as the geographic expansion of economic activities beyond a country's national borders (Ruzzier et al., 2006). Internationalization is captured via events which, over time, form the basis of a firm's behavior concerning its international activities (Jones & Coviello, 2005). As firms have recurrent responses to similar situations, these patterns form a distinct internationalization path or trajectory (Kuivalainen, Saarenketo, & Puumalainen, 2012). The idea of characterizing a firm's internationalization trajectory will be further detailed following a review of the central theories in international entrepreneurship.

2.3.2 Measuring Small Firm Internationalization

While there are many measures used to capture the firm's internationalization, they differ in their aim of study. Some studies seek to examine the firm's intensity of internationalization and explore the different internationalization trajectories adopted by firms as they relate to the speed, timing, and scope of

their international activities. Others examine internationalization from a different perspective and limit their view of internationalization to characterizing the firm's involvement in international markets. This is most often done using the firm's foreign sales to total sales (FSTS) ratio as the primary indicator for internationalization. This measure is generally operationalized two ways: as a dichotomous variable to capture the firm's internationalization propensity, and as a continuous variable to capture the firm's internationalization intensity. Empirical work in this thesis will limit itself to examining internationalization as characterized by the firm's involvement in international markets using both measures of internationalization propensity and intensity.

Table 1 Internationalization Measures

Objective	Indicator	Operationalization	Select References
Characterizing a firm's involvement in international markets	Internationalization (export) propensity	Act of engaging in international activities	Harris & Li, 2008; Monreal-Pérez, Aragón-Sánchez, & Sánchez-Marín, 2012; Van Beveren & Vandenbussche, 2010; Zucchella & Siano, 2014
	Internationalization (export) intensity	Percentage of foreign sales to total sales (FSTS)	Castaño et al., 2016; Harris & Li, 2008; Kirbach & Schmiedeberg, 2008; López Rodríguez & García Rodríguez, 2005; Love, Roper, & Zhou, 2016; Monreal-Pérez et al., 2012; Pla-Barber & Alegre, 2007; Raymond, St-Pierre, Uwizeyemungu, & Le Dinh, 2014; Rodríguez & Nieto, 2012; Veglio & Zucchella, 2015; Yi, Wang, & Kafouros, 2013; Zucchella & Siano, 2014
Characterizing a firm's intensity of internationalization	Extent (1): Scale of international sales	Percentage of foreign sales to total sales (FSTS)	Dhanaraj & Beamish, 2003; Filipescu, Prashantham, Rialp, & Rialp, 2013; Sui & Baum, 2014
	Extent (2): Entry mode type	Differentiation between contract-based and equity-based entry modes	Altomonte, Aquilante, Békés, & Ottaviano, 2013; Hollenstein, 2005; Meliá, Blesa Pérez, & Roig Dobón, 2010; Vila & Kuster, 2007
	Breadth: Number of countries	Number of foreign countries in which firm has sales	Dai, Maksimov, Gilbert, & Fernhaber, 2014; Dhanaraj & Beamish, 2003; Filipescu et al., 2013; Love et al., 2016; Meliá et al., 2010
	Speed: Time lag	Time lag between the firm's inception and its first international activity	Meliá et al., 2010; Sui & Baum, 2014

2.3.3   *A Review of Theories on Small Firm Internationalization*

2.3.3.1   *Uppsala Model of Internationalization*

Basic premise. The Uppsala model first originated in the 1970s in Sweden. It builds on Cyert and March's (1963) *A behavioral theory of the firm* and Penrose's (1959) *A Theory of the growth of the firm,* and is primarily influenced by theories of cognition, behavioralism, and decision making. The model (Johanson & Vahlne, 1977, 1990) seeks to predict a firm's commitment in foreign markets. As the firm gains experiential knowledge, its behavior in international markets is affected. The model builds on the premise that a firm will gradually increase its resource commitment abroad as it gains experience and develops knowledge about the foreign market. Indeed, the greatest obstacle to internationalization is lack of knowledge. Many of the same behavioral assumptions made by Carnegie School scholars are adopted, namely that of satisficing rather than optimizing, bounded rationality, and imperfect information.

Core constructs and assumptions. The firm is the core unit of analysis of the model. Core constructs include 'state aspects,' the firm's market knowledge base and its existing market commitments, and 'change aspects,' its commitment decisions and current activities. They are mutually influenced as the firm gains and develops experiential knowledge in a market. The firm is expected to gradually increase its resources commitment in foreign markets as it develops its knowledge base by acquiring new knowledge, i.e., by learning. Decisions concerning the firm's international commitments are taken incrementally due to market uncertainty. Yet, activity in a foreign market breeds future opportunity recognition: the process of internationalization proceeds whether or not explicit strategic decisions are made in this respect, and the process self-perpetuates. Thus, the model is evolutionary and dynamic, whereby the firm learns from its previous experience before making additional resource commitments.

In their original model, internationalization is conceptualized as a process made up of four stages (i.e., domestic only, export, sale through subsidiary, then foreign production), in which the firm begins to export in psychologically close markets, only to make increasingly 'risky' resource commitments when it has gained sufficient experiential knowledge (Johanson & Vahlne, 1990). The firm then widens and deepens its commitments abroad.

Critiques and revisions. In their later articles, Johanson and Vahlne (2003, 2009) respond to important critiques to their model, namely that it is too deterministic (Petersen, Pedersen, & Sharma, 2002), that there are other means by which the firm may acquire knowledge beyond experiential learning (Forsgren, 2002), and that it does not account for de-internationalization and other phenomena which fork from their linear internationalization process (Bell, McNaughton, Young, & Crick, 2003). Most

importantly, their model cannot explain the emergence of international new ventures (McDougall & Oviatt, 2000; Oviatt & McDougall, 1994).

The revisions to their Uppsala model redefine the firm as an organization embedded in a network of business relationships. By doing so, less emphasis is put on the stages or the location of international resource commitments. Rather, the model seeks to explain how international opportunities are identified (exogenous) or created (endogenous) and exploited. It becomes less about where the firm is internationalizing, and more about how and what the firm knows through its network relationships (Johanson & Vahlne, 2009). Thus, the model is further developed by considering the importance of networks in the internationalization of firms, defining the business network as both an enabling and constraining factor to the internationalization process.

The model continues to build on 'state' and 'change' variables, though these have been updated to reflect a new conceptualization of the firm and the environment in which it is embedded. 'State aspects' include the firm's knowledge opportunities and its network position, while 'change aspects' include its relationship commitment decisions and its ability for learning, creating, and trust-building. Much like the original model, the variables mutually affect one another. The revised model, however, depicts a dynamic and cumulative process of learning, trust, and commitment building. The concept of opportunities—originating from the entrepreneurship literature—is advanced as a subset of the firm's knowledge base. It is recognized as the most important element of knowledge which drives the internationalization process. Overall, Johanson and Vahlne (2009, p. 1424) explain that "the speed, intensity, and efficiency of the processes of learning, creating knowledge, and building trust depend on the existing body of knowledge, trust, and commitment, and particularly on the extent to which the partners find given opportunities appealing." While the revised model continues to question where an internationalizing firm will go, it becomes less deterministic in its narrative. The answer lies in where the firm and its partners see opportunities to seize. Thus, the model overcomes limits attributed to its lack of explanatory power of international new ventures and born global firms. It also incorporates many of the central tenets of social network theory which influenced a tangential theoretical stream to the Uppsala model, the social network perspective to internationalization (Coviello, 2006; Johanson & Mattsson, 1987, 1994), which sought to explain international activity in small firms using social and business networks.

2.3.3.2   International New Venture Perspective

Basic premise. Oviatt and McDougall (1994) first proposed the concept of international new ventures (INVs) in the mid-1990s as an empirical counterexample to the theory of multinational enterprises (MNEs). Their theoretical arguments first responded directly to the Uppsala model of gradual growth, which they referred to as 'the stage theory to MNE evolution' (Oviatt & McDougall, 2005b). They suggest that a newly created firm—with limited resources at its disposal—could overcome the barriers associated with expansion into foreign markets, and successfully compete abroad. Their arguments rely on transaction cost analysis, market imperfections, and the internalization of transactions to explain a form of MNE which is not large in size, as traditional theory would have it. Thus, their initial conceptualization builds on transaction cost theory as well as tenets of entrepreneurship theory and the resource-based view, although most recent empirical applications and theoretical extensions of the INV perspective have heavily built upon the latter two theories. Of importance are theoretical questions related to how a firm may gain influence of critical resources—often intangible resources such as knowledge— without owning them to develop and sustain its competitive advantage (Oviatt & McDougall, 2005b).

Core constructs and assumptions. The firm is the core unit of analysis of the model. Core constructs include the entrepreneur (or entrepreneurial team), the firm's chosen governance modes, its alliance partners, the resources at its disposal, and the location advantages captured in foreign markets. The central premise of their initial argument is that four sufficient and necessary conditions explain the existence of INVs (Oviatt & McDougall, 1994, 2005b). First, INVs internalize some of their transactions. This first element builds upon the traditional theory of MNEs. Second, they use novel or alternative governance modes to overcome their resource deficiencies. This is a distinguishing feature of new ventures, as mature organizations have often internalized a greater portion of the resources necessary for their survival. Third, they internationalize where they can capitalize on foreign location advantages. INVs may find locational advantages related to the mobility of their resources, most of all knowledge, to compete in foreign markets. It is the combination of knowledge with less mobile resources located in foreign markets that allow INVs to overcome advantages held by indigenous firms. Fourth, the firm controls unique resources which it can exploit in international markets to gain competitive advantage. Again, knowledge is most often the firm's most valuable resource. However, the mobility of such a valuable resource may threaten its commercial value. Thus, the use of appropriation mechanisms may prevent or slow the development of imitations or substitutes, and the use of alternative networked governance modes decreases the probability of network partners appropriating the new venture's knowledge. Since its introduction in the mid 1990s, theoretical and empirical work on INVs has mainly

centered on explaining their emergence, how they overcome liabilities associated with size (liability of smallness), age (liability of newness), and origin (liability of foreignness), and how they develop and sustain their competitive advantage in foreign markets (Jones et al., 2011; Zahra, 2005).

Critiques. The concept of INVs has received little critique over time, likely because the theoretical framework which guides this conversation is descriptive rather than prescriptive. The one area where there has been some definitional confusion and significant methodological limits is in identifying INVs and differentiating them from firms adopting different international trajectories. This is most apparent when examining studies on born-global firms. Some have argued that the concept of INVs and born-globals lack discriminate validity and proper definitional parameters, as they are often used interchangeably, and are cause for confusion in the literature. Though both INVs and born-global firms internationalize rapidly and quickly following inception—most often delimited as three years following the firm's founding—they differ based on the geographic scope of the firm's international activities. Crick (2009) suggests that the term "born-global" denotes a presence in the world's Triad region and a commitment spread across multiple regions. Conversely, INVs internationalize quickly to seize opportunities in foreign markets, yet do not necessarily reach a global spread in their activities. Thus, all born-globals are INVs, but not all INVs are born-globals. That said, it has become apparent that new ventures—whether right from inception or shortly thereafter—can be competitive in foreign markets.

2.3.3.3   *Comparing and Contrasting Theories in IE*

Initially, the two perspectives presented above departed from distinct theoretical footholds that hold substantial differences in their underlying assumptions. These are quickly noted by looking at the main influences of each perspective, as some important differences are observed. First, the reasoning underlying why firms internationalize differs. Where the Uppsala model posits that a resource commitment follows gains of experiential knowledge, the INV perspective suggests new ventures go abroad to reduce transaction costs and benefit from location advantages. Second, they differ in the process by which firms internationalize; sequentially and incrementally in the Uppsala model, in comparison to rapidly and quickly following inception for INVs. Third, they further differ in the assumed prolonged outcome of internationalization. Following the Uppsala model, over time a firm incrementally grows into a traditional MNE. Conversely, the INV perspective was developed as a counterargument to the evolution of MNEs over time, as suggested by the Uppsala model.

These differences are decreasing as the field incorporates tenets from social network theory to explain how firms overcome resource deficiencies. By acknowledging that the firm is embedded in a

network of firms with whom it fosters network relationships, authors of both camps are adjusting their assumptions and are instead examining the process of internationalization. The concepts of externally sourced knowledge, of international opportunity recognition and exploitation, and of innovation and change are increasingly garnering attention and theoretical importance (Jones & Coviello, 2005; Jones et al., 2011; Oviatt & McDougall, 2005a).

At the heart of the internationalization process are the concepts of time—against which the process of internationalization can be measured—and behavior—which is manifested through the actions taken by the firm over time (Jones & Coviello, 2005). Building on these two concepts, Jones and Coviello (2005) propose a holistic model that captures the internationalization of small, entrepreneurial firms. This model considers the following constructs: (1) international behavior, which is influenced by (2) the entrepreneur and (3) the firm, (4) and moderated by the external environment, which in turn influences (5) firm performance, characterized as changes over (6) time. The third construct, firm behavior, is further decomposed into the innovations and changes brought upon the firm, which are outcomes of the decisions and actions the firm has taken over time, in an iterative and fluid process which allows the firm to learn from its actions and experiences. As we know from the innovation literature, innovation rarely occurs within the firm without input from external information sources (Laursen & Salter, 2006; Lichtenthaler, 2011). The firm's network structure and content affect both its innovative performance (Laursen & Salter, 2006; Schilling & Phelps, 2007) as well as its international performance (Lin, Wu, Chang, Wang, & Lee, 2012).

Though the field of IE has yet to converge around one theory of small firm internationalization, early conceptualizations of internationalization have undergone substantial advancements moving closer towards a contingent perspective of small firm internationalization (Johanson & Vahlne, 2003; Oviatt & McDougall, 2005a).

2.3.4 *Assumptions about Innovation in IE Theories*

Innovation continues to hold a prominent place in the IE literature, as empirical studies observe that innovation is a determinant promoting the internationalization of SMEs (Cassiman & Golovko, 2011; Castaño et al., 2016; Shearmur et al., 2015; Veglio & Zucchella, 2015). Indeed, central theories in IE presented in the previous sections build upon the concept of innovation, often explicitly as a source of competitive advantage, and sometimes implicitly as a change agent for organizational adaptation. Thus, I review the role of innovation and the perspective adopted to measure and study this construct for both IE theories.

2.3.4.1   Role of Innovation in the Uppsala Model

From the Uppsala model perspective, a firm's commitment to foreign markets deepens as it gains knowledge and learns about international operations (Johanson & Vahlne, 2009; Schweizer, Vahlne, & Johanson, 2010). Commitment is furthered as the firm improves, modifies, eliminates or adds to its existing operations and activities. It is embodied in the innovations it pursues, for example, incremental product or service innovations to achieve "unwavering dedication to meeting the needs of customers" (Johanson & Vahlne, 2009, p. 1412).

For the firm to commit resources in foreign markets it develops reciprocal network relationships with various partners. This is viewed as a requirement for its successful internationalization (Johanson & Vahlne, 1990, 2009). Network connections forged through exchanges between partners are instrumental in new knowledge creation and acquisition. They also influence the resource commitments made by the firm. External information sources are thus a determining factor in the changes the firm makes concerning its resource commitments in foreign markets.

Resource commitments are primarily driven by opportunity recognition: the interactive process that brings a firm to gradually and sequentially acquire knowledge and learn about an opportunity, and to make important organizational adaptations to exploit the opportunity (Johanson & Vahlne, 2009; Schweizer et al., 2010). Opportunity exploitation often necessitates making changes to the organization's processes and activities to further commit resources in the international markets in which it becomes present. By adopting a broader understanding of innovation to encompass non-technological innovations, as I argue in the next section of the literature review, we may come to characterize these increased commitments in foreign markets as organizational innovations. By identifying them as such, we may examine how firms change and adapt to foreign markets using a broader innovation lens. We may further deepen our conceptualization of 'change' variables in the Uppsala model and addresses questions concerning how organizational change and adaptation are enabled through innovation. Thus, though the theory does not explicitly state it builds upon the concept of innovation, it is nonetheless central to the generative mechanisms that drive the cyclical nature of the model, as captured by the model's 'change' variables.

2.3.4.2   Role of Innovation in the INV Perspective

From an INV perspective, Oviatt and McDougall (2005b) call attention to the role of technological capabilities in the creation of unique and superior products that allow a foreign firm to overcome advantages held by indigenous firms. Their conceptual model of forces influencing the speed of

internalization begin with the discovery of an opportunity, implicitly linked to a service or product innovation (Oviatt & McDougall, 2005a). They also underscore the importance of continual incremental innovations to sustain a firm's competitive advantage while overcoming limitations in new ventures associated with resource scarcity (Oviatt & McDougall, 1995). Their early studies on INVs further identify their use of strategies which place greater importance on product, process, and marketing innovations than in domestic new ventures (McDougall, Oviatt, & Shrader, 2003). Likewise, Jones and Coviello (2005) model the process of entrepreneurial internationalization over time. Their basic conceptual model rests on the premise that environmental change triggers innovation and leads to the outcome of an entrepreneurial event which may be international in nature. Knight and Cavusgil (2004), too, assert that young firms may overcome deficiencies by leveraging unique capabilities, including innovation and differentiated offerings. They put forward the idea that firms with an innovation culture and a predisposition to pursue international markets tend to internationalize earlier than others.

Another line of studies has looked at how INVs adapt to entry into foreign markets (Autio et al., 2000; Bunz, Casulli, Jones, & Bausch, 2017; Hallbäck & Gabrielsson, 2013; Hollender, Zapkau, & Schwens, 2017). The term 'adaptation' is often used to reference processes or activities that are changed or put in place to allow the firm to respond to new external environments. The description of theses adaptive mechanisms inches closely towards the broader definition of innovation that will be presented in the next section. It is one that encompasses the development and establishment of new management systems (Crossan & Apaydin, 2010). Though these studies are not informed by the innovation literature, they support the argument that innovation—understood beyond a strictly technological sense—is an important driver that enables the rapid and early internationalization of small firms.

Although there exists theoretical grounding explaining why innovation is an important driver for internationalization in small firms, understanding of which innovation-related activities or combinations thereof drive this phenomenon is limited. Instead, innovation is conceptualized as an element of change which triggers, enables or sustains internationalization (O'Cass & Weerawardena, 2009; Weerawardena, Mort, Liesch, & Knight, 2007). On this topic, and of particular concern for service firms, Miozzo and Miles (2002, p. 16) note: "The main approaches to international production in services fail to integrate notions developed from the economics of innovation. New technology is seen as an enabler, even a driver of internationalization, but the analysis is left there." As will be further argued in the next sections, by broadening our definition of innovation to encompass multiple types of innovations results, and by also considering the influence of innovation activities that precede an innovation outcome, we may further

disentangle how innovation acts as a change or adaptive mechanism in theories of small firm internationalization.

2.4   Research in Innovation as a Determinant to Internationalization

2.4.1   Defining Innovation

Innovation is defined in this study following OECD (2005) guidelines, which states innovation is the implementation of a new or significantly improved product (good or service) or process, a new marketing method, or a new organizational method in business practices, workplace organizations, or external relations. The Oslo Manual further categorizes innovations as technological (e.g., product/service, process) and non-technological (e.g., managerial, marketing and commercialization). Non-technological innovations comprise all forms of innovation which are not related to the introduction of a new technology, the significant change to the firm's goods and services, or the utilization of new processes (OECD, 2005). While this definition captures innovation as an outcome, I also assume that innovation occurs under different modalities, some of which are determined by recourse to a range of activities which may reside in the firm or extend beyond its boundaries. The perspective taken on innovation is deliberately broad and expands the role of innovation beyond the traditional focus of examining innovation as the development of new products. It embraces dimensions of both technological and non-technological innovation activity and accounts for the potential of both radical and incremental change.

The OECD definition builds on the foundational work of Schumpeter (1934, p. 66), who puts forward that innovation, or development as he initially refers to it, is defined as "the carrying out of new combinations" which may take one of five cases: "(1) The introduction of a new good—that is one with which consumers are not yet familiar—or of a new quality of good. (2) The introduction of a new method of production, that is one not yet tested by experience in the branch of manufacture concerned, which need by no means be founded upon a discovery scientifically new, and can also exist in a new way of handling a commodity commercially. (4) The conquest of a new source of supply of raw materials or half-manufactured goods, again irrespective of whether this source already exists or whether it has first to be created. (5) The carrying out of the new organisation of any industry, like the creation of a monopoly position (for example through trustification) or the breaking up of a monopoly position."

In his writings, Schumpeter (1934) specified innovation should be disassociated from invention. On this topic, Fagerberg (2009, p. 21) explains: "The reason why Schumpeter stressed this difference is that he saw innovation as a specific social activity (function carried out with the economic sphere and with a commercial purpose, while inventions in principle can be carried out everywhere and without any intent of commercialisation." It is this view of innovation that is adopted which encompasses many areas in the firm's value chain.

Examination of the innovation process is one that is underdeveloped in the literature (Crossan & Apaydin, 2010). It consists of examining the drivers and sources of innovation; it asks how an innovation comes to take place in the firm. Actors—be it at the individual, group, or firm level—are driven by internal drivers such as the firm's available knowledge and resource, by external drivers like a perceived market opportunity, or by both (Cassiman & Veugelers, 2006). An innovation process precedes an innovation outcome (Crossan & Apaydin, 2010). Indeed, Lawson and Samson (2001) argue that innovation capability and innovation occur at different stages during the innovation process, and the former is required for the latter to occur. Where innovation capability encapsulates the skills and abilities that allow for the recombination of resources, innovation captures the results from the firm transforming knowledge and ideas into new products, processes and systems.

It is a process that requires from the firm to learn. The processes that constitute organizational learning are dynamic, cross all levels of the organization, and have a cost in terms of organizational resources. Thus, the firm must make decisions with regard to whether it exploits existing knowledge or whether it searches for new solutions. Originating from their *Behavioral Theory of the Firm*, Cyert and March (1963) proposed that a firm would search for new knowledge when a problem area is recognized or when a solution to a problem does not satisfy expectations of goals. This process is triggered by observing and interpreting both the external environment and the internal condition of the firm. As such the firm is constantly struggling to strike a balance between exploration and exploitation.

This process is central in Crossan et al.'s (1999) 4I framework of organizational learning. For new knowledge to be absorbed by the firm, it must be absorbed at the individual level and shared among other members of the group or organization and change the organizational code. For knowledge to be exploited, it must first become embedded in the organization's systems, structure and standard operating procedures which often dictate the decisions taken by individuals.

Following this logic, the feed forward learning process assumes a shift from learning at the individual level to learning among multiple individuals or groups. In this process, individually constructed cognitive maps are communicated to others using a common language to create shared

understanding among group members. In many ways, this process suggests taking tacit knowledge and making it explicit. Alternatively, the feedback learning process assumes individuals use explicit knowledge or tacit knowledge embedded in the standard operating procedures to guide their decisions and actions, thus structuring the behavioral outcomes of the organization. The authors recognize, however, that institutionalizing can easily drive out intuition, as it becomes more and more difficult for individuals to act upon intuitive insight due to physical and cognitive barriers created by the collective mindset of organization.

The innovation process which requires of firm to form "new combinations" of new or existing knowledge, resources, equipment, and other productive factors fundamentally builds upon the firm's ability to learn (Crossan & Apaydin, 2010; Dutta & Crossan, 2005), and occurs under conditions of uncertainty (Alexy, George, & Salter, 2013; Bouncken & Kraus, 2013). The results from it are unknown; there is little certainty with respect to whether the innovation outcome will be successful, and to what extent this success will be across time and geographic space. Moreover, as the innovation process is increasingly undertaken with partners outside the firm's boundaries, and as it largely builds upon knowledge assets which are not all located within the firm, the firm incurs additional risks and uncertainty related to the loss or decrease in value of its resources. In this perspective, we have eclipsed the understanding that innovation occurs solely within the firm, with little input from beyond the firm's boundaries.

The innovation process may then be conceptualized as comprised of three stages, interlinked with one another, through which knowledge is first sourced or generated, then transformed into a form of offering, and finally commercialized and brought to market (Love, Roper, & Bryson, 2011). Importantly, here, is the role played by knowledge as it forges behavioral paths adopted by the firm in bringing to market new products, services, ways of doing business, new management practices, and new marketing methods.

2.4.2   *Empirical Evidence in Extant Literature*

Extant literature is rich with empirical assessments of the link between innovation and internationalization. I reviewed the literature starting from 1985 onwards to assess chronologically the work carried out on this topic. Studies included in this literature review pertain exclusively to the relationship between innovation as the independent construct and internationalization as the dependent construct. Though the relationship between internationalization and innovation (learning by export) has received some attention, this relationship is beyond the scope of this thesis. I did, however, include

studies that explored the recursive relationship between innovation and internationalization. In these cases, I only report on the results where innovation is the independent variable.

2.4.2.1 Extant Literature Search Procedure

I began my search using the keywords "innovation" and "innovative" for the independent variable, and "internationalization," "internationalisation," and "export" for the dependent variable. From the initial results, I read through the abstracts and shortlisted articles that examined a similar relationship to the one under study in this thesis. I chose Hirsch and Bijaoui's (1985) article "R&D Intensity and Export Performance: A Micro View" published in the *Journal of World Economics* as the starting point, given that it is one of the earliest studies that examines the link between the two variables under study at the firm level. Moreover, these authors were among the first to question whether innovative firms export a higher percentage of their output than non-innovative, dubbed conservative, firms.

More than 25% of the studies reviewed are published in either *International Business Review* (8) or *Research Policy* (6). More than a third of studies are published in management journals, while a quarter in economics journals and another quarter in international business ones. The remainder appears in marketing publication outlets. All studies are published in peer-reviewed journals; no book chapters or working papers were considered. Some interesting observations follow on the significance of the relationship, as well as comments concerning findings specific to SMEs and service firms.

Table 2 Distribution of Journal Articles by Field of Study and Decade

Year	Economics	IB	Management	Marketing	Total Count	Total (%)
1980s	1	-	1	-	2	4
1990s	1	-	2	-	3	5
2000s	6	3	6	3	18	33
2010s	7	11	11	3	32	58
Total Count	15	14	20	6	55	100
Total (%)	27	25	36	11	100	-

Table 3 Peer-Reviewed Scientific Journals by Field of Study

Economics	International Business	Management	Marketing
Economic Policy	International Business Review	International Journal of Industrial Organization	European Journal of Marketing
Economics of Innovation and New Technology	Journal of International Business Studies	International Journal of Innovation Management	International Marketing Review
Empirical Economics	Journal of International Entrepreneurship	International Small Business Journal	Journal of International Marketing
Journal of Economic Policy Reform	Journal of World Business	International Studies of Management & Organization	
Journal of World Economics		Journal of Business Research	
Oxford Economic Papers		Journal of Business Venturing	
Review of World Economics		Journal of Management and Governance	
Small Business Economics		Journal of Small Business and Enterprise Development	
The World Economy		Journal of Small Business Management	
		Managerial and Decision Economics	
		Research Policy	
		Service Industries Journal	
		Technovation	

Table 4 Summary of Extant Literature

Author (Year)	Research Question	Theories	Sample (Method)	Findings
Castaño et al. (2016)	Are entrepreneurs who innovate more likely to internationalize?	Uppsala stage model INVS	GEM database from 17 countries in Europe, South America, Africa, and North America. (PLS-SEM)	Service sector entrepreneurs who innovate are also those that internationalize their economic activity the most, and present higher business growth. Indirect positive effects exist between the use of new technology and the internationalization of entrepreneurs in the services sector.
Langseth, O'Dwyer, & Arpa (2016)	What is the significance of the enabling, motivating, mediating and moderating forces on the speed of internationalization in SMEs?	INVs Uppsala stage model	8 small internationalized firms, both INV and traditional international. Purposive sampling in Norway and Ireland. In-depth interviews and secondary data collected. (Case study)	Technology is a strong or moderately important enabling force in all case studies. The two moderating forces (foreign market knowledge and network tie strength) can be leveraged through product innovation.
Lewandowska, Szymura-Tyc, & Gołębiowski (2016)	Are there complementarities between various types of innovation—product, process, and marketing innovations—in the export context? What is the moderating effect of innovation cooperation on the relationship between the combination of various innovation types and export?	Schumpeterian view of innovation RBV Network perspective of internationalization	6855 medium and large firms. Data collected in 2011 from the Community of Innovation Survey (CIS) Poland 2008-2010. (Automatic Interaction Detection regression; test for moderation)	There are complementarities between certain types of innovations and export of new products. The strongest relationship with export exists in firms having introduced product-process-marketing innovations, and product-process innovations. Innovation cooperation moderates the relationship between innovation combinations and export only in firms having introduced product-process innovations, and product-process-marketing innovations.
Oura, Zilber, & Lopes (2016)	What is the impact of innovation capacity and international experience on the export performance of SMEs located in an emerging country?	RBV, DC Uppsala stage model Born globals	112 Brazilian industrial SMEs. Data collected in 2013 using a survey. (PLS-SEM)	Both innovation capacity and international experience have a significant positive impact on export performance. The impact of international experience is greater than that of innovation capacity.

Author (Year)	Research Question	Theories	Sample (Method)	Findings
Lejpras (2015)	How do R&D intensity and the outputs of innovation activities affect SMEs' internationalization?	Stage theory Internalization theory Network perspective of internationalization	3075 independent manufacturing and services firms of all size from East Germany. Data collected in 2004 by the German Institute for Economic Research. (Probit regression)	Both the introduction of new novel products and patent applications significantly enhance export activity in manufacturing SMEs, while issuing licenses and R&D intensity do not have an impact.
Veglio and Zucchella (2015)	What is the role of innovation in the internationalization process of small firms in traditional industries?	Innovation systems Open innovation INVs Network perspective of internationalization	Random sample of 162 SMEs in traditional manufacturing industries in Italy. Primary data collected by survey in 2012. (Multiple regression)	Innovation is a driver in the internationalization of SMEs in traditional industries. Innovation in product design is the only significant variable among the different innovation outputs examined. Neither usual sources of innovation such as formal R&D and research partnership, nor external and informal sources of innovation such as customers and districts are relevant explanatory variables.
Raymond et al. (2014)	To what extent do the strategic capabilities of SMEs influence their export performance? Do the relationships between these strategic capabilities and export performance vary by sector?	RBV Network theory INVs Stage theory	Total sample of 347 (manufacturing and industrial service) SMEs from Quebec and France. Primary data collected by survey. (PLS-SEM)	Product/service development capabilities positively influence export, with the condition of having sufficient human and financial resources to support R&D. SMEs must then enhance their new product/service development capacity by developing their human resources management capability. Manufacturing and services differ in their allocation of human and financial resources (more in services), and the importance of competitive intelligence activities (less in services).
Zucchella and Siano (2014)	What is the relationship between innovation and internationalization (export performance) in traditional SMEs? Which sources of innovation drive export performance?	RBV OLI paradigm	Primary data collected in 2010 through face-to-face interviews and using a survey. Total sample of 162 SMEs from the textile and clothing industry in Campania, Italy. (Ordinal logistic regression)	Evidence supports a relationship between innovation and internationalization. Innovation process relies on external suppliers of knowledge and technology. Little importance is attributed to internal R&D, license acquisition, or R&D partnership with universities, research centers, and science parks.

Author (Year)	Research Question	Theories	Sample (Method)	Findings
Haneda and Ito (2014)	What are differences in innovation activities between firms with various types of international activities and firm without any such activity?	Endogenous growth theory	Japenese JNIS survey equivalent to CIS survey. Data collected in 2009. Total sample of 1587 manufacturing firms. (Tobit and probit regressions)	Internationally engaged firms use more innovation inputs and generate more innovation outputs. They differ from domestic firms in their market strategies, information sources, and innovation partners, which also affects their innovation outputs. Firms with a greater extent of international engagement are more innovative.
Suh and Kim (2014)	What are the success factors of internationally leading SMEs?	Stage theory Social network theory RBV Eclectic paradigm	88 South Korean SMEs. Primary data collected in 2009 by survey using a purposive sampling strategy. (Factor analysis and logistic regression)	R&D has a positive effect in internationally leading SMEs on their ability to enhance their technological innovation competency. They are likely to focus on R&D to establish their competitive domain in international markets. Long-term planning and R&D are key factors for international SMEs to devise post-catch up strategies and catch up to leading firms.
Sui and Baum (2014)	What is the effect of different internationalization strategies on the export market survival of SMEs? What other resources determine INV viability in international markets?	INVs Stage theory Behavioral theory of the firm	Statistics Canada database of all manufacturing SMEs with foreign sales between 1997-2005. Total sample of 1959 firms. (Cox proportional hazard model and multinomial logit model)	Innovation is both a driver and a success factor for the survival of SMEs in international environments. Product innovations reduce the hazard of exit most in born-global firms, followed by born-regionals then gradual internationalizers. Innovations are most conducive to the export market survival of born-global firms. Born-region firms profit more from innovation than gradual internationalizers.
Dai et al. (2014)	How does each dimension of the entrepreneurial orientation exert influence on a firm's international scope?	INV Entrepreneurial orientation	Use of the National Federation of Independent Business poll on international trade. Sample of 500 American SMEs from 10 manufacturing sectors. (PCA and Poisson regression)	Specifically concerning the innovativeness dimension in the entrepreneurial orientation, findings suggest a non-linear relationship between international scope and innovativeness. SMEs seeking to internationalize into many foreign markets should either adopt a low innovation strategy to minimize costs or strive to become leaders and invest in industry-leading innovations.

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Author (Year)	Research Question	Theories	Sample (Method)	Findings
Altomonte et al. (2013)	What are the patterns of correlations between internationalization, innovation and productivity across seven European countries? In which direction goes the causality between innovation and internationalization?	None explicitly stated	EFIGE dataset of manufacturing firms with at least ten employees across seven European countries (Austria, France, Germany, Hungary, Italy, Spain, UK) for 2008. (Multinomial logit model)	Firms that have a high innovation intensity tend to have a high internationalization intensity. Evidence that there is a positive causal correlation from innovation to internationalization.
Becker and Egger (2013)	What is the effect of new product versus process innovations on export propensity at the firm level?	Economic theory on innovation	Survey data from the IFO; two surveys: Innovation survey and Business survey. Total samples of 3,401 firms from Germany. (Bivariate probit model and Multinomial logit model)	Product innovation relative to process innovation is most important for the decision to export. Firms that perform both types, however, have a higher probability to export than firms that do not innovate. When performed alone, product innovation is a greater determinant than process innovation in the export behavior of a firm. Whereas product innovation increases the likelihood of internationalization, process innovations marginally increase a firm's export-to-sales ratio.
D'Angelo et al. (2013)	What are the determinants of two distinct pathways to internationalization (regional vs. global) in SMEs?	RBV	Data from the 9th wave of the Survey on Manufacturing Firms conducted in Italy by Capitalia. Total sample of 2,657 Italian manufacturing SMEs. (Tobit regression)	Product innovation has a positive effect on regional and global exporting. The marginal effects on both internationalization strategies are positive, consistent, and similar for both. The evidence thus supports a positive relationship between product innovation and exporting in regional and global markets.
Filipescu et al. (2013)	Is there a double-loop causal effect on innovation-export in manufacturing firms?	RBV Organizational learning	Data from the Spanish Survey on Business Strategy. Panel data from Spanish 696 manufacturing firms from 1994-2005. (Tobit regression)	R&D intensity and process innovations are positively and significantly associated with export breadth and depth. The number of product innovations in earlier time periods, however, does not have any significant effect. There is a causal effect between technological resources and innovation and a firm's export breadth and depth. There also exists a reciprocal relationship.

Author (Year)	Research Question	Theories	Sample (Method)	Findings
Wang and Lestari (2013)	What is the effect of business network, new product development, and marketing management on market entry success of a high-tech firm in an emerging market?	RBV	Primary data collected by survey. Sample of 56 biopharmaceutical MNCs entering China from 2009-2010. (SEM)	New product development indirectly affects market entry success, but directly supports marketing management which can, in turn, influence entry success. Though new product development competence enables the firm to become competitive in a market, it alone cannot sustain the advantage over time.
Yi et al. (2013)	Is export performance contingent on firm- and location-specific institutional idiosyncrasies?	RBV Institutional theory	Data from the Annual Census of Chinese Industrial Firms. Firm-level panel dataset of Chinese manufacturing from 2005-2007. Total sample of 359,874 manufacturing firms covering 30 sectors throughout China. (Hierarchical regression)	Innovative capabilities are positively associated with export performance. This relationship is positively moderated by foreign ownership, business group affiliation, and degree of marketization of the region where the firm operates. Innovative capabilities and export performance do not demonstrate a uniform relationship but are rather contingent upon the institutional setting in which the firm is embedded.
D'Angelo (2012)	What is the influence of innovation on the export intensity of Italian high technology small and medium firms?	RBV Open innovation Technology-gap theory Life cycle approach	Data from the 2003 Survey on Manufacturing Firms conducted in Italy by Capitalia. Total sample of 2,749 Italian high-tech manufacturing SMEs. (Tobit regression)	Product innovations as well as the turnover that comes from innovation activities positively and significantly affect the export intensity of a firm. While R&D expenditures do not affect the export intensity of high-tech SMEs (HTSMEs), the relative number of R&D employees does. The use of universities as external knowledge partners also has a positive influence.
Kaleka (2012)	What is the relative impact of experiential, scale and financial resources as well as informational, customer relationship, and product development capabilities on export performance?	RBV, DC	Primary data collected by survey. Total sample of 268 UK-based exporting manufacturing SMEs identified using Dun & Bradstreet directory. (Linear regression)	Product development capabilities have no effect on the export venture performance dimensions examined. Product development capabilities only have a positive influence on profitability when coupled with superior informational capabilities. Thus, it plays a limited role as a direct determinant to export performance.

Author (Year)	Research Question	Theories	Sample (Method)	Findings
Monreal-Pérez et al. (2012)	Does innovation lead the firm to export more products, or does a firm's export propensity induce it to innovate?	RBV	Longitudinal data from the Spanish Business Strategy Survey from 2001-2008. Unbalanced panel data of approximately 1,767 Spanish firms in manufacturing. (Probit regression)	Exporters are more productive and develop more innovations than non-exporters. Innovation increases the likelihood that a firm becomes an exporter. This relationship is greater in firms with product innovation than process innovation. When controlling for endogeneity, innovation continues to improve the firm's export propensity.
Rodríguez and Nieto (2012)	Does innovation mediate the relation between collaboration and internationalization strategies in KIBS?	Open innovation RBV Network perspective on internationalization	Data from the Spanish Technological Innovation Panel (TIP). Unbalanced panel data of approximately 1,800 Spanish KIBS from 2003-2005. (Tobit and probit regressions, and test for mediation)	There is a positive link between innovation and export intensity. Innovation mediates the link between collaboration and export intensity. Thus, collaboration also makes a positive contribution to the internationalization of KIBS via service innovation. Results also show that new firms are more likely to innovation, though they encounter greater difficulties when internationalizing due to their lack of experience.
Sahaym et al. (2012)	How does the combination of managerial discretion, capacity to offer innovative products, and uncertainty motivate export-driven internationalization?	Real options theory Managerial discretion view / TMT	Data from the U.S. Census Bureau, U.S. Bureau of Economic Analysis, Carnegie-Mellon Survey (CMS) of industrial R&D, Schonfeld and Associates, and Standard and Poor's Compustat. Total sample of 203 US manufacturing industries. (Hierarchical regression)	In instances of high levels of innovation, there is a positive relationship between managerial discretion and industry exports. Managers are then able to leverage innovations for product recombinations which foster internationalization. This relationship is further enhanced under conditions of high technological uncertainty.
Cassiman and Golovko (2011)	What are the drivers of the exporting phase in the internationalization process of firms? Are there direct and indirect effects from product innovation?	Product life cycle theory	Data from the Survey of Spanish manufacturing firms from 1990-1998. Unbalanced panel data of 8,400 firm-year observations from 20 distinct industries. (Panel regression)	Both product innovation and total factor productivity have a positive effect on the decision to export. There is a significant positive association between productivity and export in non-innovators. The effect of productivity in innovators is positive, but insignificant. Thus, product innovation has a moderating effect on the link between productivity and export.

Author (Year)	Research Question	Theories	Sample (Method)	Findings
Higón and Driffield (2011)	What is the link between innovation and exporting in UK SMEs?	Product life cycle theory Technology gap theory of trade	2004 UK Annual Small Business Survey. Total sample of 7,505 firms, of which 3,774 answered questions related to innovation. (Probit regression)	Product innovation is one of the fundamental determinants to exporting in UK SMEs. Evidence supports that product innovation is a strong predictor of export. Process innovation is also strongly related to export. Though once we control for product innovation, the effect of process innovation is insignificant.
Hortinha et al. (2011)	How do customer and technology orientations relate to innovation capabilities and contribute to exporters' performance?	Organizational learning theory	Data collected in 2009 via online survey. Random sample of 193 Portuguese manufacturing exporters in technological industries. (PLS-SEM)	There is a positive and significant relationship between both exploratory and exploitative innovation and perceived export performance. Strategic orientation does not directly lead to better performance abroad. Rather, it depends on how the firm learns and how it develops innovation capabilities based on characteristics of its knowledge base.
Cassiman et al. (2010)	What is the effect of innovation on the export-productivity association?	Product life cycle theory	Spanish manufacturing firms; ESEE survey. Panel data of SMEs from 1990-1998 from 20 industries. Approximately 9,300 firm-year observations. (Kolmogorov-Smirnov test)	Product innovation affects the decision to start exporting. Product innovation also decreases the probability that exporters will regress into non-exporters.
Damijan et al. (2010)	What is the relationship between innovation activity and decision to export?	Firm dynamics International trade theory Endogenous growth theory Product life cycle theory	Slovenian microdata combining accounting, CIS innovation and industrial survey data, as well as data on foreign trade flows, for the period 1996–2002. Sample of medium and large manufacturing and non-manufacturing firms. (Propensity score matching)	There is no empirical support that product or process innovation affect the likelihood of becoming an exporter. There is, however, evidence that export increases the probability of becoming a process (rather than product) innovator. Export also leads to productivity improvements.

Author (Year)	Research Question	Theories	Sample (Method)	Findings
Meliá et al. (2010)	How can innovation help SMEs enter foreign markets?	INV RBV / KBV Behavioral theory of the firm	Primary data collected by survey in 2005. Total sample of 105 service SMEs from Spain identified using Dun & Bradstreet database. (SEM)	A focus on innovation capabilities allows a firm to quickly enter new markets as they have developed the necessary capabilities and processes to transform their operations in response to the demands of new markets. An innovation orientation allows a firm to benefit from the advantages associated with early and rapid internationalization.
Van Beveren and Vandenbussche (2010)	What is the effect of firm-level innovation activities on firms' propensity to start exporting for firms in a small open economy?	Product life cycle theory	BELSPO Belgian database for 2000 and 2004. Sample of 600 firms in services and manufacturing industries. (Probit regression)	Controlling for endogeneity of innovation activities, the study finds no empirical evidence that product and/or process innovations lead to a greater likelihood of entering the export market. Rather, there is a self-selection bias, as only firms with a sufficiently high probability to start export engage in product and process innovation prior to their foreign market entry.
Caldera (2010)	What is the role of innovation for the firm's participation in export markets?	None explicitly stated	Data from the ESEE Survey. Representative panel of approximately 1,890 Spanish manufacturing firms over the period 1991-2002. (Probit regression and 2SLS estimation)	Previous innovation by a firm enhances its probability of exporting. This finding is robust to various alternative specifications and measures of innovation. The likelihood of exporting is greater in firms that introduce product innovations than process innovations. Product-upgrading innovations are more beneficial than cost-reducing innovations in the decision to export.
Harris and Li (2009)	What determines who exports and how much is exported, and which factors are most important in driving such exporting activities?	Product life cycle theory Absorptive capacity	Data from the Community Innovation Survey 2001 (CIS3) and the Annual Respondents Database (ARD). Total sample of 7,709 UK firms. (Heckman model)	R&D plays an important role in helping firms overcome barriers to internationalization. In firms that have entered export markets, R&D does not increase its export intensity. Absorptive capacity also helps to overcome barriers to entry, but more so indirectly by significantly impacting R&D, which in turn decreases barriers to entry.

Author (Year)	Research Question	Theories	Sample (Method)	Findings
O'Cass and Weerawardena (2009)	What is the role of international entrepreneurship and innovation in small to medium-sized enterprise (SME) internationalization?	Stage (Uppsala) model INV perspective Firm-behavior model of entrepreneurship	Primary data collection. Sample of 302 Australian manufacturing SMEs. Initial population gathered from larger study. (PLS-SEM)	Organizational innovations are necessary for SME internationalization. Both technological and non-technological innovations are of importance. Exporters relative to non-exporters are more likely to develop superior products and pursue innovative ways of performing their value-creating activities. Separately and together they may impact a firm's international market performance.
Lages et al. (2009)	How do a set of capabilities (organizational learning, relationship management, and quality capabilities) influence product strategy (product quality and product innovation) and export performance?	RBV Contingency theory	Primary data collection. Sample of 112 Portuguese manufacturing firms from several sectors. Initial population gathered from governmental agency database. (PLS-SEM)	Product innovation is positively associated to export performance. Results point to a complex relationship between various product strategies, which build on organizational learning capabilities for innovation and relationship capabilities. Findings suggest that relationship capabilities allow the firm to improve its product innovation and product quality, which leads to improvement of export performance.
Kirbach and Schmiedeberg (2008)	What is the importance of innovations on the export behavior of manufacturing firms in Germany and their development during the last decade?	Product life cycle theory	Data from the German equivalent to CIS survey. Unbalanced panel of about 8,700 manufacturing firms in West and 3900 firms in East Germany for a period of 11 years, 1993–2003. (Tobit and probit regressions)	There is a positive link between innovation and export. Innovative firms are more likely to export and tend to record a greater share of their revenue from international markets. Whereas product innovation positively affects both the decision to export and export intensity, process innovation is insignificant. There is also a positive non-linear relationship between R&D and both export probability and export share.
Pla-Barber and Alegre (2007)	What is the relationship between export intensity, innovation and size in the technological setting of a science-based industry	Sectoral patterns of innovation Product life cycle theory RBV TCE	Primary data collected in 2002. Total sample of 121 firms from biotechnology sector in France. (SEM)	There is a positive link between innovation and export intensity. The relationships between size and export, and size and innovation are both insignificant. These findings suggest that these relationships should be examined within the industrial setting, where the firm's technological trajectory should be considered.

Author (Year)	Research Question	Theories	Sample (Method)	Findings
Tomiura (2007)	How are internal R&D intensity and external networking channels related to the firm's export decision?	Factor production trade theory KBV	Data from The Basic Survey of Commercial and Manufacturing Structure and Activity (1998). Total sample of 118,300 manufacturing firms from multiple industries in Japan. (Linear regression)	The positive relationship between R&D intensity and export is only present in SMEs, not large firms. A higher R&D intensity is thought to be less important in large firms to overcome entry barriers associated with export. These firms instead possess a wider range of non-R&D advantages that support their penetration into foreign markets.
Hollenstein (2005)	What are the factors determining the choice of a specific internationalization strategy?	OLI paradigm Classical theory of international trade TCE / internalization	Primary data collected in 1998 via survey. Total sample of 2,424 Swiss firms from 28 industries, both manufacturing and services. (Multinomial logit model)	O-advantages related to several types of innovation-related capabilities, human capital and other firm-specific assets are the most important drivers of internationalization, irrespective of firm size and type of strategy. Small firms, irrespective of internationalization strategy, rely most on assets oriented towards the generation of incremental innovations. Medium and large firms draw on a larger knowledge base enabling them to produce more fundamental innovations.
López Rodríguez and García Rodríguez (2005)	What is the influence of a firm's technological capacity on both its decision to export and its export intensity?	RBV KBV	ESEE Survey of Business Strategies 1998-1999. Total sample of 1,234 Spanish manufacturing firms with 10 or more employees. (Tobit and logit regressions)	Product innovations, number of product innovations, patents, number of patents registered, and process innovations all have a positive and significant impact on the decision to export. All technological resource variables are significantly and positively associated with export intensity, as well.
Knight and Cavusgil (2004)	What are the roles of an innovative culture and organizational capabilities in the early adoption of internationalization and its subsequent international performance in the born-global firm?	RBV KBV Behavioral theory of the firm	Primary data collection by via survey. Total sample of 203 US manufacturing firms. Initial population identified from Directory of US Exporters and CorpTech Directory of Technology Companies. (SEM LISREL)	The innovative processes that drive the development of superior and unique products are particularly important to the success of born-global firms. Technological competence, unique product development, and quality focus—all organizational activities related to innovation, R&D, knowledge development, and capabilities—determine a born-global firm's competitive position and its international success.

Author (Year)	Research Question	Theories	Sample (Method)	Findings
Lachenmaier and Woessmann (2004)	Does innovation cause export?	Product life cycle Model of international trade Endogenous growth models of innovation	Data from the 2002 IFO innovation survey. Total sample of 981 German manufacturing firms. (Tobit and 2SLS estimation)	There exists a statistically significant causal link from innovation to exports. When examined separately, both product and process innovations are positive and significant. The causal effect of innovation on export varies by sector. In traditional sectors, there is no significant effect, while in modern sectors, the effect is quite large.
Guan and Ma (2003)	What is the role of various innovation capability dimensions and firm characteristics in determining the export performance of firms?	RBV	Primary data collection. Total sample of 213 Chinese manufacturing firms in Beijing for the period of 1996-1998. (Multiple regression)	Core innovation assets have little effect on the export ratio, while supplementary innovation assets drive export growth. Firms should consider technological activities and their enabling processes, as technological innovations are dependent on the firm's strategies, organization, and culture. Multiple capabilities (learning, R&D, marketing, organizational, resource exploiting, and strategic capability) are positively and significantly correlated with firm's export ratio.
Dhanaraj and Beamish (2003)	How do firm size, enterprise and technological intensity affect export strategy in US and Canadian SMEs?	RBV	Primary data collection by mail survey. Total sample of 157 manufacturing firms from Canada and the US. (SEM LISREL)	There is a positive and significant relationship between technological intensity and degree of internationalization in American, but not Canadian firms. Conversely, there is a positive and significant relationship between enterprise characteristics—of which one factor is perceived importance of innovation on ability to export—and degree of internationalization in Canadian, but not US firms. Overall, there is empirical support for the direct and indirect influence of technological capabilities on the internationalization of manufacturing SMEs.
Roper and Love (2002)	What are differences between the determinants of export performance among UK and German manufacturing plants?	Neo-endowment model Life-cycle approach to trade	Data from the 1991 and 1993 Product development survey (PDS). Total sample of 1,700 UK and 1,300 German manufacturing plants. (Tobit regression)	The positive link between innovation and export performance at the firm level is also present at the singular manufacturing plant. Product innovation influences both the probability and propensity to export, both in UK and German plants. The determinants of export probability differ between innovators and non-innovators.

Author (Year)	Research Question	Theories	Sample (Method)	Findings
Basile (2001)	What is the relationship between innovation and export behavior of Italian manufacturing firms in different exchange rate regimes over three distinct time periods?	TCE	Data from the 1992, 1995 and 1998 survey by Mediocredito Centrale. Total sample of more than 4,000 Italian manufacturing firms. (Tobit and probit regressions with Cragg specification)	Firms that introduce product and/or process innovations, either through formal R&D or through the acquisition of new equipment, are more likely to export. Product innovations are likely related to capturing higher returns on product innovations in foreign markets, while process innovations allow to reduce innovation costs and compete in foreign markets. The behavior of non-innovative firms may be partly explained by entry costs into foreign markets, which are influenced by fluctuations in exchange rate regimes.
Nassimbeni (2001)	Do exporters and non-exporters differ in technology and ability to innovate?	INVs Stage theory	Primary data collection. Total sample of 165 small Italian manufacturing companies. (Discriminant analysis and Tobit and OLS regressions)	Product innovation is a strong predictor of export. The firm's ability to penetrate foreign markets and compete against indigenous firms is linked to a wider product range and the availability of a novel product.
Sterlacchini (2001)	What are the characteristics besides size and industry that influence a firm's export behavior?	Pavitt taxonomy Factor production trade theory	Primary data collection in 1991 via mail questionnaire. Total sample of 3,659 Italian manufacturing firms. Initial population gathered from Mediocredito Centrale. (Tobit and probit regressions)	Innovative activities are positively related to export performance, but their relative impact changes with firm size. Small internationalized firms rely heavily on product innovations. Medium and large-sized firms have a broader range of innovation indicators that are positively and significantly associated with their export propensity. Both the intensity of R&D and the adoption of cost-cutting process innovations enhance their export performance.
Sterlacchini (1999)	What is the role of innovative activities in small, non-R&D-performing firms which belong mainly to 'supplier-dominated' industries and, to a lesser extent, to 'specialised suppliers'?	Pavitt taxonomy	Primary data collection in 1997 via direct interviews. Total sample of 143 small Italian manufacturing firms from 'supplier dominated' industries. (Tobit and probit regressions)	Even though they do not focus on R&D, the innovative activities of small firms in non-R&D intensive sectors are important. By extending the measurement of innovation beyond R&D to capture broader innovative efforts, the relationship between innovative activities and firm export intensity is positive and significant.

Author (Year)	Research Question	Theories	Sample (Method)	Findings
Wakelin (1998)	What is the role of innovation in determining export behavior in both innovating and non-innovating UK firms?	None explicitly stated	Data from the SPRU innovation survey (1988-1992). Total sample of 320 UK manufacturing firms. (Tobit and probit regressions with Cragg specification)	Being an innovator decreases the probability of exporting, though the number of firm innovations and the level of innovation in the sector increases the probability of exporting. Results show that innovating and non-innovating firms behave differently in terms of probability of exporting and level of exports. This implies that the capacity to innovate affects the behavior of the firm.
Lefebvre et al. (1998)	Which R&D-related capabilities best discriminate the non-exporters from the active exporters? Which R&D related capabilities are the strongest determinants of export intensity per different export destinations?	RBV	Primary data collection via mail questionnaire. Total sample of 101 'specialized supplier' firms. Initial population identified by a Canadian R&D tax program. (Discriminant analysis and tobit regression)	Multiple factors related to innovation activities are positively and significantly associated with export performance. These include technological knowledge intensity, R&D strategies in basic research, the improvement of existing products and technological assets, as well as privileged sources of information from internal groups and customers. These differ to the determinants of export intensity, which are R&D strategies in new product development, applied research, and improvement of existing products. Various forms of collaborations (with competitors, public agencies, and customers) are also important determinants. Presence in global markets rather than regional ones may then require more proactive, aggressive and externally oriented innovation capabilities.
Schlegelmilch and Crook (1988)	What are the determinants to a firm's export intensity?	The specific advantages theory Product life cycle model Trade theory	Primary data collection via mail survey. Total sample of 130 UK mechanical engineering companies. Initial population identified from the Compass UK business directory. (OLS regression)	R&D intensity it not a significant determining factor in export intensity, nor is the percentage of products in the introduction and growth stages of their lifecycle.

Author (Year)	Research Question	Theories	Sample (Method)	Findings
Hirsch and Bijaoui (1985)	Is the acquisition of proprietary knowledge (innovation through internal R&D) positively correlated with export performance? Does this relationship depend on factor intensity?	Neo-classical factor proportion model Technology gap or product life cycle model	Data from the Israeli Central Bureau of Statistics, Ministry of Commerce and Industry, Interdisciplinary Center for Technological Analysis and Forecasting. Two waves of surveys: 1977 and 1981. Total sample of 111 large manufacturing firms. (Linear regression)	Findings suggest that the export propensity of firms that are engaged in R&D is higher than that of the business branch to which they belong. There is thus a positive correlation between R&D intensity and export growth.

2.4.2.2   Significance of the Relationship between Innovation and Internationalization

There exists ample empirical evidence in support of a positive and significant relationship between a firm's innovation and its internationalization, with some demonstrating causal direction (Altomonte et al., 2013; Cassiman & Golovko, 2011; Higón & Driffield, 2011). This relationship has been examined using an extensive array of independent variables. Of the empirical studies reviewed, 40 percent used at least two types of innovation in their models. However, the variety of means by which innovation is examined gravitate heavily toward a technological understanding of innovation. Its operationalization captures mostly the introduction of product—and to a lesser extent, process— innovations, as well as R&D intensity (e.g., Becker & Egger, 2013; Caldera, 2010; Lejpras, 2015; Love et al., 2016).

Whilst the literature spanning a period of over 30 years provides overwhelming support for a positive relationship between innovation and internationalization, four notable exceptions provide counterevidence that should be kept in mind. Specifically, Schlegelmilch and Crook (1988) observe that in a sample of 130 UK mechanical engineering companies, R&D intensity is not a significant determinant for export intensity. Similar results are echoed in Kaleka (2012), who reports that in a sample of UK-based manufacturing SMEs, product development capabilities have no effect on export performance. Rather, product development capabilities positively affect profitability which, when coupled with superior information capabilities, leads to export performance. Damijan et al. (2010) examine whether product and process innovations increase the likelihood of export in Slovenian firms from various manufacturing and service sectors over a six-year period. They find no empirical support for such a relationship. Similarly, Van Beveren and Vandenbussche (2010) examine the effects of firm-level innovation activities on a firm's propensity to start exporting. Results from their study on 600 Belgian manufacturing and service firms suggest that there is no empirical evidence to support that product and/or process innovation lead to a greater likelihood of export.

2.4.2.3   Empirical Findings in Samples of SMEs

Seventeen of the fifty-five empirical studies reviewed pertained to SMEs. Across most studies, greater attention is attributed to the firm's technological innovation and capabilities. A large portion of firms do not address forms of non-technological innovation (D'Angelo, 2012; D'Angelo et al., 2013; Dhanaraj & Beamish, 2003; Sui & Baum, 2014). That said, overall the findings do not differ from those of the whole sampled literature and demonstrate the importance of innovation as a determinant to small firm internationalization. Both technological and non-technological innovations are significant drivers of

international activity (O'Cass & Weerawardena, 2009). It is also crucial for the firm to build its overall innovation capacity by improving its absorptive capacity and fostering links to external information sources (Love et al., 2016; Meliá et al., 2010; Raymond et al., 2014). Yet the small firm should be mindful of its adopted innovation strategy, as its associated costs may offset the possible efficiency gains unless the firm is a leader in its markets or has adopted a low-cost innovation strategy (Dai et al., 2014). Some inconsistencies are reported across all studies looking at innovation antecedents. While Veglio and Zucchela (2015) report the insignificant role of R&D and external knowledge sourcing in non-R&D intensive sectors, these results counter those of Sterlacchini (1999) who, also in non-R&D intensive industries, finds a significant positive relationship between R&D and export.

2.4.2.4 *Empirical Findings in Samples of Service Firms*

An even smaller proportion of the empirical work examined in the review pertained to services. Of the 55 articles considered, only eleven report having services in their sample. Of these, only three restrict their sample to services. Overall, the findings provide support to the positive relationship between innovation and internationalization. However, Schlegelmilch and Crook's (1988) study on mechanical engineering firms in the UK puts into question the positive effect of R&D on export in service firms. These findings lie in contrast to those of Meliá et al. (2010) who observe that by looking at a broader understanding of innovation, the firm's innovation capability and orientation are associated with its ability to enter foreign markets and capitalize on the advantages associated with early internationalization. Similarly, Rodríguez and Nieto (2012) observe a positive relationship between service innovation and export intensity. They report this link is mediated by the firm's collaboration, and thus contributes positively to the firm's internationalization. Castaño et al. (2016) further note that service sector entrepreneurs who innovate are also those most likely to internationalize. The use of technology also indirectly facilitates internationalization in a service context. Together, these findings underscore the importance of examining the role of antecedent factors of innovation in explaining internationalization in service firms.

2.4.2.5 *Summary and Current State of the Literature*

In summary, previous empirical studies have consistently found a positive relationship between innovation and export (Cassiman & Golovko, 2011; D'Angelo et al., 2013; Pla-Barber & Alegre, 2007; Shearmur et al., 2015). Yet, this relationship may overlook important nuances due to the predominant use of conventional techniques which largely neglect the problem of endogeneity (Antonakis, Bendahan, Jacquart, & Lalive, 2014; Jean et al., 2016; Reeb, Sakakibara, & Mahmood, 2012), as well as the common

adoption of innovation measures capturing product innovations only (e.g., Baronchelli & Cassia, 2014; M. Baum, Schwens, & Kabst, 2015; D'Angelo et al., 2013; Knight & Cavusgil, 2004).

Four issues arise. First, an overwhelming majority of studies only examine product innovations, and to a lesser extent product and process innovation concurrently. Moreover, there is still reliance on R&D intensity as a measure of innovation, which greatly emphasizes the importance of technological innovations. Other innovation types such as marketing and managerial are often neglected. Yet previous works show it is the combination of different types of innovation rather than one type in isolation that is correlated with a firm's propensity to enter export markets (Guan & Ma, 2003; Lewandowska et al., 2016). Indeed, Guan and Ma (2003) observe there may be interdependent relationships between the total improvement to a firm's innovation capabilities and its export growth. This is a growing trend in the literature, as there has been an increase since the early 2000s in the number of innovation types capturing a firm's innovation capability when examining its relationship with internationalization.

Second, little attention is given to the innovation inputs and activities that precede innovation outcomes. By operationalizing innovation as an outcome only, much of the complexity surrounding the construct is lost. The few studies that examine various innovation activities as determinants to internationalization find that various elements such as skilled human capital, use of external information sources, and absorptive capacity are positively linked to export (D'Angelo, 2010; Harris & Li, 2009; Lejpras, 2015; Patel, Fernhaber, McDougall-Covin, & van der Have, 2014). The importance of understanding how a firm arrives at an innovation is increasingly communicated (Brunswicker & Vanhaverbeke, 2015). SMEs often encounter challenges in their innovation activities associated with time and resource limitations (van de Vrande, de Jong, Vanhaverbeke, & de Rochemont, 2009). A critical limit is the lack of managerial capabilities required to coordinate and integrate external knowledge flows to the firm's internal innovation activities (Robertson, Casali, & Jacobson, 2012). Thus, SMEs may struggle to achieve positive innovation results from their investments in innovation-related activities.

Third, the relationship between innovation and internationalization (or export, as it is often captured) is one that is inherently plagued by problems of endogeneity. This problem is well documented (Jean et al., 2016), yet only a small percentage of studies examining this relationship address the theoretical and empirical downfalls as well as the difficulty inferring causality. Three forms of endogeneity are reported (Van Beveren & Vandenbussche, 2010). First, the relationship between innovation and internationalization is characterized by a problem of simultaneity, where decisions to innovate and internationalize are often made simultaneously with one another. Second, decisions to innovate may be made in anticipation for internationalization, thus introducing an anticipatory effect into

the equation. Finally, as internationalization persists over time, it is necessary to control for previous internationalization experience as such would introduce a causality bias. Without assessing and controlling for these effects, caution is introduced when discussing the robustness of previous studies' empirical results.

As this phenomenon does not lend to experimental designs, the tried-and-trued method for making valid causal inferences, researchers are left with exploring non-experimental data (Antonakis, Bendahan, Jacquart, & Lalive, 2010). A novel approach for exploring this question is the use of tools that make use of Boolean algebra and set-theoretic methods rather than conventional statistical techniques. This topic will be reintroduced in Chapter 3 and discussed at length in Chapter 4.

A fourth and final problem is that of testing the underlying hypotheses which theoretically frame the relationship between innovation and internationalization. In management research, scholars are often making necessity statements without testing their hypothesis for necessity: conventional statistical methods are not tailored to test for *necessary but not sufficient* or *necessary but insufficient conditions* (Dul, 2016). Yet many of the theories, including those examined in this chapter pertaining to IE, make statements, either implicitly or explicitly, about the necessity of causal conditions. For example, in my review of the Uppsala Model and the INV perspective, I demonstrate how innovation is thought to be a necessary condition for internationalization, modeled as a 'change' or 'adaptive' mechanism in both respective theoretical frameworks. An important distinction must then be made between necessary and sufficient conditions. Necessary conditions are proverbial bottlenecks: without X, there can be no Y. Sufficient conditions, on the other hand, ensure that the outcome occurs; they produce the outcome. By assuming that innovation is a prerequisite for internationalization, the theoretical stance adopted is one of necessity: there can be no internationalization without innovation.

To the best of my knowledge, we have yet to examine using alternative analytical techniques whether evidence supports the statement that innovation is a necessary condition for internationalization. On this topic, Dul (2016) states that the cause for such systemic misidentification of necessity vs. sufficiency of conditions is due to a misalignment between theory and method. The interpretation of significant results using correlation-based techniques leads the researcher to make statements of necessity rather than that of sufficiency.

Given the limitations identified in the extant empirical literature, and with a broader, more integrative definition of innovation in mind, the following sections review three burgeoning streams of the innovation literature. They address and discuss distinct themes which may further inform IE theories:

- *innovation in services*, and the study of innovation from a synthesis or integrative approach;
- the *open innovation paradigm*, and the use of external information sources as inputs into the innovation process;
- and, *innovation modes*, and the likelihood of equifinal innovation patterns.

2.4.3   *Examining Innovation in Service Firms*

The first theme examined originated in response to a shift in the industrial composition of most advanced economies. With the rise of services, it became apparent at the turn of the century that the study of innovation in a 'service-rich world' should reflect the peculiarities of services (Coombs & Miles, 2000; Gallouj & Windrum, 2009). Yet how we examined and measured innovation had long been rooted in the study of technological innovation. Firm-level studies of innovation had been predominantly conducted on manufacturing industries and little attention was given to non-technological innovation (Djellal & Gallouj, 2001; Drejer, 2004; Gallouj & Weinstein, 1997). Traditional innovation measures anchored in technology adoption and technological innovations were not well aligned for the study of service innovations. This was predicated on the notion that services fundamentally differed from manufacturing in the characteristics that distinguished the delivery and value proposition to end customers, and the attributes which comprised the service itself: namely, its intangibility and its interactivity, or client-intensity (Coombs & Miles, 2000; Miles, 2008).

In response, Coombs and Miles (2000) put forward a taxonomy that distinguishes between three approaches to the study of service innovation. First, the *assimilation* or *technologist* approach assumes services innovations are similar to manufacturing innovations, and thus similar methods and concepts are used for their study. Second, and in stark contrast, the *service-oriented* or *demarcation* approach proposes that services innovations are distinct from manufacturing innovations, and thus new theories and instruments are necessary for their study. Third, the *integrative* or *synthesis* approach proposes that services and manufacturing do not follow entirely different approaches to innovation. Rather, by considering both technological (product-oriented) and non-technological (service-oriented) perspectives in a holistic manner, we may gain insight on overlooked aspects of the innovation process which are increasingly becoming present in manufacturing firms. Thus, this last approach aims at integrating insight from assimilation-type research based in manufacturing to that of demarcation-type research based in services to provide a more uniform framework with which to study innovation in both manufacturing and services alike (Gallouj & Savona, 2009; Gallouj & Windrum, 2009).

The study of service innovation from this perspective is centered on Schumpeter's (1934) definition of innovation which, as suggested by Drejer (2004), is broad enough of a definition to encompass innovation in both services and manufacturing. The original work is inclusive of both technological and non-technological innovations, as captured in five areas: product, process, market, input, and organizational innovation. Following the empirical work of others (Castro, Montoro-Sanchez, & Ortiz-De-Urbina-Criado, 2011; Love et al., 2011; Ordanini & Parasuraman, 2011; Santamaría, Nieto, & Miles, 2012; Toivonen & Tuominen, 2009), and closely related to the definition provided in the previous section from the Oslo Manual (2005), innovation is then given a much broader sense, moving beyond a strict understanding of technological innovation. As the boundaries between goods and services are increasingly blurred, the rationale for such a shift in understanding becomes greater (Gallouj & Savona, 2009). As services are increasingly acquiring characteristics generally attributed to manufacturing—the acquisition and use of information and communication technologies (ICTs), for example—so, too, are manufacturing firms acquiring characteristics generally attributed to services, such as gaining value from business functions like marketing, design, after sales, and delivery (Coombs & Miles, 2000). What is more, this trend is likely to persist and accelerate due to continuous technological developments that enable further convergence between service and manufacturing sectors, while fostering growth in service sectors and more service innovation (Carlborg, Kindström, & Kowalkowski, 2014).

So, why examine multiple types of innovation and not just new service (or product) innovation? A few studies are informative in answering this question. First, in a longitudinal study of the Australian retail banking industry, Roberts and Amit (2003) examine product-related, process-related, and distribution-related acts which encompass three distinct innovation types. They find that firms with active and consistent innovation activity reap greater financial benefits. Importantly, these innovation patterns may differ to some extent from the industry norm. Thus, there may be an emergence of differentiated competitive positions over time as "the firm's current competitive position (and therefore its current financial performance) is a function of its unique history of innovative activity" (Roberts & Amit, 2003, p. 118). These findings are extended by Damanpour et al. (2009) who believe that in service firms, the argument for focusing on one type of innovation—as prescribed by the logic of the absorptive capacity argument, where the firm focuses its innovative activity in a knowledge area it continuously deepens—is not suitable to explain the adoption of incremental innovations. Rather, in their longitudinal study of UK public service organizations, they propose and find empirical support that the adoption of different types of innovation (e.g., co-adoption of service, technological process, and administrative process innovations) associated with different business functions in the organization have a greater positive influence on the firm's competitive position. Building on the resource-based view and dynamic capabilities perspectives,

they argue that the introduction and integration of sets of innovation types, in itself a unique value-adding capability that provides the firm with distinctive competencies, creates value for the firm by differentiating it from its competition and allows it to respond to changes in its environment.

Building on these studies, others find that the introduction of multiple types of innovation is a greater determinant to export than the introduction of a single type (Becker & Egger, 2013; Lewandowska et al., 2016; O'Cass & Weerawardena, 2009). There, then, exist complementarities between types of innovation, where both technological and non-technological innovations are important determinants to export (O'Cass & Weerawardena, 2009). For example, Lewandowska et al. (2016) report that the strongest predictor of new product export is the introduction of product-process and product-process-marketing innovations. Similarly, Becker and Egger (2013) observe that firms that introduce product-process innovations are more likely to export than non-innovators, and when performed alone, product innovation is a better determinant to export than process innovation.

From these empirical findings, the current conceptualization of innovation in IE theories may, therefore, be insufficient to encapsulate the complexity of service innovations. Considering only the technological characteristics of innovation may lead to an underestimation of the variety of non-technological innovations that occur both in manufacturing and service firms. Doing so may give us an incomplete picture of the capabilities that enable a firm to adapt and compete in foreign markets. Moreover, it reverts to adopting an assimilation approach in the study of innovation outside the innovation literature, and it neglects to consider improvements made to our understanding of innovation as a multifaceted construct. By reframing the adopted definition of 'innovation' within the IE theoretical dialogue to that proposed by the synthesis approach, it becomes possible to account for a much broader range of sources of innovation and configurations of innovation types which may lend a positive influence on the firm's internationalization.

2.4.4   *Examining Innovation from an Open Innovation Perspective*

The second theme examined emerged in response to a shift in paradigm at the core of the innovation literature. Innovation is undertaken by actors with limited knowledge and resources; such is particularly the case in the SME context (van de Vrande et al., 2009). Small firms are often resource constrained and demonstrate a dependence towards the broader ecosystem in which they are embedded to access resources and capabilities not yet internalized (Love & Roper, 2015). It is now widely recognized that the innovative success of a firm depends on its ability to effectively coordinate and integrate a broad range of internal and external sources of scientific and technological knowledge (Dahlander & Gann,

2010; Sammarra & Biggiero, 2008). As stated by Fagerberg (2004, p. 10), "every new innovation consists of a new combination of existing ideas, capabilities, skills, resources, etc. It follows logically from this that the greater the variety of these factors within a given system, the greater the scope of them to be combined in different ways, producing new innovations which will be both more complex and more sophisticated." A renewed understanding of innovation depicts it as an open and distributed process, recognizing the systemic and social dimensions of innovation and, specifically, the importance of external knowledge, learning, and feedback (Lundvall, 1992).

From this perspective, innovation is an open process relying on "the use of purposive inflows and outflows of knowledge to accelerate internal innovations, and expand the markets for external use of innovation, respectively" (Chesbrough, 2006, p. 1). The open innovation paradigm differs significantly from earlier conceptualizations of the innovation process where the firm was portrayed as the locus of innovation and its internal processes the determining factor to its innovation performance. This change in paradigm fundamentally shifts the locus of innovation: without denying that internal capacities and processes are of fundamental importance, the role of external knowledge as a source of innovation is now likewise acknowledged and emphasized (Lichtenthaler & Lichtenthaler, 2009; Nieto & Santamaría, 2007). Information sources are defined as means by which knowledge and information are acquired related to the firm's future growth strategy or contributing to the firm's current growth strategy. This definition is adapted from Amara and Landry (2005) and builds on the well-adopted definition proposed by the OECD Innovation Survey.

Within this new context, not only are external information sources given additional weight in the innovation process, but there is also a change in perception whereby useful knowledge is understood as being widely distributed. Firms must be well connected to identify and access it. As the innovation process becomes more open, intermediate markets have arisen where firms can interact and transact at various stages that were once closed or occurred internally within the firm (Dahlander & Gann, 2010; Huizingh, 2011). Although a firm may have access to external knowledge, it may not recognize its potential value, nor have the capacity to assimilate it to its existing knowledge base (Cohen & Levinthal, 1990). In this context, the firm's absorptive capacity is important, especially for exploring learning and innovation. Recent empirical work provides support for the theoretical understandings of absorptive capacity, whereby it contributes directly to innovation by allowing for the identification and translation of external knowledge inflows into tangible benefits for the firm (Kostopoulos, Papalexandris, Papachroni, & Ioannou, 2011).

Though the firm may open itself to external partners, it may not be able to appropriate all information and knowledge to which it has access. This is explained by the inherent characteristics of knowledge, as tacit knowledge is more difficult and costlier to transfer than codified knowledge. Furthermore, openness is a two-way transaction, and each firm needs to develop a strategy whereby it focusses upon information sources that are likely to be useful, assesses the costs of divulging knowledge it possesses, and considers the variety of ways knowledge can be acquired (Dahlander & Gann, 2010). Indeed, knowledge can be developed internally or absorbed from the firm's external environment via a variety of external sources (Doloreux & Shearmur, 2013; Sammarra & Biggiero, 2008). These sources may come from the market (i.e., clients, suppliers, competitors, and service firms, including KIBS), institutions (i.e., education and research establishments, and public and private research laboratories and institutes), or other external sources such as conferences, trade fairs, scientific journals, trade or technical publications, and professional and industrial associations (Amara & Landry, 2005).

In the case of KIBS, external linkages, interactions with external information sources, and networking are all important for innovation. As they provide complex solutions which they build from expert specialized knowledge, often answering specific client problems, tacit knowledge acquisition is particularly important to anticipate, respond to, or even create user needs (Kang & Kang, 2014; Koch & Strotmann, 2008). Their highly interactive and relational nature leads to a preference for informal versus formal knowledge sharing practices (Mina, Bascavusoglu-Moreau, & Hughes, 2014). Although there are many benefits to the adoption of open innovation practices, some downfalls must be acknowledged. Not all forms of external knowledge sourcing have the same impact on a firm's innovation performance, especially with respect to its technological innovation (Kang & Kang, 2009). R&D collaborations are quite costly to maintain, and their outcomes are not certain (Kang & Kang, 2014). There are also costs associated with external knowledge search, as there comes the point where the returns on knowledge search are negative (Katila & Ahuja, 2002; Laursen & Salter, 2006). Yet these findings are increasingly questioned due to the rapid development of ICTs which decrease the cost of external knowledge search (Kang & Kang, 2009, 2014).

Taken together, theory on open innovation and several key empirical findings point to the potential interplay between innovation, external knowledge sourcing and internationalization. First, the open innovation literature and some of its empirical trends, particularly those about services, suggest that the innovation process is increasingly distributed. External information sources positively contribute to the firm's innovation performance (Kang & Kang, 2009, 2014). Second, the extant empirical literature on the relationship between innovation and internationalization underscores almost consistently a positive

relationship between the two constructs, though this relationship is most often examined from the perspective of product or technological innovation. As service innovations tend to be 'architectural' or recombinative rather than technological in nature (de Vries, 2006; Mina et al., 2014), it then becomes important to adopt a broader understanding of innovation.

Third, the review of IE theories highlights the importance of knowledge as a primary driver for internationalization; experiential knowledge gained by the firm as well as tacit knowledge gained from network partners (Casillas, Barbero, & Sapienza, 2015; Fletcher & Harris, 2012; Fletcher, Harris, & Richey, 2013). Keeping in mind that small firms are increasingly opening themselves up to multiple external information sources (Corrocher, Cusmano, & Morrison, 2009; van de Vrande et al., 2009), these inputs into the innovation process may then impact how firms introduce their service offerings in new foreign markets.

2.4.5   *Examining Innovation from an Innovation Modes Perspective*

The third and last theme examined emerged in response to the increased acknowledgment that innovation behaviors differ across firms and industries. From an evolutionary point of view, firms exhibit heterogeneous innovation behaviors and therefore may adopt diverse strategies and follow different trajectories. There is considerable diversity in how firms innovate which may be related to various market environments (Leiponen & Drejer, 2007), locations (Shearmur, 2015), sectoral and technological regimes (Malerba, 2005; Pavitt, 1984), or national institutions (Lundvall, 2007). In parallel, the management literature provides insight on heterogeneity within industries. Drawing on the knowledge-based view of the firm (Grant, 1996b; Kogut & Zander, 1992) and the dynamic capabilities approach (Teece, 2007), firms may have different abilities to generate knowledge and to benefit from knowledge spillovers. Organizational knowledge and capabilities may then be a source of differentiation in strategy and behaviors across firms and industries.

In the innovation literature, the concept of innovation modes is used to capture the complexity of innovation, and more generally, the numerous innovation-related activities that are taking place within a firm (Asikainen, 2015; Nunes & Lopes, 2015; Rodriguez, Doloreux, & Shearmur, 2016). These include internal activities (such as R&D, but not exclusively), external use of information and knowledge sources indicative of open innovation activities, and innovation results such as the development of new or improved products and processes, new forms of design, and organizational and management practices. Taken together, these activities provide a sense of the firm's direction of knowledge flow, its resource

commitment to innovation, and its innovation orientation across multiple types of innovation related-activities, internal and/or external to the firm.

Srholec and Verspagen (2009, p. 7) define innovation modes as "*how* firms innovate, as opposed to the question *how much resources* they devote to innovation." Filippetti (2011, p. 7) expands on this definition, and defines innovation modes as "grouping firms depending on a number of characteristics of their innovation activities, behaviors, and strategies." Similarly, Nunes and Lopes (2015, p. 1796) suggest "the linkages between forms of knowledge and learning define innovation modes used by firms."

There are two broad approaches concerning innovation modes and the way they are defined. The first is *prescriptive* in nature and builds on the work of Jensen et al. (2007), who theoretically identify two distinct innovation modes. The 'Science, Technology and Innovation' (STI) mode emphasizes the scientific and technical nature of innovation. The 'Doing, Using and Interacting' (DUI) mode underlines experience and interactive practice. This conceptual taxonomy has received extensive empirical attention by others who, too, adopt a prescriptive stance on innovation modes (Fitjar & Rodríguez-Pose, 2013; Parrilli & Alcalde-Heras, 2016; Parrilli & Elola, 2012).

The second is *exploratory* in the identification of innovation modes (Asikainen, 2015; Doloreux & Shearmur, 2010; Filippetti, 2011; Hollenstein, 2003). Scholars make use of multivariate methods to 'let the data speak' and do not assume innovation modes are homogenous across firms and sectors (Hollenstein, 2003). However, explorative studies have measured innovation modes quite differently. Table 5 highlights the variety of indicators used to capture this construct, ranging from strictly using innovation input indicators only (Leiponen & Drejer, 2007; Rodriguez et al., 2016), to using both inputs and outputs (Asikainen, 2015; Frenz & Lambert, 2009), and inputs, outputs, and other organizational, structural and performance indicators (Doloreux & Shearmur, 2010; Hollenstein, 2003; Peneder, 2010; Srholec & Verspagen, 2009).

Although explorative studies are less restrictive than the prescriptive taxonomy proposed by Jensen et al. (2007), the variability in the indicators used to empirically delineate groups renders comparison across studies difficult. That said, their findings are much richer as they account for the various innovation modes firms may adopt to achieve their innovation result.

Despite these advances, there are notable empirical and theoretical gaps in the IE literature. Studies that have examined the relationship between specific innovation inputs and activities are less clear about the relationship between innovation and internationalization. For instance, Veglio and Zucchella (2015) find that product design has the greatest influence on export propensity in Italian SMEs from

traditional industries, and that monitoring competitors and the use of trade fairs as information sources strongly influence innovation results. Patel et al. (2014) examine the relationship between the location of network partners, innovation complexity, and speed of internationalization. They find that firms that balance local and foreign network connections are quicker to bring new products to market. Such a balance between network partners is also necessary when innovations are of greater complexity. Lejpras (2015) finds that innovation results in manufacturing SMEs, namely product innovations and patent applications, and certain innovation inputs such as proximity to research institutions enhance export propensity, while internal R&D intensity exerts no influence. Thus, given the complexity of the innovation construct, a next step to further our understanding is to decompose and examine this relationship by exploring how innovation modes are associated with a firm's propensity and intensity of internationalization.

Table 5 Select Overview of Studies Identifying Innovation Modes

Author(s)	Measures	Data	Modes of innovation
Hollenstein (2003)	Inputs, outputs and performance (explorative)	Swiss Innovation Survey (1999), private services sectors	1: 'Science-based high-tech firms' 2: 'IT-oriented network-integrated developers' 3: 'Market-oriented incremental innovators' 4: 'Cost-oriented process innovators' 5: 'Low-profile innovators'
Jensen et al. (2007)	Inputs, and organizational (prescriptive)	2001 Danish DISKO Survey	1: 'Science, Technology and Innovation' 2: 'Doing, Using, Interacting'
Leiponen and Drejer (2007)	Inputs (explorative)	CIS2 Denmark and Finland	1: 'Science-based' 2: 'Supplier-dominated' 3: 'Production intensive' 4: 'Market driven'
Frenz and Lambert (2009)	Inputs and outputs (explorative)	CIS2006, OECD countries	1: 'New-to-market innovating' 2: 'Marketing-based imitating' 3: 'Process modernising' 4: 'Wider innovating'
Srholec and Verspagen (2009)	Inputs, outputs, and appropriability (explorative)	Eurostat CIS3	1: 'Research' 2: 'User' 3: 'External 4: 'Production'

Author(s)	Measures	Data	Modes of innovation
Doloreux and Shearmur (2010)	Inputs, outputs, and barriers (explorative)	Primary data, Québec (Canada)	1: 'Non-innovator, information obstacles' 2: 'Innovators, financial obstacles' 3: 'Innovators, no financial obstacles' 4: 'Non-innovator, no obstacles' 5: 'Government, university information'
Peneder (2010)	Inputs, outputs, and appropriability (explorative)	CIS3	1: 'High innovation intensity' 2: 'Intermediate-to-high innovation intensity' 3: 'Intermediate innovation intensity' 4: 'Intermediate-to-low innovation intensity' 5: 'Low innovation intensity'
Filippetti (2011)	Inputs, outputs, and drivers (explorative)	Innobarometer Survey (2009)	1: 'Outward-oriented non-technological inn.' 2: 'Cost-saving innovation' 3: 'R&D focus with strong basic collaboration' 4: 'Inner-oriented non-technological innovation' 5: 'Outward-oriented multifaceted innovation'
Nunes and Lopes (2015)	Inputs, outputs, network (prescriptive)	Primary data, Portugal	Mode 1: 'DUI innovation mode' Mode 2: 'Moderate STI mode' Mode 3: 'Territorial Embeddedness Innovation mode'
Rodriguez et al. (2016)	Inputs (explorative)	PITEC Panel Survey (2012), Spain	1: 'Independent innovators' 2: 'Barras-type innovators' 3: 'Balanced innovators' 4: 'Highly cooperative innovators'

2.5   Contextualizing Innovation and Internationalization in Small KIBS

2.5.1   International Trade of Services

The services industry was not liberalized until 1995 when the General Agreement on Trade in Services (GATS) was put into effect after the World Trade Organization's (WTO) Uruguay Round. The WTO advocates for six benefits that have resulted since: a) economic performance, b) development, c) consumer savings, d) faster innovation, e) greater transparency and predictability, and f) technology transfer. The purpose of the GATS was to liberalize markets, not to deregulate trade in services and open domestic markets to foreign competition. However, since the mid-1990s, domestic firms have increasingly seen the presence of foreign competitors. The consistent increase in service imports speaks to the opening of Canada's market, which brings in foreign services and increased competition for Canadian firms.

The globalization of markets has forever changed how firms operate. At the core of these changes are the opening of once protectionist trade barriers and the ever-changing advancements in technology facilitating communication methods and increasing the mobility of business offerings. What is more, the development of multinational enterprises has led to interrelated economies and financial markets (Hitt, Bierman, Uhlenbruck, & Shimizu, 2006). In response to this change in competitive landscape, some KIBS SMEs that were once local support service providers have evolved by expanding their geographic reach to meet the growing needs of their clients, whom themselves have expanded abroad (Greenwood & Empson, 2003).

This trend continues to strengthen. Service firms have become an integral part of global economies. According to the WTO, services are the fastest growing sector. They account for two-thirds of all global output, one-third of global employment, and almost 20% of global trade. The Canadian market landscape further reinforces the need for improved understanding of this phenomenon in the context of KIBS firms. Innovation, Science and Economic Development Canada (2016) reports that of all employer businesses, 78.5 percent operate in service-producing sectors. Of the 1.14 million small business registered in Canada in late 2015, 12 percent operate under NAICS 54: Professional, Scientific and Technical Services.

Over the last two decades, small Canadian firms in KIBS sectors have increasingly diversified the countries to which they export (Industry Canada, 2011). In 1999, Statistics Canada reported that small

KIBS firms exported 77.3 percent of their total exports to the United States; second was the European Union market, which accounted for merely 8.0 percent of exports. In 2009, KIBS firms had decreased their total exports to the US to 47.8%. Data demonstrate an increasing trend towards greater market diversification, some towards the European Union (15.6 percent), Japan (3.7 percent), and South America (4.5 percent). Another show of diversification is the marked increase in export to 'Other countries' from 11.2 percent in 1999 to 25.9 percent in 2009. Unfortunately, at the time of this study, more recent trade data on KIBS had not been made available.

Lack of up-to-date data notwithstanding, several compelling reasons have surfaced and reinforced the need to study service firms. Noted are the vital roles that services play in economies worldwide (Javalgi & Martin, 2007), the necessity of export and other forms of international sales as a means of firm growth and survival (Davidsson & Wiklund, 2000; Lu & Beamish, 2006), and the sheer increase in the number of service firms engaging in international activities (Chiru, 2007; Javalgi & Martin, 2007). The growing trends seen in the most recent Canadian data on the KIBS industry fortify the need to further our understanding of how small and medium-sized Canadian KIBS firms develop their competitive strategy, employing innovation to succeed in foreign markets (Industry Canada, 2011).

2.5.2   Defining KIBS

Knowledge intensive business services (KIBS) are defined as "enterprises whose primary value-added activities consist of the accumulation, creation, or dissemination of knowledge for the purpose of developing a customized service or product solution to satisfy the client's needs" (Bettencourt, Ostrom, Brown, & Roundtree, 2002, pp. 100–101). They rely heavily on professional knowledge to supply intermediate products or services that are knowledge-based (Miles et al., 1995). KIBS sectors thus constitute a service subsector comprised of firms whose primary activities depend on human capital, knowledge, and skills (Muller & Doloreux, 2009). The individuals employed by KIBS are oftentimes highly educated and holders of advanced degrees in their respective fields of expertise. The professional knowledge sourced to create KIBS is either related to a specific discipline or a functional domain (den Hertog, 2000).

Some distinctions are made, however imprecise (Corrocher et al., 2009; Doloreux & Shearmur, 2010), between three broad KIBS groups (Miles, Belousova, & Chichkanov, 2017; Miles et al., 1995): technological or technical services (T-KIBS) such as computer systems design and maintenance, software design, and engineering services firms; professional services (P-KIBS) such as accounting, legal, management consultancy, and other similar professional services firms; and creative services (C-KIBS)

such as advertising, architecture, branding, and design consultancy firms. As a whole, they mostly differ from one another by their primary sources of knowledge, the type and frequency of interactions they foster with their client, and the resources most important for their innovation capability.

That said, their service offerings share three important features: they are intangible, highly interactive, and customizable (Miles, 2008). A KIBS firm creates value for its clients by providing knowledge-intensive inputs into its business processes (Miles, 2005). Though KIBS services may be partly embedded in physical artifacts, they are often still intangible due to their knowledge-based characteristics. The value imputed by the knowledge imparted to the firm is often much greater than that of the physical artifacts which allowed for its transfer. They differ from highly standardized service firms in that their service production relies on tacit knowledge and requires the recombination of various knowledge inputs into a customized solution targeted at specific client requirements (den Hertog, 2000; Miles, 2005).

Additional characteristics distinguish the KIBS sector from others. First, KIBS are a knowledge-intensive sector characterized by high rates of innovation (Doloreux & Shearmur, 2012; Rodriguez et al., 2016). Second, knowledge is considered a KIBS firm's most valuable resource as it is both its primary production factor and at the core of the services it offers (Miles, 2008). It combines various types of highly specialized knowledge to develop and co-create solutions that respond to their clients' specific problems (Muller & Doloreux, 2009). Thus, the firm's capability surrounding its knowledge management is crucial to its success, as the relationships fostered between KIBS and its clients require from it to process, integrate, generate and assimilate knowledge frequently and with a certain level of complexity.

On this topic, Muller and Zenker (2001, p. 1504) offer that "typical knowledge processing within a KIBS consists, for instance, of the integration of external knowledge, the acquisition of available knowledge related to a specific problem and the elaboration of the codified knowledge corresponding to the specific need of the client firm." Knowledge is then constantly recombined, as the firm gains new knowledge from its interactions with clients and combines this new knowledge with its existing base. Thus, these interactions between KIBS and their clients perpetuate processes of knowledge acquisition and knowledge generation, primarily thought the firm learning by trying to solve problems on behalf of its clients (Muller & Zenker, 2001).

2.5.3   *Characterizing KIBS Innovation*

For some time, service firms were largely neglected from research in innovation: categorized in Pavitt's (1984) taxonomy as 'supplier dominated,' identified as having weak in-house R&D capabilities, being of relatively small size, adopting innovations rather than being innovative in and of themselves, and following a cost-cutting technological trajectory. Yet as research in economic geography drew attention to KIBS, it became apparent that these firms were not merely passive recipients of innovation from upstream industries (Muller & Doloreux, 2009). Today, a growing literature on innovation in KIBS (Miles, Belousova, & Chichkanov, 2018) further informs understanding of innovation theories writ large, as they provide a salient counterexample to the traditional focus on manufacturing and high-technology sectors.

In this respect, as stated by Hipp and colleagues (2015, pp. 43–44): "KIBS are increasingly recognised as being major users, originators and transfer agents of technological and non-technological innovations, playing a major role in creating, gathering, and diffusing organisational, institutional and social knowledge." They are drivers of innovation in their clients and highly innovative themselves (Camacho & Rodriguez, 2008; den Hertog, 2000; Doloreux & Shearmur, 2010; Tether & Hipp, 2002; Wong & He, 2005).

To introduce new services, KIBS require new knowledge or new knowledge combinations resulting from the acquisition, assimilation, and exploitation of new competencies, within and beyond the firm's boundaries (Pina & Tether, 2016). Innovation is not limited to the services offered by KIBS firms (service innovation). Rather, it may occur throughout the value chain and the typology offered by the OECD (2005) provides an appropriate backdrop against which it is possible to identify where improvements and changes are made to the firm's activities to sustain its growth. Indeed, empirical findings support the notion that compared to manufacturing firms, KIBS firms do perform favourably concerning technological innovation, and that non-technological innovations are also of importance (Amara, Landry, & Doloreux, 2009).

2.5.3.1   *Dynamic Capabilities for Innovation in KIBS*

While there is a predominant technologist view of innovation in manufacturing where formalized R&D is an essential component to understanding the innovation process, many are calling for a departure of this view in the study of KIBS innovation. A call for adopting the notion of dynamic capabilities is beginning to gain traction (Amara et al., 2009; den Hertog et al., 2010; Janssen, Castaldi, & Alexiev, 2018; Teirlinck & Spithoven, 2013).

At the core of this perspective is that different facets of the firm's innovation capability sustain its innovation. One view is offered by Hogan and colleagues (2011) who find that three dimensions capture the KIBS firm's context and reflect its core activities and responsibilities to clients. The first, client-focused innovation capability, captures the firm's ability to provide its clients with the services and products it offers while providing them with unique value propositions and innovative ways to solve their problems. The second, marketing-focused innovation capability, captures its ability to develop and implement new ways to go-to-market and promote its services and products. The third, technology-focused innovation, reflects the firm's ability to acquire new technology and adopt technological innovation from upstream industries to remain ahead of competitors.

Another view is offered by Janssen and colleagues (2016), in which their proposed capabilities follow knowledge at various points in the innovation process, thus capturing its input into the firm, its transformation, and its output. Of the five capabilities, two capture knowledge sourcing, one, knowledge transformation, and another two, knowledge application. While it is not the objective of this research project to test specific dynamic capabilities, it remains that the capabilities identified as primarily important to a KIBS firm's innovation relate to its ability to transform knowledge from its original input into its final output. Thus, the importance of knowledge and other intangible inputs is acknowledged while also underscoring the results of innovation, as solutions are implemented in client firms and changes are made to how the KIBS firm functions. The subheadings of innovation inputs and outputs, of knowledge transformation and recombination, and of patterned innovation behaviours are thus used to explore the literature on KIBS innovation.

2.5.3.2   *Innovation Inputs and Outputs*

As was noted earlier, knowledge is a KIBS firm's most valuable resource (Miles, 2008). Not only does it make up the firm's primary output, but KIBS also rely on it to innovate, primarily through the recombination of old and new knowledge (Anand, Gardner, & Morris, 2007; Miles, 2005).

A firm invests into its knowledge base and adds to its stock of knowledge by motivating its employees who possess expert skills and highly tacit knowledge. Expertise is vital to the survival of KIBS firms as they are hired by their clients to provide customized solutions for them (Teece, 2015). While internal investments in the firm's innovation capacity include R&D (Leiponen, 2005, 2006, 2012; Rodriguez, Doloreux, & Shearmur, 2017), other forms of less tractable innovation investments are made, such as investments in hardware and software, staff development and training, and the acquisition of external knowledge (Amara, Landry, & Traoré, 2008). Indeed, fostering the inflow of external knowledge

through a variety of information sources is a crucial determinant to innovation (Becheikh, Landry, & Amara, 2006). Regardless of their size, KIBS firms cannot solely rely on the knowledge created internally for the successful development of their innovations.

Indeed, their clients are one of their most important innovation inputs (Bettencourt et al., 2002; Morris, Smets, & Greenwood, 2015; Toivonen & Tuominen, 2009). Knowledge pertinent to innovation often resides at the supplier-client interface (Toivonen & Tuominen, 2009). Clients may prompt innovation by seeking from KIBS solutions to the problems they face and by fostering innovation through the knowledge they bring to KIBS firms, as they co-produce the services they purchase from them (Morris et al., 2015). They participate in defining the problem to resolve, they gather information in strive of solving it, and they review various options before landing upon a final solution. Cooperation between KIBS and their clients may then initiate a circular learning loop, in which feedback from clients provides information necessary for adaptation or changes to the existing services offered by KIBS, and the provision of KIBS services contributes to innovation in client firms (Aslesen & Isaksen, 2007).

Through the pressures of their demands and insofar as they ask of the firm for competent and innovative solutions, clients facilitate product or service innovation which may then loop back and affect other parts of the organizational model (Morris et al., 2015). Thus, there likely exist complementarities in the types of innovations performed by KIBS firms (Amara et al., 2009; den Hertog, 2000; Doloreux & Shearmur, 2010). One view is that the outputs of one type of innovation may become inputs or trigger other types of innovation, in a cascading sequence where the performance in one type may leverage other forms of innovation (Amara et al., 2009). Another view is that technological and non-technological innovations are not independent. Given the characteristics of service firms, and more particularly of KIBS, the development of any innovation may involve multiple areas of the firm's value chain, for example concurrently implicating its production and delivery processes as well as how it communicates and fosters relationships with clients and other actors with whom it engages.

2.5.3.3 *Resource Transformation and Recombination*

Services are often rendered following a knowledge recombination process in which knowledge gained from the interaction with the client is combined with the firm's existing knowledge; additional knowledge may be acquired, and new knowledge is generated (Muller & Zenker, 2001). As knowledge is the key component in KIBS innovation, its inherent characteristics influence the innovation process. On this topic, Leiponen (2005) notes that while knowledge may be held collectively in the firm, its accessibility and shareability is linked to its codification.

Knowledge that has been made explicit through codification facilitates sharing and integration elsewhere in the organization; it enhances the possibility for the firm to appropriate additional returns on its development, if created internally, or its acquisition, if integrated from an external information source. To this point, individual tacit knowledge is negatively correlated with innovation, as it is the most difficult to combine with other knowledge assets held by the firm (Leiponen, 2005). Thus, the formalization of knowledge management processes and the creation of collective knowledge bases to capture individual tacit competencies, often residing in teams but challenging to share firm-wide, improves the chances of recombining these intangible assets for innovation.

Given its high level of reliance on knowledge inflows and new knowledge combinations for innovation, it is fitting, then, that the firm's competitive posture and its competitive advantage are closely related to its ability to motivate its expert workforce, to build organizational capabilities that support the inflow of knowledge, and to shape a strategy that is aligned in its balance between knowledge generation and knowledge exploitation (Teece, 2015). Notable for their success are mechanisms for knowledge appropriation and intellectual property protection, control over specialized assets, and a good business model.

2.5.3.4   Patterns of Innovation Behaviors in KIBS

Though congregated under one heading, KIBS firms are a heterogeneous group and exhibit variability in their innovation behaviours (Doloreux & Shearmur, 2010) and in the knowledge bases that inform their service offerings (Pina & Tether, 2016). It is best to approach examining innovation in KIBS from an innovation mode approach, which encapsulates innovation inputs, processes, and results (Miles et al., 2017), as previous studies that have examined innovation patterns among and between KIBS sectors have found substantial heterogeneity within KIBS subsectors (Camacho & Rodriguez, 2008; Corrocher et al., 2009; Doloreux & Shearmur, 2010; Freel, 2006; Hipp & Grupp, 2005).

2.5.4   *Characterizing KIBS Internationalization*

KIBS are internationalizing as a viable growth strategy as costs of doing business abroad decrease. However, characteristics inherent to KIBS affect the ease with which they internationalize. As identified in the previous subsection, a KIBS firm's relationships with its clients are important avenues for knowledge sourcing. These relationships also foster the 'co-production' of the services rendered to the client, as KIBS often work closely with their clients to offer them customized solutions to their specific business problems. This, then, has implications for their internationalization (Miles & Miozzo, 2015).

Developments in information and communication technologies profoundly influence the production and delivery of services, and particularly of KIBS (Miozzo & Soete, 2001). Adoption and use of various technological platforms may extend the service provider's reach to clients in ways that do not require lengthy co-location or geographical proximity. The increasing prevalence of intermittent face-to-face contact supplemented by electronic communications (Doloreux & Shearmur, 2012) alters the need for co-location with clients (Torre & Rallet, 2005), a logistical consideration highly pertinent to the internationalizing firm. To overcome difficulties associated with the transfer of tacit or complex knowledge between a KIBS provider and its spatially distant clients (Doloreux & Shearmur, 2012; Miles, 2008), the firm may create instances of temporary geographic proximity by sending personnel to clients' locations (Bettiol, De Marchi, Di Maria, & Grandinetti, 2013).

Studies show that KIBS internationalization is influenced by factors which are related to knowledge and information, largely parceled between resources and capabilities. With respect to resources, a firm's knowledge base—which includes the entrepreneur's cumulative know-how and experience (Bettiol et al., 2013; Deprey, Lloyd-Reason, & Ibeh, 2012) and the firm's accumulated market and experiential knowledge (Bettiol et al., 2013; Scott-Kennel & von Batenburg, 2012)—positively influence internationalization. With respect to capabilities, internationalization is driven by the firm's knowledge management capabilities (Bettiol, Di Maria, & Grandinetti, 2011). Much work has also surveyed the influence of networking and cooperative capabilities in KIBS (Krull, Smith, & Ge, 2012; Scott-Kennel & von Batenburg, 2012). Collaborative relationships with partners such as suppliers and customers act as important knowledge bridges (Bettiol et al., 2011; Rodríguez & Nieto, 2012). These interactions improve the firm's absorptive capacity and may lead to greater innovation, which is, too, an important determinant to KIBS internationalization (Battisti, Gallego, Rubalcaba, & Windrum, 2015; Shearmur et al., 2015).

2.6   Chapter Summary

In this chapter, I laid the theoretical foundation upon which the hypotheses of the next chapter are grounded. I commented on how current IE theories assume that innovation is an important driver for internationalization in small firms. Yet our understanding of which innovation-related activities or combinations thereof that drive this phenomenon is limited. I make the point that though these theories conceptualize innovation as an element of change which triggers, enables and sustains

internationalization, a simplified reading of the innovation construct as a result only, and a product (or service) one at that, takes away the complexity and uncertainty which surrounds the innovation process.

My review of the empirical literature brings forward two important points which I seek to address in the hypotheses of the next chapter. First, extant literature has predominantly focused on technological innovation; little attention has been given to non-technological innovation. Yet previous work shows it is the combination of different types of innovation rather than one type in isolation that is correlated with a firm's propensity to enter export markets (Guan & Ma, 2003; Lewandowska et al., 2016). Second, little attention is given to the innovation inputs and activities that precede an innovation result. By operationalizing innovation as an outcome only, much of the complexity surrounding the construct is lost. By simplifying the construct and capturing only innovation results, we neglect much of the knowledge acquisition and integration process that precedes an innovation result and that could influence the firm's internationalization. Moreover, we neglect to acknowledge that in the case of SMEs, firms often struggle to achieve positive innovation results from their investments in innovation-related activities. This chapter concluded with a brief contextualization of innovation and internationalization in KIBS.

CHAPTER 3   THEORETICAL BACKGROUND AND HYPOTHESES

3.1   Chapter Overview

The INV perspective and the Uppsala theory of gradual internationalization both assume innovation is a critical determinant to the initiation and continuation of international activity in small firms (Johanson & Vahlne, 1990, 2009; Oviatt & Mcdougall, 1997; Oviatt & McDougall, 2005a, 2005b; Schweizer et al., 2010). As demonstrated in the literature review, though the relationship between innovation and internationalization has received considerable empirical attention, testing of this foundational assumption in the IE literature remains incomplete. As much of the IE literature builds on innovation as a mechanism for 'change' and 'adaptation,' this thesis poses the following research question: *Does a small KIBS firm's innovation influence its propensity and intensity of internationalization?* I examine whether firms that are more inclined towards innovation have a greater propensity and intensity of internationalization. In alignment with the reviewed body of literature, I adopt a wider definition of innovation, which is understood as a multidimensional construct going beyond product or service innovation. Rather, it encompasses multiple types of innovation results—including product, process, management and marketing innovations—and captures the preceding activities that may give way to innovation results, such as internal innovation activities and external knowledge sourcing.

IE theories build upon the premise that the firm's innovation capabilities and, more specifically, its product or service innovation drive it towards foreign markets. Empirical findings also support the idea that internationalization decisions are driven by a firm's ability to invest in knowledge development and innovation (Filatotchev & Piesse, 2009). Multiple motivations for this relationship are cited in the past, many of which are economic in nature: to capitalize on larger potential market shares (Aspelund & Moen, 2005; Bloodgood, Sapienza, & Almeida, 1996), to recover greater fixed investments costs (Kafouros, Buckley, Sharp, & Wang, 2008; Love & Mansury, 2009; Zahra, Ireland, & Hitt, 2000), and to seize perceived market opportunities by developing and adapting products and services tailored to foreign customer needs (Filipescu, Rialp, & Rialp, 2009; Rodríguez & Nieto, 2012; Zahra et al., 2000). Though multiple motivations exist, common to all is the idea that greater innovation investments lead to an improved ability or greater impetus for internationalization.

Though the Uppsala model and the INV perspective fundamentally differ on the pace and timing of internationalization in a small firm, each recognizes the role of innovation as a means for 'change' and 'adaptation' in foreign markets. It may then be deduced that a small firm's internationalization will depend upon its innovation, irrespective of its internationalization trajectory. This statement is supported by the notion that the generative mechanisms of both the Uppsala model (Johanson & Vahlne, 2009) and the INV perspective (Oviatt & McDougall, 2005b) rely on innovation as a change agent. Both theories implicitly use a larger understanding of innovation to capture multiple types of innovation, both technological and non-technological, as a means for the firm to 'change' and 'adapt' to foreign markets and compete against local firms.

Yet in both theories, though primarily more so the INV perspective, greater emphasis is put on technological capabilities and product innovation to garner and sustain a competitive advantage abroad. The precedent of attributing greater importance toward technological innovation transpires into the empirical examination of this relationship, whereby most studies capture the construct of innovation only through product—and to a lesser extent process—innovation. Thus, there are discrepancies between the theoretical conceptualization of small firm internationalization and its empirical examination. By investigating innovation strictly through a technological innovation lens, we may only gain an incomplete understanding of how the firm 'changes' and 'adapts' its business offering to penetrate and sustain its activities in foreign markets. What is more, perpetuating a limited definition of innovation comprised only of technological innovation further entrenches the notion that product innovation is a prerequisite for small firm internationalization.

Therefore, I strive to examine the relationship between innovation and internationalization in the small KIBS firm context in three steps. In each step, I progressively broaden the conceptualization of innovation to encompass advances made in the innovation literature since the late 1990s. Doing so overcomes limitations to IE theories that overlook how the innovation construct has evolved in the innovation literature, and expands the role of innovation beyond the traditional focus of new product introductions. Moreover, as will be explained in the next chapter, I make use of a novel method, Qualitative Comparative Analysis (QCA), to test the study's hypotheses and to compare these results with those derived from traditional statistical analyses.

The analytical strategy is best summed up by a 2 x 3 x 2 table, as depicted in Table 6. While all methods used to test the hypotheses outlined in this chapter are discussed at length in Chapter 4, it is important to note at this time that two distinct methodological philosophies are used for hypothesis testing: traditional statistical analyses (e.g., binary logistic regression and fractional logistic regression) as

well as Qualitative Comparative Analysis (e.g., fuzzy set QCA and crisp set QCA). The reader may notice the hypothesis statement wording differs for each type of method to reflect terminology appropriate to each methodological approach.

Table 6 Overview of Comparative Hypothesis Design

Innovation Topic	Traditional Statistical Analysis	Qualitative Comparative Analysis
Service Innovation	H1a: positive association between service innovation and internationalization propensity	H1b: service innovation is a necessary condition for internationalization propensity
	H4a: positive association between service innovation and internationalization intensity	H4b: service innovation is a necessary condition for internationalization intensity
Combination of Service and Other Innovation Results	H2a: positive association between service innovation in combination with other types of innovation results and internationalization propensity	H2b: configurations of service and other types of innovation results are conducive to internationalization propensity
	H5a: positive association between service innovation in combination with other innovation results and internationalization intensity	H5b: configurations of service and other types of innovation results are conducive to internationalization intensity
Open Innovation and Innovation Modes	H3a: positive association between open innovation modes and internationalization propensity	H3b: configurations of innovation attributes analog to an open innovation mode are conducive to internationalization propensity
	H6a: positive association between open innovation modes and internationalization intensity	H6b: configurations of innovation attributes analog to an open innovation mode are conducive to internationalization intensity

Three primary hypotheses are laid out in this chapter.[2] In the first hypothesis, I set out to test in a sample of small KIBS firms the theoretical assumption that there exists a positive relationship between performing a service innovation and internationalization. In the second hypothesis, I extend this assumption by examining whether performing multiple configurations of innovation results positively influences internationalization, as one considers that a firm innovates in multiple areas of its value chain via multiple types of innovation (i.e., product, process, management, and marketing). Thus, I examine

[2] The numbering of the hypotheses reflects the order in which they will be examined in Chapter 5.

whether multiple 'recipes' of innovation results are associated with internationalization. In the third hypothesis, I depart from the assumption that innovation results are a prerequisite for small firm internationalization. I examine whether there exist equifinal configurations of innovation variables when one considers both innovation inputs and outputs to explain internationalization. Of interest, I strive to determine whether configurations that reflect an 'open' innovation mode—an innovation pattern that characterizes the firm's openness towards external knowledge acquisition, investment in its internal innovation activities, and successful innovation results—are positively associated with internationalization.

Each hypothesis is first tested using a binary operationalization of internationalization—dubbed internationalization propensity—which depicts whether or not the firm recorded sales from foreign markets. It is then tested using a continuous fractional variable capturing a firm's internationalization intensity, commonly calculated using the foreign sales to total sales (FSTS) ratio which depicts the relative percentage of sales received from foreign markets.

In so doing, I extend IE theory testing by acknowledging that innovation is a broader construct consisting of various internal and external activities as well as outputs that go beyond product or service innovation. More importantly, I call upon new developments in the innovation literature that suggest various innovation activities and results taken together form distinctive innovation modes which may influence the firm's internationalization. Finally, I also bring forth a novel method that departs from conventional statistical techniques and makes use of Boolean algebra to examine the necessary and sufficient conditions related to innovation that explain internationalization. As each hypothesis will subsequently be tested using both traditional statistical techniques as well as QCA, I comment on how the use of different methodological philosophies may come to forge our understanding of a complex topic such as the one under review in this thesis.
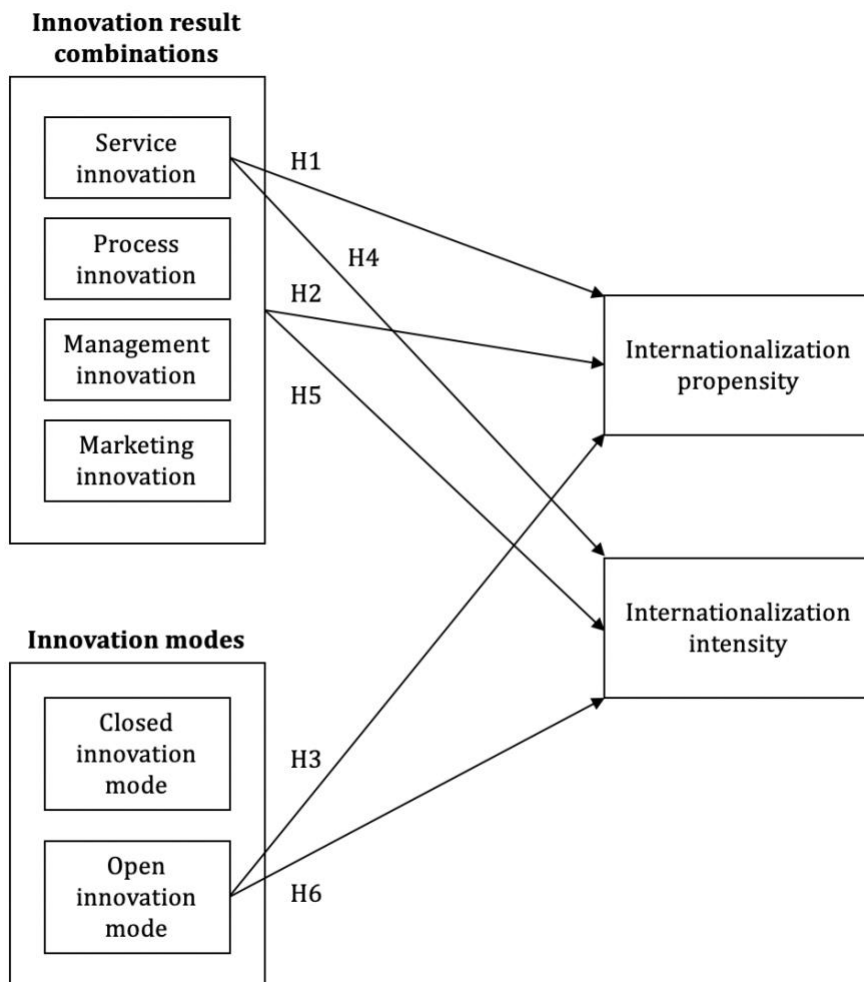
Figure 1 Overview of Hypothesis Structure

3.2 The Relationship between Service Innovation and Internationalization

I begin by testing the underlying assumption common to both the Uppsala model and the INV perspective that firms that innovate have a greater propensity to internationalize. Thus, to account for a general situation of small firm internationalization applicable to KIBS firms, I propose that *KIBS that innovate their services are more likely to internationalize than those that do not.* Two main reasons lend support to this hypothesis.

First, firms that perform service innovations may recognize an economic impetus to exploit their innovations in foreign markets (Cassiman & Golovko, 2011) and thus be more likely to internationalize. Some have demonstrated that where innovation costs are considerable, firms need to achieve a certain degree of internationalization to reap the fruit of their innovation. With internationalization, the fixed costs associated with innovation are spread out over a larger market share to recover initial investments (Kafouros et al., 2008; Love & Mansury, 2009). Internationalization also offers a means for the firm to exploit its innovation, and often follows the development of a new or significantly improved service or product (Higón & Driffield, 2011; Prashantham, 2008). Firms may penetrate new markets with greater ease due to the firm's ability to exploit its innovation (Filipescu et al., 2009). An innovation to the firm's product or service may also act as a barrier to imitation or entry against competing firms. It may enable the firm to benefit from a first-mover advantage (Becker & Egger, 2013), and extend the product or service's life cycle (Leonidou, Katsikeas, Palihawadana, & Spyropoulou, 2007). These technological factors are also important drivers of internationalization in KIBS, as service innovations are crucial upon entering export markets and to extend their market penetration (Gourlay, Seaton, & Suppakitjarak, 2005; Love et al., 2011).

Second, service innovations may direct firms toward international opportunities. Firms respond to international opportunities that exist within their 'knowledge corridor' (Chandra, Styles, & Wilkinson, 2009). As a KIBS firm makes use of its expert knowledge and innovates its service offering, the firm further entrenches the knowledge corridors that shape what opportunities can be observed and to which the firm can respond. Indeed, opportunity recognition and the exploitation of said opportunities is a critical capability for internationalization (Chandra, Styles, & Wilkinson, 2012; Johanson & Vahlne, 2009; Pitelis & Teece, 2010). Vahlne and Johanson (2013) specify as firms gain experience, and these experiences are inputted into innovation processes, changes may then result. In the case of KIBS, users are given a prominent place in the value creation process as they are often co-creators or co-producers of the knowledge-based solution they purchase from a KIBS firm (Bettencourt et al., 2002). New services are often 'user-driven' and result from client-supplier interactions, largely determined by consumer needs and tacit knowledge rather than internal codified knowledge (Hipp et al., 2015). In this sense, KIBS' clients may act as important knowledge resources. They act as an input into the innovation process, where they help forge and give sense to the value of a service innovation. They also act as an external information source for new international opportunities, as clients are known to be important ties for the recognition of new opportunities (Bell, Crick, & Young, 2004; Freeman, Edwards, & Schroder, 2006; Kuivalainen et al., 2012).

In summary, a KIBS firm that innovates its services may encounter a greater propensity to internationalize due to an economic impetus to exploit its innovation, and to newly recognized international opportunities related to the exploitation of said innovation. Therefore, I propose the following:

H1a: There is a positive relationship between recording a service innovation and the internationalization propensity of small KIBS firms.

H1b: Service innovation is a necessary condition for internationalization propensity in small KIBS firms.

To further extend testing of the underlying assumption that innovation is a pivotal driver of small firm internationalization, I examine the influence of service innovation on the firm's internationalization intensity. In alignment with recent studies in IE, internationalization intensity is understood as the scale of the firm's international sales, or its 'degree of internationalization' (Dhanaraj & Beamish, 2003; Filipescu et al., 2013; Sui & Baum, 2014). Building on the same general situation of small firm internationalization, I propose that KIBS firms that innovate their services are more likely to attain a higher internationalization intensity than those who have not recorded any innovation at all.

Firms that perform service innovations may be better positioned to seize international opportunities abroad, which in turn may affect their internationalization intensity. In SMEs, the development of capabilities associated with product/service innovation is influential to the export performance of the firm (Raymond et al., 2014). More specifically, a KIBS firm's innovation capabilities are reported as being positively related to its internationalization (Di Maria, Bettiol, De Marchi, & Grandinetti, 2012). Indeed, service firms that innovate are those that internationalize their activities the most and achieve higher business growth (Castaño et al., 2016).

The relationship between product/service innovation and internationalization intensity has received empirical attention, with studies focusing predominantly on manufacturing and high technology sectors. Product innovation has been found to improve the firm's strategic positioning and its ability to seize foreign opportunities. Innovation to a firm's product enables it to develop its competitive advantage primarily through product differentiation, thus allowing the firm to compete in foreign markets (López Rodríguez & García Rodríguez, 2005). It has also been linked as a key determinant to export intensity in high technology SMEs (D'Angelo, 2012), science-based knowledge-intensive (Pla-Barber & Alegre, 2007), and manufacturing firms (Kirbach & Schmiedeberg, 2008). Firms that innovate their products are not only more likely to export, but they also tend to report a higher percentage of sales from foreign

markets than those that do not. However, these findings are contested by Love et al. (2016) and Harris and Li (2009), who find that innovation is not associated with a firm's export ratio, as captured by the FSTS ratio, in UK SMEs and manufacturing firms.

The effect of product innovation on the geographic scope of a firm's internationalization has also been examined, though mostly again within the context of high technology and manufacturing. D'Angelo et al. (2013) report that product innovation has a positive impact on the regional and global scale of a firm's export in Italian manufacturing firms. These results echo those of others (Cassiman & Golovko, 2011; Roper & Love, 2002; Wakelin, 1998) who have also examined this question in similar European manufacturing settings. Most recently, Love et al. (2016) report that the degree of novelty of an innovation is positively associated with the geographical scope of the firm, both in terms of its number of countries and number of regions. They suggest that a more radical product innovation is associated with export into more distant markets outside the firm's regional market, perhaps enabling the firm to overcome additional liability of foreignness associated with moving well beyond the home region. Accordingly, a positive association between product innovation and the firm's geographic scope has been consistently established in the manufacturing sector.

However, the above-stated studies predominantly examine the effect of innovation on internationalization intensity in manufacturing or high technology firms; little attention has been given to services or KIBS firms. That said, our understanding of KIBS—of how they operate and of the factors that drive their internationalization—supports the idea that a similar relationship will hold. KIBS firms are inherently relational in nature, given that value is communicated to their clients through the development of solutions that build upon tacit knowledge sharing and collaboration (den Hertog, 2000; Doloreux & Shearmur, 2012). At the heart of KIBS' activities lie the production of knowledge from knowledge, a function which rests on their ability to process and produce knowledge on behalf of and in respond to the needs of their clients (Gallouj, 2002). Thus, embedded in the service offering of KIBS firms is the heightened importance of personal interaction between service provider and client. The firm's human capital acts as an interface between the firm and its environment. Through its formal and informal networks, KIBS professionals may gain access to new information. Via these interactions, tacit knowledge is exchanged, and KIBS firms gain new market knowledge through their business relationships (Freeman & Sandwell, 2008; Krull et al., 2012). Service innovations are often triggered by the needs of their clients' requirements (Bettencourt et al., 2002). They are the result of collaborations with different actors such as customers, employees, or other commercial partners (Doloreux & Shearmur, 2010), and are implemented through recursive interactive loops between the client and the service

provider (den Hertog et al., 2010; Hipp & Grupp, 2005). Changes associated with service innovation in KIBS alter the service content as well as the procedures linked with its production and delivery (Hipp & Grupp, 2005). These changes are critical to the adaptation of services to new market conditions imposed by entry into foreign markets, or to respond to the needs of international clients.

Taken together, we may gather that KIBS firms that innovate their services are better positioned to identify and respond to new international opportunities, and as such, are therefore more likely to attain a higher internationalization intensity. In accordance, I propose the following hypotheses:

> H4a: There is a positive relationship between recording a service innovation and the internationalization intensity of small KIBS firms.

> H4b: Service innovation is a necessary condition to attain at least low internationalization intensity in small KIBS firms.

3.3 The Conjunctive Effect of Multiple Innovation Results on Internationalization

The relationship between product (and service) innovation and internationalization is well established in the literature. However, building on advancements in the service innovation literature, I question whether it is the combination of innovation types rather than just product or service innovations alone that increase the firm's propensity to internationalize. Thus, I begin to explore the assumption that product or service innovations, only, are drivers of small firm internationalization. Doing so departs from most studies on small firm internationalization that historically have focused on examining the effect of the firm's technological innovations. That said, recent empirical work also underlines that both technological and non-technological innovations are drivers of internationalization, and more importantly, greater benefits of product and service innovations are observed when coupled with other types of innovation (Becker & Egger, 2013; Lewandowska et al., 2016; O'Cass & Weerawardena, 2009). Thus, I propose that firms that record multiple types of innovation are more likely to internationalize than those that do not innovate at all.

For the firm to compete in foreign markets, it must undertake innovation in all its value creating activities, encompassing both technological and non-technological innovations (O'Cass & Weerawardena, 2009). The development of innovations throughout the firm's value chain may better position the firm to act upon international opportunities. Indeed, Vahlne et al. (2011) express the need to examine resource commitment decisions in foreign markets as a reconfiguration of the resources available to the firm, and a redesign of its coordination systems and their content. The acts of reconfiguring and

redesigning resources are in and of themselves innovations, requiring from the firm new means-ends relationships which are encompassed under the broader definition of innovation (Drucker, 2015; OECD, 2005, 2010; Schumpeter, 1934). This view of internationalization is paralleled by Weerawardena et al. (2015) who argue that in INVs, both technological and non-technological innovations are requisite to the successful early internationalization of small, young firms. Moreover, they stress the importance of non-technological innovations, particularly those concerned with transforming external information into marketing innovations which bring value to customer needs.

Similar remarks have been made in the case of KIBS. Rodríguez and Nieto (2010, 2012) stress the importance of innovation capability in KIBS as an important competitive factor for internationalization. The firm's innovation capability allows it to develop services tailored to the needs of international clients while being able to transform and adapt the firm's processes to deliver its services under new conditions. The highly relational nature of KIBS requires the firm to establish means by which it embeds itself in its environment and develops new knowledge and relationships (Najafi-Tavani, Giroud, & Sinkovics, 2012). To this point, Bettiol and colleagues (2013) argue that necessary to the successful extension of a KIBS' market is the ability to cope with the problem of distance between the firm and its clients; to develop relational capabilities by leveraging network technology and developing cooperative agreements with organizations outside the domestic market. Taken together, these activities encapsulate both technological and non-technological innovations which mold the firm's competitive posture and better position it to respond to the needs of foreign clients.

In summary, a KIBS firm that performs multiple types of innovation may encounter a greater propensity to internationalize as they are better positioned to respond to the needs of foreign clients and seize foreign international opportunities. This is due to the inherent relational nature of the internationalization process which requires innovation across multiple business functions. Therefore, I propose the following hypothesis:

> H2a: There is a positive relationship between recording a service innovation in conjunction with other types of innovation and the internationalization propensity of small KIBS firms.

> H2b: Service innovation in combination with other types of innovation are conducive to internationalization propensity in small KIBS firms.

I continue to apply the logic that combinations of different types of innovation have a greater influence on small firm internationalization rather than product or service innovation alone, or no innovation at all. To extend the testing of this assumption in IE theories, I now apply it to the firm's

internationalization intensity. As extrapolated above, not all innovations are created equal. The benefits of a service innovation may be observed in conjunction with other types of innovation, and both technological and non-technological innovations are drivers of small firm internationalization. This logic is thus conducive to configurational thinking: 'recipes' of condition variables may demonstrate equifinality and lead to similar outcomes (Fiss, 2011; Ragin, 2008). IE theories are unclear, however, how innovating across multiple areas of the firm's value chain influence its internationalization intensity. As a means for theory extension, I propose that firms that adopt certain configurations of innovation types are more likely to have a higher internationalization intensity than those that do not innovate at all.

As previously expressed, a firm may develop its competitive edge through its innovation capability. It allows the firm to compete based on its product or service offerings while striving to reduce the cost of production through process innovation (Filipescu et al., 2009). There exist complementarities between technological and non-technological innovations (Becker & Egger, 2013; Damanpour et al., 2009; Lewandowska et al., 2016; O'Cass & Weerawardena, 2009; Weerawardena et al., 2015). The overall innovation performance of a firm is not only dependent upon its ability to innovate its product, services, and processes. Rather, it also depends on the non-technological innovations which accompany the technological ones (Lewandowska et al., 2016; Mothe & Uyen Nguyen Thi, 2010). Taken together, combinations of innovations work jointly towards improving the firm's innovation capability and driving the firm's competitive advantage.

We may then expect a higher internationalization intensity from firms that record multiple types of innovation given their improved ability to respond to market opportunities. On this topic, Meliá et al. (2010) report that a firm's emphasis on innovation enables it to enter new markets as it has developed the capabilities necessary to transform its resources and capabilities, and reshape its processes and structures to new market demands. The idea of firms accruing greater internationalization benefits from concurrently producing different types of innovation is gaining traction. Weerawardena et al. (2015) note that the concurrent adoption of both technological and non-technological innovation supports early internationalization in both US and Australian new ventures, as it improves the firm's innovation capabilities and its ability to respond based on its market knowledge. Guan and Ma (2003) also observe in Chinese manufacturing firms that an improvement in the firm's overall innovation capability increases its export growth. The same importance attributed to technological activities related to technological innovation should also be given to the supporting or enabling processes that encompass non-technological innovation. Moreover, supplementary innovation assets are crucial to both the development of technological innovations, as well as determining the export performance of firms. Similarly, in their

study of medium and large industrial Polish firms, Lewandowska et al. (2016) find that the strongest positive relationship with new product exports is found when firms perform product-process innovations, as well as product-process-marketing innovations. A weaker relationship is noted in firms that introduce new product innovations only. These findings are in line with those of Autio et al. (2000) and Bloodgood et al. (1996), who also note that innovation that builds on the firm's organizational knowledge enables it to adapt to foreign markets and to perceive opportunities abroad.

Though the idea of innovation complementarities has been floating for some time, only now is it garnering greater empirical consideration. In the case of service firms, the effect of innovation complementarities has received little empirical attention and overall, no study has yet to examine the effect of innovation complementarities on internationalization intensity. Moreover, studies looking at innovation complementarities have almost exclusively used conventional statistical tools to examine these relationships. Yet, correlational techniques are not conducive to examining complex relationships, where interdependencies and interaction effects are expected from three or more contributing factors (Fiss, 2011; Ganter & Hecker, 2014; Ragin, 2008).

With that said, studies pertaining to services on the effect of innovation complementarities do, however, lend support for the hypothesis that multiple innovation types are associated with a higher internationalization intensity. The services delivered by KIBS to their clients rely on the firm's ability to transfer knowledge and skills, intangible outputs that fundamentally differ from the tangible nature of goods and products. Scholars have underlined the importance of straying from the focus on technological innovations. Damanpour et al. (2009) propose that the argument to deepen the firm's knowledge in one area and build its absorptive capacity by focusing on one type of innovation does not explain incremental innovation in service firms. Rather, they suggest innovation throughout the firm's value chain promotes a greater impact on the firm's competitive position.

One reason for this is that KIBS firms must continuously update their service offering, as appropriation mechanisms and other means of protection against imitation and commodification are nearly impossible (Morris et al., 2015). Reports of innovation in KIBS firms underscore the importance of incremental innovations incurred during the customization of solutions in response to clients' particular needs and problems. It follows, then, that recent advancements underscore the importance of examining innovation across the firm's value creating areas to encompass the activities which support the firm's ability to implement changes to how services are managed, marketed, and delivered to clients (Amara, D'Este, Landry, & Doloreux, 2016). The few empirical studies on complementarities in KIBS support these ideas, as findings suggest there exist complementarities between technological and non-

technological innovations (Amara et al., 2009), and these are associated with firm performance (Santos-Vijande, González-Mieres, & López-Sánchez, 2013) and employment growth (Szczygielski, Grabowski, & Woodward, 2017).

When juxtaposed to the phenomenon of KIBS internationalization, such results may have profound meaning to the innovations necessary to support the firm's adaptation of its offerings to new markets. Thus, firms that perform multiple types of innovation may be better positioned to seize more international opportunities and to respond to the needs of foreign clients, and therefore, may be more likely to have a higher internationalization intensity. I thus propose the following hypotheses:

> H5a: There is a positive relationship between recording a service innovation in conjunction with other types of innovation and the internationalization intensity of small KIBS firms.

> H5b: Service innovation in combination with other types of innovation are conducive to attaining at least low internationalization intensity in small KIBS firms.

3.4 The Relationship between Innovation Modes and Internationalization

The final set of hypotheses seeks to extend further assumption testing in IE theories by introducing the concept of innovation modes. IE theories are silent on whether firms may differ based on how they come to innovate, and whether these differences in innovation behaviors affect their internationalization propensity and intensity. The concept of innovation modes allows to identify similar behaviors adopted by firms that capture their investment in internal innovation activities, their acquisition and integration of external information sources, and the various types of innovation results they output. They are interpreted on a continuum varying from closed, when the firm makes use of only internal resources, to open when it makes greater use of external information sources (Dahlander & Gann, 2010; Lichtenthaler, 2011; Rodriguez et al., 2016). Building yet again on the same general situation of small firm internationalization, I propose that firms that adopt an 'open' innovation mode are more likely to internationalize and attain a higher internationalization intensity.

The traditional view of innovation is one that is closed and linear. As the literature departs from this understanding of innovation and adopts a networked understanding of learning and knowledge acquisition critical to the innovation performance of the firm, scholars do, however, continue to underscore the importance of the firm's internal innovation activities. R&D may indeed play a dual role building the firm's innovation capability (Doloreux, Shearmur, & Rodriguez, 2016). The firm's internal

knowledge activities are necessary to generate new stocks of knowledge, which in turn contribute to the creation of new combinations of new and old knowledge which foster various types of innovation. R&D is also linked to the development of an organizational culture open to the acquisition of new knowledge, and the development of processes necessary to organize and integrate new knowledge into the firm's existing knowledge base (Laursen & Salter, 2006; Love, Roper, & Vahter, 2014).

External information sources complement the firm's internal R&D activities, as the firm's internal knowledge generating activities are crucial to the development of the firm's knowledge base (Cassiman & Veugelers, 2006; Hagedoorn & Wang, 2012). The firm's openness to external sources of knowledge tends to increase with R&D intensity as well as human capital intensity (Mina et al., 2014). Jointly, information search and the organization of new ideas positively improve the firm's absorptive capacity (Laursen & Salter, 2006). The concept of absorptive capacity, as brought forward by Cohen and Levinthal (1990), suggests that critical to the firm's innovation performance is its ability to recognize the value of external knowledge and to exploit it in its innovation activities. By acquiring and accessing knowledge from various parties in the firm's external environment such as customers, clients, and governmental research agencies, among others, the firm builds upon the knowledge it currently holds.

Of importance, however, is that empirical results predominantly underscore that external search is beneficial to firms that innovate to imitate competitors, rather than to introduce novel radical innovations. Furthermore, for firms that play catch-up to competitors, there are diminishing returns to a firm opening itself to many information sources and having too wide a breadth of search, and that maintaining these linkages or developing depth in these relationships is costly to the firm (Dahlander & Gann, 2010; Laursen & Salter, 2006). These findings also hold for service firms (Battisti et al., 2015). Indeed, innovation in services and more specifically in KIBS is often very rapid and incremental in nature; therefore, it is neither novel to the marketplace nor radical, and arises as a form of intra- or extra-sectoral imitation (Djellal & Gallouj, 2001; Hipp & Grupp, 2005). Aligned with this logic, the importance of external information sources in KIBS firms is well documented and established (Amara et al., 2009; Asikainen, 2015; Doloreux & Shearmur, 2010, 2013), as varied external information sources act as drivers of both technological and non-technological innovations (Amara et al., 2009).

Building on the open innovation paradigm, two reasons support why small KIBS firms that adopt an open innovation mode may be better positioned to recognize and seize international opportunities, and thus, have a greater propensity to internationalize and attain a higher internationalization intensity. First, having diversity in the firm's knowledge base promotes greater innovation success. Prior research

demonstrates that innovation outcomes are affected by the breadth of information sources utilized by the firm.

Leiponen and Helfat (2010) theoretically explore the idea that as the success of an innovation result is uncertain, a firm may improve its odds of achieving an innovation success by adopting a variety of approaches in its innovation activities. They apply this logic to the concept of knowledge search beyond the firm's boundaries and suggest that by accessing a greater number of information sources, the firm may improve its odds of obtaining knowledge it will recognize as valuable towards an innovation outcome. Breadth in the firm's external knowledge sourcing becomes important as a means to counter managerial cognitive biases which narrowly limit the scope of the search for new knowledge. Their empirical findings pertaining to manufacturing firms in Finland call for the adoption of a greater breadth both in terms of innovation objectives (e.g., replacing outdated products, improving product quality, and expanding product assortment, among others) as well as information sources, as both are predictors of greater technological innovation success at the firm level. In the case of SMEs, innovation performance is found to be improved by increasing the breadth of external information sources. A 'full-scope' sourcing strategy is preferable to one that is minimal, though firms may also find benefits by being selective in their sourcing approach due to the incurred costs of having a greater breadth (Brunswicker & Vanhaverbeke, 2015).

In the case of service firms as well as KIBS, there is consistent support for the view that diversity in the firm's information sources promotes innovation success (Leiponen, 2005; Love et al., 2011; Love, Roper, & Hewitt-Dundas, 2010; Mansury & Love, 2008; Tether, 2005). Furthermore, a firm's openness towards external sources of knowledge positively affects its innovation performance and the diversity of innovation types it records (Love et al., 2011). As established in the previous chapter, the literature consistently finds a strong association between innovation and internationalization; an association which holds in the case of KIBS firms. It may then be posited that the firm's improvement of its innovation success through the use of multiple information sources may then translate into greater internationalization intensity.

Second, the capabilities necessary to align external inbound knowledge flows into the firm's knowledge base may be complementary to capabilities foundational to the firm's internationalization. SMEs that adopt an open inbound knowledge sourcing strategy are confronted with managing and organizing more complex innovation processes (van de Vrande et al., 2009). It is insufficient for the firm to be simply open to external information sources; they must also develop the internal capabilities

necessary to organize and manage these resources and develop appropriate linkages with the firm's existing knowledge base (Brunswicker & Vanhaverbeke, 2015; Love et al., 2011).

Capabilities surrounding knowledge management supporting 'internal connectivity' are, therefore, crucial for open innovation to benefit the firm's innovation outcomes. In their study of Chinese manufacturing firms, Guan and Ma (2003) find that beyond allowing core innovation assets to function effectively, supplementary innovation assets which 'support and harmonize the innovation process' are also determinants of the firm's export performance. Building on Teece's (2007) conceptualization of the microfoundations of dynamic capabilities, Al-Aali and Teece (2014, p. 107) suggest that the capabilities foundational to the internationalization of small firms may be disaggregated into three categories: "(1) identification and assessment of opportunities at home and abroad (sensing), (2) mobilization of resources globally to address opportunities and to capture value from doing so (seizing), and (3) continued renewal (transforming)." These capabilities call upon the firm's ability to recognize the value of new knowledge from the firm's external environment, integrate it into its existing knowledge base, and apply it to commercial ends. They call upon the firm's ability to organize and manage its internal knowledge flows and innovate throughout its value chain via various innovation types as a means to seize and respond to new market opportunities, as well as transform their business offering by creating recombinations of new and existing resources. For example, firms that are internationally engaged make use of a greater number of innovation inputs, and generate more innovation outputs (Haneda & Ito, 2014). Consequently, firms that actively invest in knowledge management capabilities inherent in the successful adoption of an open innovation strategy may then be better positioned to identify and respond to international opportunities. This may then translate to greater internationalization intensity.

Understanding of innovation in KIBS suggest these rationales hold for this sub-sector of service firms. KIBS are recognized as highly innovative organizations: the competencies and capabilities that form their ability to innovate are built through various internal and external activities (Doloreux & Shearmur, 2013; Miles, 2008; Tether, Li, & Mina, 2012). Innovation outcomes are heavily reliant upon inputs from external knowledge from various sources, including market sources such as customers and suppliers (Tether & Tajar, 2008). In the case of KIBS, the firm's openness towards external information sources is linked to both positive innovation performance outcomes (Cho, Park, & Choi, 2011; Love et al., 2011), as well as export activity (Di Maria et al., 2012; Doloreux et al., 2016; Rodriguez et al., 2016).

Taken together, the evidence provided suggests that the adoption of an 'open' innovation mode leads to a greater likelihood of internationalization and to a higher internationalization intensity. Two reasons support this conjecture: first, having diversity in the firm's knowledge base promotes greater

innovation success, and second, the capabilities necessary to align external inbound knowledge flows into the firm's knowledge base may be complementary to capabilities foundational to the firm's internationalization. Understanding of innovation in KIBS supports why this relationship should hold in this sub-sector of service firm. Therefore, I propose the following hypotheses:

H3a: There is a positive relationship between adopting an open innovation mode and the internationalization propensity of small KIBS firms.

H3b: A combination of moderate internal innovation activities and use of external information sources in conjunction with technological or non-technological innovation results—all indicative of an open innovation mode—are conducive to internationalization propensity in small KIBS firms.

H6a: There is a positive relationship between adopting an open innovation mode and the internationalization intensity of small KIBS firms.

H6b: A combination of moderate internal innovation activities and use of external information sources in conjunction with technological or non-technological innovation results are conducive to attaining at least low internationalization intensity in small KIBS firms.

3.5   Chapter Summary

This chapter brought forward three sets of hypotheses designed to test the influence of innovation on internationalization, as assumed by current IE theories. They also extend testing of this assumption by further developing the innovation construct to reflect advances made in innovation studies.

As was briefly mentioned, I will make use of a novel method, QCA, as well as traditional statistical analyses to test these hypotheses. While both analytical techniques will be detailed at length in the following chapter, adopting new methods that depart from conventional statistics and comparing their results to those derived from mainstream methods may impart a new understanding of this established phenomena to extend and refine theory. Specifically, by examining established relationships using novel methods that build on Boolean algebra and principles of necessary and sufficient conditions, I may comment on how configurations of condition variables related to innovation influence the propensity and intensity of internationalization in small KIBS firms, thus providing insight by way of a new methodological lenses.

Secondary to the three sets of hypotheses is another guiding line of questioning pertaining to how this change of method may depart from or support current understanding. As QCA builds on Boolean

algebra principles rather than correlations, the researcher is not plagued by the same limitations imposed by conventional approaches. This secondary line of questions puts into question current understanding of existing theory by examining how, when applying configurational thinking and distancing ourselves from linearity, additive effects, and unifinality (Fiss, 2011; Woodside, 2016), we may come to examine theoretical assumptions by embracing principles of non-linearity, synergistic effects, and equifinality.

Table 7 Secondary Line of Questioning from Comparative Methods

Hypothesis Set	Secondary Line of Questioning
The Relationship between Service Innovation and Internationalization	(1) Is service innovation a necessary condition for the presence of internationalization? Are other types of innovation necessary for the presence of internationalization?
The Conjunctive Effect of Multiple Innovation Results on Internationalization	(2) What are the differences between the configurations that explain the presence and the absence of internationalization propensity? Between the configurations that explain the presence and the absence of low and moderate internationalization intensity?
The Relationship between Innovation Modes and Internationalization	(3) What can be said of equifinal solutions? Are innovation results—predominantly technological innovations—conditions part of a sufficient configuration for the presence of low or moderate internationalization? Are there alternate configurations that include only innovation inputs and no innovation results?
	(4) What differences are there in the configurations that explain the presence or absence of the two outcome variables when we include internal innovation activities and information sources to the analysis?

By examining configurations of conditions associated with the multiple dimensions of the innovation construct, I may pose questions such as: How do configurations of condition variables (innovation) that lead to an outcome (internationalization) differ from those that explain the absence of said outcome? Are innovation results, particularly technological innovations, conditions that are part of a sufficient configuration for the presence of low (or moderate) internationalization intensity? Are there solutions that include only innovation inputs? Table 6 captures the secondary line of questioning that guides the analysis.

Boolean algebra and QCA are further explained in the following chapter. A case is made for why the use of QCA is an appropriate methodological approach for the study of these questions. I also comment on why this novel method is ready for import into international entrepreneurship studies to refine and extend existing theories.

Table 8 Synthesis of Hypotheses

The Relationship between Service Innovation and Internationalization

H1a:	There is a positive relationship between recording a service innovation and the internationalization propensity of small KIBS firms.
H1b:	Service innovation is a necessary condition for internationalization propensity in small KIBS firms.
H4a:	There is a positive relationship between recording a service innovation and the internationalization intensity of small KIBS firms.
H4b:	Service innovation is a necessary condition to attain at least low internationalization intensity in small KIBS firms.

The Conjunctive Effect of Multiple Innovation Results on Internationalization

H2a:	There is a positive relationship between recording a service innovation in conjunction with other types of innovation and the internationalization propensity of small KIBS firms.
H2b:	Service innovation in combination with other types of innovation are conducive to internationalization propensity in small KIBS firms.
H5a:	There is a positive relationship between recording a service innovation in conjunction with other types of innovation and the internationalization intensity of small KIBS firms.
H5b:	Service innovations in combination with other types of innovation are conducive to attaining at least low internationalization intensity in small KIBS firms.

The Relationship between Innovation Modes and Internationalization

H3a:	There is a positive relationship between adopting an open innovation mode and the internationalization propensity of small KIBS firms.
H3b:	A combination of moderate internal innovation activities and use of external information sources in conjunction with technological or non-technological innovation results—all indicative of an open innovation mode—are conducive to internationalization propensity in small KIBS firms.
H6a:	There is a positive relationship between adopting an open innovation mode and the internationalization intensity of small KIBS firms.
H6b:	A combination of moderate internal innovation activities and use of external information sources in conjunction with technological or non-technological innovation results are conducive to attaining at least low internationalization intensity in small KIBS firms.

CHAPTER 4   METHODOLOGY

4.1   Chapter Overview

The objective of this chapter is to describe the data collected for this thesis, as well as the analytical strategy employed to examine the hypotheses developed in the previous chapter. The chapter is organized as follows.
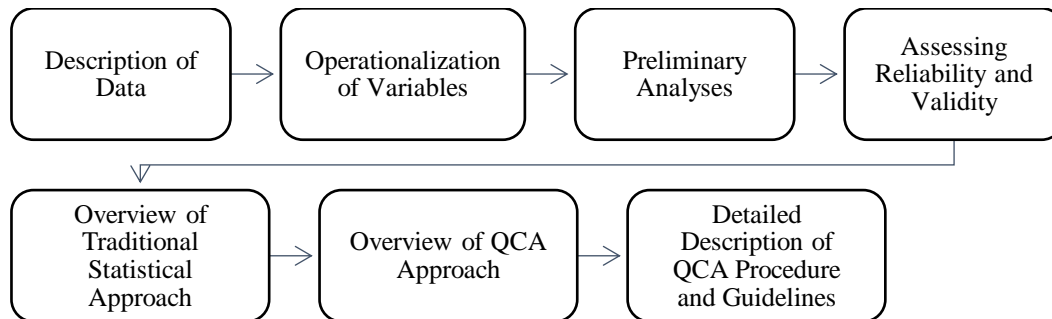
Figure 2 Overview of Methodology Chapter

First, I describe the data collection instrument as well as the data collection process. I further provide details regarding the primary data collected in partnership with Drs. David Doloreux (HEC Montreal) and Richard Shearmur (McGill University). I then go on to describe the results of a series of preliminary analyses I completed to ascertain whether the theoretical relationship was observed in the sampled data. I follow by giving a brief overview of the analytical technique, including a thorough introduction to the Qualitative Comparative Analysis (QCA) method. I argue the importance of importing this tool into IE research, as it continues to gain traction elsewhere in the social sciences. I follow by reviewing the analytical procedure and guidelines related to QCA[3], and in turn, I explain how the variables were operationalized. I also provide an assessment of their reliability and validity.

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[3] For ease of reading, the subsection on QCA variable calibration is found in Chapter 5 Section 5.3.1, prior to the QCA analyses.

4.2   Description of Data

4.2.1   KIBS as Sample of Choice

First and foremost, it is important to acknowledge that data collection was completed as part of a larger study of KIBS innovation in Quebec. This project, spearheaded by Drs. Doloreux and Shearmur, enabled data collection on a variety of tangential topics related to KIBS innovation, of which one was their internationalization.

The study of innovation as a driver of internationalization has predominantly been examined in larger, established manufacturing firms (e.g., Haneda & Ito, 2014; Lejpras, 2015; Lewandowska et al., 2016). More recent studies, however, advocate for the examination of this phenomenon beyond this sector and in smaller firms (e.g., Sui & Baum, 2014; Veglio & Zucchella, 2015). An observation I make in the literature review is that only a relatively small percentage of studies examine this phenomenon in service firms (Meliá et al., 2010; Podmetina, Smirnova, Väätänen, & Torkelli, 2009; Van Beveren & Vandenbussche, 2010), and knowledge-intensive service firms in particular (Rodríguez & Nieto, 2012; Schlegelmilch & Crook, 1988). Although this sub-sector of service firms continues to experience growth in international trade (Seens, 2015), considerably less attention is given to knowledge-based services in comparison to other knowledge-based activities such as high-tech manufacturing and software.

With that in mind, I chose to study the KIBS population in the province of Quebec, Canada for two main reasons. First, there continue to be relatively few IE studies on KIBS firms in comparison to other industrial sectors. This historical trend can be dated back to the introduction of IE theories in the late 1970s, which originated from the examination of high technology and manufacturing firms. From my review of the empirical literature, only a small percentage of studies included service firms in their sample; relatively few chose to study service firms outright. The trend towards using larger databases such as various waves of the Community Innovation Survey (CIS) in Europe and its equivalents throughout the world have the advantage of large-sample empirical testing. Although many of these surveys including the CIS do include a broad range of service sectors nested under tertiary industries, many scholars choose to restrict their sample to manufacturing firms (e.g., Lewandowska et al., 2016). Such a trend neither acknowledges the rise of importance of service industries as an integral part of the knowledge economy, nor provides for a comprehensive testing of IE theories across industrial sectors.

Second, I chose to study KIBS in the province of Quebec due to the availability of quality information on the total population. The *Centre de Recherche Industrielle du Quebec* (CRIQ) is a formal provincial institution which acts as a valuable knowledge repository of Quebec's diverse industrial

sectors. Through their continued participation with both industry and the Quebec government, they have amassed a comprehensive database of companies based in and operating throughout the province. Such an endeavor has yet to be realized in many other Canadian provinces. The CRIQ database is used in this thesis as a means to identify the total KIBS population in Quebec. With such information, it was then possible to gather a representative sample of KIBS firms regarding NAICS subsector as well as geography. Moreover, the size of Quebec's economy is approximately that of Sweden's (Doloreux & Shearmur, 2010). It thus provides an interesting canvas upon which to examine these research questions as KIBS are one of Quebec's fasting growing sectors in terms of employment and firm growth.

4.2.2   *Description of Target Population and Sampling Strategy*

Sampling Strategy. A stratified random sampling strategy was adopted to ensure that the sample was representative of the Quebec population concerning geography and sector. The total Quebec population of KIBS SMEs with less than 250 employees was identified using the *Centre de Recherche Industrielle du Quebec* database. There, a total of 2,510 KIBS firms were classified under the NAICS Code 54 'Professional, Scientific and Technical Services.' This comprises the total population, bounded by the provincial geographical territory of Quebec.

Table 9 Comparison of Initial Sample to Quebec KIBS Population Characteristics

	Population		Sample		
Sectors	Freq.	%	Freq.	%	
P-KIBS					
5416 Management, scientific and technical consultants	523	20.9	112	22.3	
XXX Others professional KIBS[4]	380	15.2	69	13.7	
T-KIBS					
5413 Architectural, engineering, and related services	546	21.8	123	24.5	
5415 Computer systems design and related services	696	27.8	131	26.1	
XXX Others creative KIBS[5]	363	14.5	67	13.7	
Total	2508[a]	100.0%	502	100.0%	
Location[6]	Freq.	%	Freq.	%	
Metropolitan					
Montreal	1330	53.0	239	47.6	*
Quebec City	586	23.3	126	25.1	
Central region	382	15.2	81	16.1	
Peripheral region	212	8.4%	56	11.2	
Total	2510	100.0%	502	100.0%	
Size	Freq.	%	Freq.	%	
1-9 employees	948	43.9	194	38.6	*
10-49 employees	944	43.7	240	47.8	
50 - 249 employees	268	12.4	68	13.5	
Total	2160[b]	100.0%	502	100.0%	

[a] Two firms were not classified.
[b] Size information for 350 firms is not specified
* $p < .05$ ** $p < .01$

[4] Includes NAICS Codes 5411 (Legal Services) and 5412 (Accounting, Tax Preparation, Book Keeping and Payroll Services)

Differences were examined between the total population and the final sample to test for its representativeness. Results from *t*-tests in Table 1 show that for the most part, there are no significant differences in terms of firm size, location, and sector. However, firms from Montreal and of smaller size are slightly underrepresented, in comparison to the total population.

Description of Initial Sample. A total of 502 firms responded to the survey, for a response rate of 20%. Of this sample, 159 KIBS firms indicated recording at least 1% of total sales from international markets; the remainder was comprised of domestic firms. Of the firms that recorded international sales, 61 firms recorded at least 25% of their total sales abroad. The majority of the sample (87%) was comprised of small firms with less than 50 employees.

Table 10 Descriptive Statistics of KIBS Sample

Variable	n	Min	Max	Avg	Median	SD
Age	475	2	99	20	18	13.39
Size	501	3	250	27	12	39.91
FSTS ratio	159	1	100	25	10	25.95

4.2.3   Data Collection Procedure

Data for this thesis was collected between February and September 2014. The survey was conducted via computer-assisted telephone interviews and undertaken by a professional market research firm with whom one of the principal investigators of the larger study had a longstanding relationship. The interviewers were asked to follow a set questionnaire to ensure the data was systematically collected (Fowler, 2013). This data collection tool will be further detailed in the following subsection.

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[5] Includes NAICS Codes 5414 (Specialized Design Service) and 5418 (Advertising, Public Relations, and Related Services)

[6] The four regional categories capture three types of regions. The first two are the province's metropolitan agglomerations of Montreal and Quebec City. Central regions were determined as being those within an hour to an hour and a half's drive from the nearest metropolitan center (the limit is approximate given the spatial units). Small peripheral and rural regions were determined as those that qualified neither as metropolitan nor as central agglomerations. Each firm was categorized based on the location of its headquarter or main office in its domestic market: coded as either metropolitan (Montreal or Quebec City), central, or peripheral.

One informant was contacted per firm. The participants were either the CEO, managing director or partner, or another member at the executive level. They had an in-depth understanding of the firm's current and previous activities and its general strategy and could report with certainty on questions about the firm's innovation as well as the scope of its activities domestically and abroad.

4.2.4   Questionnaire Design

The survey tool was developed in collaboration with Drs. David Doloreux and Richard Shearmur. The instrument was finalized in January of 2014 and is the result of multiple iterations between all collaborators. The tool was developed in French, the researchers' mother tongue, as data was gathered in companies across the province of Quebec where the predominant spoken language is French. The questionnaire asked the respondents to answer, to the best of their ability, questions pertaining to the time period between 2011 and 2013. In order, the tool had the following subheadings: (1) Innovation, (2) Information Sources, (3) General Characteristics of the Firm, and (4) Markets and Internationalization.

The first section pertained to *innovation* in KIBS firms and asked questions about four types of innovations: a new service, a new human resource management practice, a new internal management practice, and a new commercialization or marketing practice. The questions were formulated in keeping with the Oslo manual guidelines (OECD, 2005), and contextually adapted for KIBS firms. For each innovation type, respondents were asked to i) identify whether they had recorded that type of innovation between 2011 and 2013, ii) describe the degree of novelty of that innovation, and iii) identify what external KIBS firms had been used throughout the innovation process, where their KIBS collaborators were located, the nature of the interaction with their collaborator, and the frequency of their interactions.

The second section pertained to *information sources* used by KIBS firms. The first set of questions inquired about internal innovation activities and asked whether the firm had participated in these activities between 2011 and 2013. Responses were captured as yes (1) or no (0). The second set of questions asked respondents to gauge the importance of eleven information sources on the activities of their firm. These sources ranged from market sources to institutional sources, and other available sources. Responses were captured as either non-applicable (0), weak (1), moderate (2), or high (3) importance.

The third section of the survey tool inquired about *general firm characteristics*. These questions included the number of employees in 2013, the percentage of university graduates, the legal status of the firm (independent, headquarter, or subsidiary), the firm's year of establishment, and its geographical location.

The last section pertained to the firm's *markets and internationalization*. Respondents were asked to identify the number of countries outside Canada where the firm had at least one client. The categories given were: i) one country, ii) two to five countries, iii) five to ten countries, iv) more than ten countries, and v) none. Respondents were also asked to estimate the average percentage of sales (totaling 100 percent) over the last three years for each of the following markets: i) international market outside of Canada, ii) Canadian market outside Quebec, and iii) Quebec market. We also asked the years in which the firm began selling i) outside Quebec, in Canada and ii) internationally, outside Canada. Finally, respondents were asked to identify the entry modes their firm had used to penetrate foreign markets. A total of eight entry mode choices of increasing resource commitment and risk were given, and answers were captured as yes (1) or no (0).

The tool was inspired by other data collection instruments on this topic that have received significant academic attention and have been widely tested. The first two sections adopt measures like those found in the Community Innovation Survey for participating European Union countries, Statistics Canada's Survey of Innovation and Business Strategy, and the third edition of the OECD's Oslo Manual. The last section is inspired by a review of measures adopted in IE empirical studies. These measures were adapted to shorten the length of response time given the vast breadth of topics covered in the questionnaire.

4.2.5   *Data Cleaning and Manipulation*

The database was cleaned and thoroughly inspected to ensure the accuracy and reliability of the final product of the data collection process. Of note, several steps were taken to ensure the quality of the database. First, as the data was collected as part of a larger study, I reduced the number of variables in the database by eliminating the variables not under study in this thesis. Next, as the database was initially populated with French labels and variable names, I translated them into English, and all variables names and labels were amended accordingly.

Second, I examined the database for missing cases and incomplete answers. It was noticed that several cases dropped out or provided incomplete answers as of Section 3: General Characteristics of the Firm. These cases were examined carefully to assess whether the cases should be kept in the final sample, or whether they should be excluded based on incomplete answers. I assessed these cases following five criteria: whether the firm provided (1) a figure for its size (the first question in Section 3 of the survey); (2) an estimate of the percentage of its employees with higher education diplomas; (3) the year in which it began its operations; (4) the geographic scope of its activities; and (5) the percentage distribution of its

sales among three aggregated markets: Quebec, Canada and International. The first three criteria were used as evidence for consistency of overall answers, and the ease of response for these questions is constant across both international and non-international firms. The last two criteria were used as evidence for consistency of answers pertaining to the firm's internationalization.

Based on these criteria, it was established that 72 cases were incomplete. To verify that these incomplete cases did not introduce a bias into the sample, I completed a series of t-tests and chi-square analyses to ascertain that they did not differ significantly in terms of size, sector, and location to the remainder of the sample. These three variables were gathered from the CRIQ database and thus were available for all cases. All three tests demonstrate that there were no significant differences between the complete responses' means and proportions to those of the incomplete responses.

Upon further examination of the missing data, however, it was found that the incomplete answers came predominantly from non-innovators. A series of cross-tabulations were completed to ascertain the extent of this bias. The results from the chi-square tests confirmed a positive significant relationship between being a non-innovator and dropping out early in the survey. With that said, though the incomplete answers predominantly represented non- or low-innovators, the inclusion of these cases would have created another more important bias in the database. Because there was no information with respect to the geographic scope of their activities, it was impossible to make a reliable assumption with respect to this study's primary dependent variable, internationalization. Had I assumed that the non-innovators had a domestic scope of activities, I would have simply reinforced the assumption that non-innovators do not export, as implied in theories of small firm internationalization. As the data was unavailable for those 72 cases, I concluded it was best to eliminate these data points.

Third, I completed another review for missing or incomplete answers. I found that the 'age' variable had not been answered appropriately. Upon examination, I found that the data points were missing completely at random (MCAR). This was identified using Little's MCAR test with EM[7], where I failed to reject the null hypothesis that the data were missing completely at random ($\chi_2(10) = 15.762$, p = 0.107). At first, the decision was made to eliminate the firms that had not answered the 'age' question. However, it was quickly overturned for two reasons: first, QCA is first and foremost a case-based approach rather than a variable-based one, and second, the 'age' variable represented an important firm characteristic. Indeed, after running a first series of QCA analyses without the 'age' variable, it became

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[7] Little's MCAR test with EM was performed using the following continuous variables: age, FSTS, diploma, information source breadth, information source depth, and internal activities breadth.

evident that by eliminating this condition, the resulting solutions were plagued by contradictory rows.[8] Thus, I retained the 'age' variable and adjustments to the sample ensued. These adjustments as well as others made to the sample follow recommendations to redefine a sampled population for QCA based on theoretical grounds; they will be discussed in detail in the next subsection.

New variables were created with the objective of later testing the hypotheses outlined in Chapter 3 of this thesis. Again, QCA is an iterative analytical process and is not meant to be applied in a linear and mechanical manner (Berg-Schlosser, De Meur, Rihoux, & Ragin, 2009; Schneider & Wagemann, 2010a, 2010b). Some of the variables were subject to revisions following initial rounds of QCA analysis, while others were newly created as they were originally omitted or benefitted from creating 'macro-variables.'[9] Others were eliminated altogether due to their lack of empirical importance. To ensure transparency and reliability in the QCA process, how and why condition and outcome variables were added, modified, or eliminated will be explicitly stated in the appropriate subsections.

While the primary objective of this thesis is to test the hypotheses developed in Chapter 3 following a set-theoretic methodology, I also compare the results of the QCA analysis to those derived using traditional quantitative methods, particularly logistic and fractional logistic regressions. That said, before detailing how the study's variables were operationalized, I provide the reader with a brief review of the preliminary analyses that were completed following the database manipulation stage. I then follow by reviewing the chosen analytical approaches adopted in this thesis.

4.2.6   *Description of Revised Sample*

Even after data cleaning and preparation, it became apparent during the beginning stage of analysis that the original sample of KIBS firms, though representative of the Quebec population, was highly heterogeneous with respect to innovation activities, firm characteristics, and internationalization.

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[8] Contradictory rows, as will be further explained in Section 4.7, are truth table rows that have cases that exhibit both the presence and the absence of the outcome. They have a consistency level well below 1.0 and provide ambiguous information in arriving to the QCA solution terms. It is best practice for a researcher to resolve contradictory rows using a variety of strategies, two of which I adopted in this thesis: to redefine the sampled population, and to review the model for omitted variables (Greckhamer, 2015; Greckhamer et al., 2013; Schneider & Wagemann, 2010a, 2012).

[9] Macro-variables are an analytical strategy used in QCA to create supersets or subsets comprised of multiple condition variables using the logical AND or the logical OR operators, respectively. In so doing, the researcher allows for a condition to be deemed 'present' if, in the case of supersets, one condition amongst the multiple specified is present, and if, in the case of subsets, all conditions amongst the multiple specified are present. While I tested models that included macro variables comprised of the various information sources under their respective headings, I opted to keep with the direct calibration of the composite variables created in the cluster analysis. This analytical strategy is in line with the one adopted by Fiss (2011).

Initial QCA analyses were plagued with contradictory rows that indicated, most prominently, the need to redefine the sampled population under study (Berg-Schlosser & De Meur, 2009; Greckhamer, 2015; Greckhamer, Misangyi, & Fiss, 2013).

Sampled population selection in QCA requires that cases exhibit a certain 'domain of investigation' (Berg-Schlosser & De Meur, 2009), that is, an area of homogeneity that delimits and bounds which cases are included in the analysis. Never should the population be taken as a given. It is common for the researcher to include or eliminate cases at a later stage of the research process (Berg-Schlosser & De Meur, 2009; Greckhamer et al., 2013). In choosing cases, the outcome—in this case small firm internationalization—is of primary concern. Included cases should display both the presence and the absence of the outcome to ensure maximum heterogeneity in the outcome variable. Yet these cases must share sufficient 'background characteristics' to permit comparisons and be considered as constants throughout the analysis.

Table 11 Steps Taken to Revise Sample for QCA

Step Taken	Sample	Reasoning
1. Original sample	502	Used a purposive and stratified sampling strategy representative of Quebec population in terms of size, location, and sector.
2. Sample post data cleaning	429	Eliminated cases with incomplete information or beyond original boundaries of case selection.
3. Assessed firms that did not provide age information	343	Included 'Age' variable; eliminated cases with missing information.
4. Eliminated firms that were neither independent nor headquarters	334	Ensured cases share comparable 'background characteristics.'
5. Eliminate firms that had more than 99 employees	322	Ensured cases share comparable 'background characteristics.'

It became apparent upon closer examination of the data that different 'types' of cases were included in the larger original sample: for example, firms that were subsidiaries of larger firms, and thus, had access to greater organizational resources; and, firms that were larger in size, even if still characterized as medium-sized firms, which too benefited from additional organizational resources. The introduction of these cases in the QCA made it such that I was no longer examining comparable firms. Given the theoretical foundation upon which this thesis builds—small firm internationalization—I made

the decision to further delimit the boundaries of the sampled population using two addition criteria: establishment type, and firm size. I eliminated from the sample the 9 firms that were neither independent firms nor headquarters. I also removed the remaining 12 firms that were of medium size, and therefore employed more than 99 employees. This distinction follows guidelines adopted by Statistics Canada and Industry Canada in their reporting on small and medium-sized enterprises (Industry Canada, 2011).

Table 12 Comparison of Initial Sample to Revised Sample (n=322)

	Initial Sample		Revised Sample	
Sectors	Freq.	%	Freq.	%
P-KIBS				
5416 Management, scientific and technical consultants	112	22.3	73	22.7
XXX Others professional KIBS	69	13.7	41	12.7
T-KIBS				
5413 Architectural, engineering, and related services	123	24.5	78	24.2
5415 Computer systems design and related services	131	26.1	89	27.6
XXX Others creative KIBS	67	13.7	41	12.7
Total	502	100.0%	322	100.0%
Location	Freq.	%	Freq.	%
Metropolitan				
Montreal	239	47.6	154	47.8
Quebec City	126	25.1	78	24.2
Central region	81	16.1	49	15.2
Peripheral region	56	11.2	41	12.7
Total	502	100.0%	322	100.0%
Internationalization	Freq.	%	Freq.	%
Domestic (0% FSTS)	343	68.3	200	62.2
International (≥ 1%)	159	31.7	122	37.8
Total	502	100.0%	322	100.0%
Innovation	Freq.	%	Freq.	%
Service Innovation	308	61.4	208	64.6
Process Innovation	212	42.2	139	43.2
Managerial Innovation	212	42.2	154	47.8
Marketing Innovation	173	34.5	133	41.3 *
Total	502	-	322	-

As such, the final sample for QCA is comprised of 322 cases. Two-sample proportion test for sector, location, internationalization intensity (as measured by the foreign sales to total sales [FSTS] ratio), and type of innovation results indicate that the two samples do not differ from one another at the

0.05 level for all but the proportion of marketing innovations recorded in the revised sample. This revised sample is also used for the analysis of hypotheses using traditional statistical techniques to maintain grounds for comparison between the two sets of results.

4.3   Operationalization of Variables

4.3.1   Outcome (Dependent) Variables

Internationalization Propensity. The firm's internationalization propensity was operationalized using the foreign sales to total sales (FSTS) ratio. This indicator is widely adopted in the literature (e.g., Becker & Egger, 2013; Lejpras, 2015; Monreal-Pérez et al., 2012; Sui & Baum, 2014; Zucchella & Siano, 2014) to differentiate domestic (non-international) firms to international ones. In a first instance, firms with a FSTS of 0 were categorized as domestic, and those with a FSTS equal to or greater than 1 were categorized as international.

Table 13 Measures of Internationalization

Measure	Coding	Survey Question(s)
Internationalization Propensity	Dummy (0-1) Categorization: 1 – at least 1% FSTS 0 – 0% FSTS	Not applicable Computed based on question on degree of internationalization 1 – International 0 – Non-international (Domestic)
Internationalization Intensity	Percentage of foreign sales over total sales Range: 0.00 – 1.00	Please estimate for the last three years the average percentage of sales from the following markets (total 100%). a. International markets, outside Canada b. Canada, outside Quebec c. Quebec

Internationalization Intensity. The firm's internationalization intensity was also operationalized using the FSTS ratio. The continuous variable is fractional in nature and captures the proportion of sales from foreign markets. It may take on a value between 0.0 to 1.0 (Castaño et al., 2016; Love et al., 2016; Raymond et al., 2014; Zucchella & Siano, 2014).

4.3.2   Condition (Independent) Variables

Novelty of Innovation. Novelty of innovation differentiates between degrees of innovation radicalness, ranging in decreasing order of novelty from new-to-market, to new-to-firm, to adaptation, and to no innovation at all. New-to-market innovations are thought to require greater innovation investment from the firm than adaptations. Respondents were asked to qualify the degree of novelty of the most recent innovation introduced in the last three years, for each type of innovation introduced. The responses were captured using an ordinal variable which range, in the case of service innovation novelty, from: (i) an adaptation to an existing service for a new client; (ii) a service already offered within the group, now offered by the firm; (iii) a service never before offered by the firm; (iv) a service never before offered in the firm's market. For all other types of innovations (e.g., process, managerial, marketing), three options were provided to respondents. These responses were adapted to fit the KIBS context and align with well-established guidelines proposed by the Oslo Manual (OECD, 2005, 2010; Rodriguez et al., 2017): (a) adaptation, (b) new-to-firm innovation, and (c) new-to-market innovation[10].

[10] In the case of service innovation novelty, I aggregate the responses of items (ii) and (iii) as both indicative of new-to-firm innovation.

Table 14 Measures of Innovation Novelty

Measure	Coding	Survey Question(s)
Novelty of Service Innovation	Range (1-4) Categorization: 1 - Adaptation 2 - New-to-firm 3 - New-to-firm 4 - New-to-market	The most recently introduced new or improved service is: a. An adaptation of an existing service for a new client b. A service already offered within the group, now offered by the firm c. A service that has never before been offered by the firm d. A service that has never before been offered in the firm's market
Novelty of Process Innovation	Range (1-3) Categorization 1 - Adaptation 2 - New-to-firm 3 - New-to-market	The most recently introduced new or improved human resource management practice is: a. An adaptation of an existing practice to respond to the needs of a new client b. A practice never before carried out by the firm c. A practice not yet carried out by the firm's competitors
Novelty of Managerial Innovation	Range (1-3) Categorization 1 - Adaptation 2 - New-to-firm 3 - New-to-market	The most recently introduced new or improved internal management practice is: a. An adaptation of an existing practice to respond to the needs of a new client b. A practice never before carried out by the firm c. A practice not yet carried out by the firm's competitors
Novelty of Marketing and Commercialization Innovation	Range (1-3) Categorization 1 - Adaptation 2 - New-to-firm 3 - New-to-market	The most recently introduced new or improved commercialization or marketing practice is: a. An adaptation of an existing practice to respond to the needs of a new client b. A practice never before carried out by the firm c. A practice not yet carried out by the firm's competitors

Innovation Types. The firm's innovation results were captured through four indicators, each representing a different type of innovation. These four types of innovations are reflective of the Oslo Manual's understanding of innovation, encompassing both technological (product/service, process innovations) and non-technological (managerial and marketing) innovations. I used the 'novelty of innovation' variable to discern between firms having recorded improvements to their existing business practices or market offerings (incremental innovations) and those having performed, at a minimum, new-to-firm innovations. As such, the variable for each type of innovation result was operationalized as a binary response (yes or no) whether the firm recorded at least a new-to-firm innovation of that type in the

three years prior to data collection. This practice is in line with other empirical studies that examine internationalization or export as an outcome (Doloreux, Shearmur, & Van Assche, 2019; e.g., Higón & Driffield, 2011; Lewandowska et al., 2016; Love et al., 2016), and likewise in other studies from the broader innovation literature (e.g., Amara et al., 2016; Damijan, Kostevc, & Rojec, 2017; Hervas-Oliver, Sempere-Ripoll, Boronat-Moll, & Rojas-Alvarado, 2018; Protogerou, Kontolaimou, & Caloghirou, 2017). The first two variables (product and process) capture the firm's technological innovations, while the other two (management, marketing) capture its non-technological ones.

Table 15 Measures of Innovation Types

Measure	Coding	Survey Question(s)
Service Innovation	Dummy (0-1)	Based on 'novelty of service innovation' question; answers new-to-firm and new-to-market coded as "1"
Process Innovation	Dummy (0-1)	Based on 'novelty of process innovation' question; answers new-to-firm and new-to-market coded as "1"
Management Innovation	Dummy (0-1)	Based on 'novelty of management innovation' question; answers new-to-firm and new-to-market coded as "1"
Marketing and Commercialization Innovation	Dummy (0-1)	Based on 'novelty of marketing and commercialization innovation' question; answers new-to-firm and new-to-market coded as "1"

Innovation Activities. Respondents were asked whether or not the firm had performed six internal innovation activities during the three years prior to data collection. These activities are fairly standard across innovation studies and are systematically queried in the Community Innovation Survey and other national equivalents, such as Canada's own Survey of Innovation and Business Strategy. These activities have also been examined under the label of 'innovation expenditures' in other recent studies (e.g., Rodriguez et al., 2017).

The composite variable 'innovation activities breadth' captures the relative investment made by the firm with respect to the queried internal innovation activities. The variable was created by summing the total of the six innovation activities, thus giving a range between 0 and 6. The mode of this variable is 4 activities while a third of all firms indicate performing at least 3 of the above indicated activities.

Table 16 Measures of Innovation Activities

Measure	Coding	Survey Question(s)
Internal R&D	Dummy (0-1)	During the last three years 2011-2013, has your firm participated in the following activities? (Yes / No) a. Internal R&D;
Equipment and software acquisition	Dummy (0-1)	During the last three years 2011-2013, has your firm participated in the following activities? (Yes / No) b. Equipment and software acquisition;
Other external knowledge acquisition	Dummy (0-1)	During the last three years 2011-2013, has your firm participated in the following activities? (Yes / No) c. Other external knowledge acquisition;
Staff training	Dummy (0-1)	During the last three years 2011-2013, has your firm participated in the following activities? (Yes / No) d. Staff training;
Marketing and commercialization activities of new or improved services	Dummy (0-1)	During the last three years 2011-2013, has your firm participated in the following activities? (Yes / No) e. Marketing and commercialization activities of new or improved services;
Knowledge management policies or strategies	Dummy (0-1)	During the last three years 2011-2013, has your firm participated in the following activities? (Yes / No) f. Knowledge management policies or strategies
Internal activities breadth	Count (0-6); Range (1-6)	Composite variable based on the sum of the previous six indicators

Information Sources. In alignment with multiple previous studies (Amara et al., 2016; Amara & Landry, 2005; Laursen & Salter, 2006; Rodriguez et al., 2017; Shearmur & Doloreux, 2013), respondents were asked to assess the perceived importance for a series of information sources, rating them as not used (0), of low (1), medium (2) or high (3) importance. The interest here differs from looking at the breadth

(number) of sources used (Laursen & Salter, 2006), and instead seeks to understand the perceived value of these sources (Rodriguez et al., 2017; Shearmur & Doloreux, 2013).

Table 17 Measures of Information Sources

Measure	Coding	Survey Question(s)
Information source	Range (0-3) Categorization: 0 - none 1 - weak 2 - moderate 3 - high	During the last three years 2011-2013, what was the importance of each of these information sources to your firm? (4-point Likert Scale) a) Staff; b) Clients or consumers; c) Suppliers; d) Consultants; e) Commercial laboratories; f) Universities; g) Technological institutes / Cegep; h) Governmental research laboratories; i) Private research institute; j) Conferences, commercial fairs, or expositions; k) Internet; l) Investors; m) Other firms in your group
Information source breadth	Count (0-13); Range (0-13)	Composite variable CC
Information source depth	Count (0-13); Range (0-9)	Composite variable based on the sum of the previous 13 indicators, where the information source is indicated as being of 'high' importance

Many have analyzed these sources using multivariate methods by combining them under the headings of internal, market, research, and general sources (e.g., Amara et al., 2016; Amara & Landry, 2005). To ascertain whether this classification held in this study's sample, a principal component analysis (PCA) with promax rotation was completed. The use of an oblique method was chosen to allow for correlation between factors.

Table 18 Factor Analysis: Pattern Matrix of Information Sources

Variables	Research	General	Internal	Market
Commercial laboratory	**0.698**	0.046	-0.106	0.177
University	**0.735**	-0.014	0.263	-0.234
CEGEP	**0.859**	-0.042	0.179	-0.189
Governmental laboratory	**0.776**	0.027	-0.128	0.088
Private research institute	**0.670**	-0.013	-0.199	0.125
Conferences, expos and fairs	-0.055	**0.818**	-0.078	-0.031
Internet	-0.110	**0.797**	0.177	-0.134
Investors	0.190	**0.485**	-0.088	0.146
Others within group	0.154	**0.526**	-0.032	0.078
Staff	-0.002	-0.006	**0.820**	0.200
Clients	0.006	0.011	**0.870**	0.079
Suppliers	0.002	0.042	0.250	**0.648**
Consultants	-0.030	-0.062	0.083	**0.804**
Eigenvalue	3.528	1.749	1.299	1.099
Variance	27.14	13.454	9.996	8.45
Total variance	59.04			
Bartlett's test	$\chi2$ (78)	1047.39		
	p ($\chi2 = 0$)	0.000		
KMO test	Overall MSA	0.728		

Note: Factor loadings > .4 are in bold. Extraction Method: Principal Component Analysis. Rotation Method: Promax with Kaiser Normalization. Rotation converged in 6 iterations.

The results suggest a four-factor solution with all items loading highly and cleanly on their respective factor; the solution accounts for 59.04% of the total variance. The Kaiser-Meyer-Olkin measure of sampling adequacy is .728, above the recommended value of .6, and Bartlett's test of sphericity is significant ($\chi2$ (78) = 1047.385, p < .000). With only one exception, all items aligned under the theoretically correct factor.

One modification to the item classification was made in comparison to previous studies: 'clients or consumers' falls under internal rather than market sources. This interpretation follows contemporary theoretical developments in service innovation. KIBS clients are often innovation co-creators as their inputs are often triggers for technological and non-technological innovation (den Hertog, 2000; Toivonen & Tuominen, 2009; Vence & Trigo, 2009). Thus, the 13 variables are operationalized under these same well-established headings, accounting for two internal sources (i.e., staff, clients or consumers), two market sources (i.e., suppliers, consultants), five research sources (i.e., commercial laboratories,

universities, technological institutes, governmental research laboratories, private research institutes), and four general sources (conferences, commercial fairs or expositions, Internet, investors, and others within group).

The items were combined into four scales, one for each higher-order type of information source to facilitate QCA variable calibration (Fiss, 2011). The composite variables were created by summing the totals for each indicator included in that variable and retaining the average (Hair Jr., Black, Babin, & Anderson, 2014).

Table 19 Correlation Table: Information Source Scales

Composite Variables	mean	SD	Internal Sources		Market Sources		Research Sources		General Sources
Internal Sources	2.74	.49	1.00						
Market Sources	1.74	.65	.106	†	1.00				
Research Sources	0.63	.62	-.063		.092		1.00		
General Sources	1.39	.64	.036		.180	**	.433	**	1.00

"†" $p < 0.10$; "*" $p < 0.05$; "**" $p < 0.01$; "***" $p < 0.001$

In addition to these four composite variables, two additional variables that capture the breadth and depth of the firm's information sources were created in alignment with studies from Laursen and Salter (2006) and others in the field of open innovation (Cui, Ye, Teo, & Li, 2015; Idrissia, Amara, & Landry, 2012). The information source breadth variable was created by summing the total number of information sources identified as having at least 'weak' importance to the firm. The depth variable was created by summing the total number of sources indicated as having a 'high' importance.

Firm Characteristics. Three variables encompassing theoretically relevant firm characteristics were included in the analyses. First, the size of the firm was considered, as larger firms are expected to devote greater resources and to provide better support to internationalization activities. The size of the firm was captured by the number of full-time employees employed by the firm in 2013.

Second, the age of the firm was considered, as older firms have theoretically acquired greater resources and experience over time, and thus may hold an advantage compared to younger, more resource-scarce firms. The age of the firm was captured by deducting the year in which the firm stated its inception from 2013.

Prior to conducting the traditional statistical analyses, the data were analyzed to ensure they respected the assumptions of each statistical technique and that the data did not depart substantially from normality. This was done using measures of skewness and kurtosis as well as the Shapiro-Wilk test for normality. In addition, tests were made to assess the influence of outliers. The two continuous control variables of age and size were found to be significantly skewed and exhibiting abnormal distributions. The choice to apply a geometric transformation was made to prevent high leverage observations from inflating the regression coefficient estimates. Three types of geometric transformations were applied to address their strong positive skewness. While square root, log and inverse transformations did not completely correct for nonnormality, as evidenced by a significant Shapiro-Wilk test, they did reduce the degree to which the data were skewed. Based on the results and following the guidelines expressed by Cohen, Cohen, West and Aiken (2003), the age variable was transformed using its square root and the size variable its log.

Third, the KIBS four-digit NAICS code was considered. These categorize the KIBS sample as follows: i) Architectural, engineering and related services (NAICS 5413); ii) Management, scientific and technical consultants (NAICS 5416); iii) Computer systems design and related services (NAICS 5415); iv) Others professional KIBS which include Legal services (NAICS 5411) and Accounting (NAICS 5412); and, v) Others creative KIBS which include Specialized design services (NAICS 5414) and Advertising, public relations, and related services (NAICS 5418). This was done to account for the potential heterogeneity between sectors concerning the ease of transferring the firm's services abroad. While creative KIBS could be categorized on their own (Miles et al., 2017), the relative low number of cases pertaining to these NAICS codes limited such an operationalization.

Table 20 Measures of Firm Characteristics

Measure	Coding	Survey Question(s)
Size	Square root of the number of employees in 2013	What is the total number of employees in your firm in 2013?
Age	Log of the number of years firm has been in business	In what year did your firm begin its activities?
Sector	NAICS Sector Categorization: 5413 - Architectural, Engineering 5415 - Computer Systems Design 5416 - Management, scientific and tech. consulting 5420 - Other professional KIBS 5421 - Other creative KIBS	Not applicable Secondary data gathered from CRIQ database

4.4 Preliminary Analyses

The revised sample (n = 322) includes both international and non-international (domestic only) firms. The international sample (n = 122) includes all firms that indicated that on average at least 1% of their sales were derived from international markets for the three years before the data collection. A series of preliminary analyses were completed using conventional statistical analyses between the independent and dependent variables of interest to ascertain whether the expected relationship between innovation and internationalization was observed in the sampled KIBS firms.

I first examined whether there were differences between the sample of domestic and internationalized firms. Results from chi-square and t-tests suggest the two subsamples do not differ from one another with respect to firm age, size or sector.

I then moved on to completing a series of preliminary analyses that assessed the association between innovation and internationalization using various indicators for both constructs. Using the Kruskal-Wallis test, the results suggest there are no differences in the innovation results of domestic and internationalized firms; these results hold across all types of innovations. I further examined these relationships using categorical variables, only. Results from the series of chi-square tests of association performed, too, demonstrate no difference in terms of innovation output in domestic and internationalized firms. Results also hold when considering the firm's geographic scope of activities—number of countries in which firm realizes sales—rather than its internationalization intensity.

Table 21 Cross-tabulation of Innovation and Internationalization

		Innovation [a]		
		Non-Innovator	Innovator	Total
Propensity of Internationalization [b]	Domestic	68	134	200
	International	28	94	122
	Total	94	228	322

[a] Innovation (condition): Innovator if firm recorded any of 4 types of innovation at novelty level of new-to-firm or higher; Non-innovator otherwise. [b] Propensity of Internationalization (outcome): International if FSTS ratio equal or greater than 1; Domestic otherwise.

Yet by examining the 2 x 2 matrix of firms that innovate to those that do not (condition variable) against their degree of internationalization (outcome variable), one can observe that most internationalized firms are innovators. Moreover, as I have argued that innovation is a multidimensional construct per the literature review exposed in Chapter 2, it is hypothesized that the innovation attributes which comprise the broader innovation construct work in conjunction with one another to lead to certain internationalization outcomes.

However, when based solely on conventional statistical techniques, though the result from the chi-square analysis are significant, χ_2 (1, n = 322) = 3.7021, p = .054, measures of association between innovation and internationalization are relatively weak. The presence of non-innovating international firms as well as innovating domestic firms both decrease the correlation between the two variables (Ragin, 2008). Yet theoretically speaking and building upon the other preliminary analyses conducted, the relationship between innovation and internationalization is likely complex and heavily intertwined. I thus conclude the results warrant further analysis using configurational theory and set-theoretic techniques.

More importantly, however, is that the use of dichotomous variables capturing innovation (innovator vs. non-innovator) and internationalization propensity (international vs. domestic) as currently stated gives way to results that are ambiguous in set theoretic terms. A non-innovating firm may internationalize, which suggests that innovation is neither a necessary nor a sufficient condition for internationalization. That said, this simple 2 x 2 matrix does not account for the multiple condition variables related to innovation that will be tested in this thesis, nor does it paint a complete picture of how firm characteristics work in conjunction with innovation variables to lead to internationalization outcomes. These are some of the questions that will be further explored in the next chapter. It is, nonetheless, important to consider that these gross demarcation between categories are insufficient in

providing a clear assessment of whether innovation (of any type) is a necessary or sufficient condition for internationalization. As a result, these preliminary analyses in conjunction with insight from set theory further support the use of QCA as an analytical tool to further explore the research questions posed in this thesis.

4.5   *Assessing Reliability and Validity of Measures*

Though the study's measures are calibrated to facilitate QCA analyses (Fiss, 2011; Ragin, 2000, 2008), they must nonetheless demonstrate appropriate reliability and validity. These tests were completed on the revised sample. Generally speaking, the results do not differ significantly from those found when performed with the original sample.

4.5.1   *Reliability*

Reliability seeks to assess the ratio of systematic variance to total variance, with the objective of identifying the degree to which the indicator is free of random error (Schwab, 2005). Cronbach's alpha is used to assess the internal consistency of the variable 'information sources.' Particularly, I am concerned that the multiple items that comprise the construct's sub-dimensions demonstrate high internal consistency. The results show that the Cronbach's alpha coefficient for all the items is close to 0.7, which indicates adequate reliability (Nunnally, 1978).

I also test the internal consistency of the other three variables, 'innovation types,' 'innovation novelty,' and 'innovation activities.' The results show that these items do not provide adequate reliability for a multi-item construct. It should be noted that the Cronbach's alpha coefficients do not differ much from those reported in studies using similar items (e.g., Amara et al., 2009; Rodriguez et al., 2017). All items were kept in the analysis due to their theoretical importance.

Table 22 Scale Reliabilities

Scale (# of items)	Items	Item Range	Cronbach's Alpha
Innovation types (4)	Product innovation Process innovation Managerial innovation Marketing innovation	0-1	0.573
Innovation novelty (4)	Product innovation Process innovation Managerial innovation Marketing innovation	0-4	0.539
Innovation activities (6)	Internal R&D Software and equipment acquisition Other external knowledge acquisition Staff training Marketing and commercialization activities of new or improved services Knowledge management policies or strategies	0-1	0.510
Information sources (13)		0-3	0.731
Internal sources (2)	Staff Clients or consumers	0-3	0.693
Market sources (2)	Suppliers Consultants	0-3	0.340
Research sources (5)	Commercial laboratories Universities Technological institutes / Cegep Governmental research laboratories; Private research institute;	0-3	0.801
General sources (4)	Conferences, commercial fairs, or expositions; Internet Investors Others within group	0-3	0.624

4.5.2   Internal Validity

Internal validity seeks to assess whether the phenomenon observed is due to the independent variables, or whether it can be attributed to other unaccounted variables (Pedhazur & Schmelkin, 1991). Steps were taken to ensure internal validity. I used measures that had been previously validated and that had demonstrated appropriate reliability and validity. Moreover, I put in place procedural techniques to counter the potential for common method variance by masking the purpose of the study within a larger focus on innovation and growth strategies (Podsakoff, MacKenzie, & Podsakoff, 2012).

However, this study faced one important threat to internal validity that cannot be addressed due to the use of naturally occurring data, and therefore, due to its nonexperimental design. As with most studies in IE, it is impossible to mitigate against the threat that firms self-select into the dependent variable of interest: either they choose to remain in their domestic market, or they pursue internationalization. I could and do control, however, for variables which may confound the results: namely, the size of the firm, its age, and the sector in which it operates.

4.5.3   External Validity

External validity seeks to assess whether the findings from one population, setting, and time are generalizable to or across another (Pedhazur & Schmelkin, 1991). The original study used a stratified random sampling strategy. As such, the sample is representative of the population of KIBS firms in Quebec in terms of firm size, geographical location, and KIBS sub-sector distribution. However, the revised sample examines specifically small firms, and thus results should be addressed carefully such that they are not over-generalized to firms that do not exhibit these characteristics.

The generalizations that may result from a QCA differ from those informed by statistical inference (Berg-Schlosser et al., 2009). The results of a QCA are propositions—found in the form of solution formulae—that can be applied to and tested on additional cases which share similar characteristics to those that were the original subject of the QCA. Thus, results could be extended to and tested on small firms from economies of comparable size and KIBS subsector distribution to that of the Province of Quebec.

4.5.4   Assessing Common Method Bias

As all data were collected using the same instrument and using a single self-reported source, it was important in a first instance to determine whether the instrument itself was an important source of

variance. Specifically, I was concerned with assessing whether common method bias was problematic (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003; Podsakoff et al., 2012). To assess this possibility, I used Harman's single-factor test (Harman, 1976) to ascertain whether a single latent factor solution could explain more than half of the sampled data's variance. The unrotated principal component factor solution shows that common method bias is not a concern: analysis of all measures using the revised sample gives a ten-factor solution with eigenvalues larger than 1. The first factor accounts for only 13.38% of the variance, well below the threshold of 50%, and the first three factors account for less than 30%, further indicating that there is not one general factor.

4.6   Overview of Traditional Statistical Techniques

The independent variable at the core of this research study was operationalized in two ways: as the firm's internationalization propensity, a binary response, as well as the firm's internationalization intensity, captured as the percentage of foreign sales to total sales (FSTS) ratio, a fractional response. The analytical technique adopted for each analysis varied according to the independent variable's characteristics.

Table 23 Overview of Traditional Statistical Analyses

Independent Variable	Variable Characteristics	Technique (Stata Command)
Internationalization Propensity	Binary (0-1)	Logistic Regression (logistic)
Degree of Internationalization	Proportional data, continuous (0.0-1.0); 0.0 represents no sales from foreign markets, 1.0 represents all sales from foreign markets	Fractional Logistic Regression (fracreg)

4.6.1   Binary Logistic Regression

In a first instance, I sought to test the hypotheses using the firm's internationalization propensity, a binary dependent variable. The analyses were run in Stata 15.0 using the *logit* function. The use of logistic (or logit) regression in modeling the presence or absence of export is well established in the literature, as this form of modelling assumes a binomial distribution of error terms, a reasonable

expectation given the dichotomous nature of the dependent variable. Moreover, it allowed to model both continuous and categorical variables. It differs from multiple regression analysis in that it directly predicts the probability of an event occurring (Hair Jr. et al., 2014), thus allowing to comment on whether innovation results and other innovation attributes are relevant in predicting whether firms internationalize or not.

The logistic regression model is expressed as follows:

$$E(y_i = 1|x_i) = \alpha + \beta_j x_i$$

in which α is a constant, β_j ($j = 0, \ldots,$ n) are parameters to be estimated and x_i is a vector of predictor and control variables describes below. Three models were estimated to test the hypotheses developed in Chapter 3.

Model 1:   α + β_1 SERVINN + β_2 PROCINN + β_3 MGTINN + β_4 MKTINN + β_5 AGE + β_6 SIZE + β_7 TKIBS;

Model 2:   α + β_1 INNDIV2 + β_2 INNDIV3 + β_3 INNDIV4 + β_4 INNDIV5 + β_5 INNDIV6 + β_6 INNDIV7 + β_7 INNDIV8 + β_8 AGE + β_9 SIZE + β_{10} TKIBS;

Model 3:   α + β_1 INNMODE2 + β_2 INNMODE3 + β_3 INNMODE4 + β_4 INNMODE5 + β_5 INNMODE6 + β_6 AGE + β_7 SIZE + β_8 TKIBS;

$E(y_i = 1|x_i)$ reads as the probability that firm i internationalizes given x_i. The three models differ from one another based on the innovation variables examined. More specifically, Model 1 examines whether the presence of service, process, management, or marketing innovations are predictors of internationalization, while controlling for all other types of innovation results and firm characteristics.

Model 2 differs from Model 1 by examining whether it is certain combinations of innovation results that predict internationalization. Eight mutually exclusive combinations are modeled, with the objective of isolating the effect of service innovation in combination with other types of innovations. The model also controls for firm age, size, and sector.

1. no innovation (reference category);
2. *one type:* service innovation only;
3. *one type:* any one type of innovation among process, management and marketing;
4. *two types:* service innovation in conjunction with another innovation among process, management, and marketing innovation;
5. *two types:* any two innovations among process, management, and marketing innovations;

6. *three types:* service innovation in conjunction with two other innovations among process, management, and marketing;

7. *three types:* process, management, and marketing innovations;

8. *four types:* service, process, management and marketing innovations

Model 3 differs from the previous two as it examines whether certain innovation modes are predictors of internationalization. The innovation modes are determined in the next section using data reduction techniques as well as cluster analysis. Six mutually exclusive innovation modes will be explained; these are provided here to explain the above-listed model. This model again controls for the same firm characteristics.

1. non-innovator (reference category);

2. management innovator;

3. soft innovator;

4. service innovator;

5. complex innovator;

6. process innovator.

4.6.2   *Fractional Logistic Regression*

In a second instance, I tested the hypotheses using the firm's internationalization intensity, as operationalized by its FSTS ratio. As such, the dependent variable was fractional in nature and bounded between a unit interval, such that $0 \leq y \leq 1$. The command *fracreg* in Stata 15.0 specifying a logit function was used to complete these analyses; robust standard errors are calculated.

The use of fractional logistic regression overcomes difficulties associated with the use of a percentage as a dependent variable for multiple reasons. Indeed, recent reviews of fractional outcome variables in top management journals demonstrate that researchers seldomly use appropriate modeling techniques, often opting for linear regression models that output invalid parameter estimates which go beyond the unit value thresholds {0, 1} delimited by fractional data (Ramalho, Ramalho, & Murteira, 2011; Villadsen & Wulff, 2018). While other studies have adopted the Tobit regression to model the firm's FSTS (e.g., D'Angelo et al., 2013; Filipescu et al., 2013; Rodríguez & Nieto, 2012, among others), such an approach is critiqued as inappropriate given that the percentage of foreign sales cannot take values below 0 and beyond 1 (Baum, 2008). In these cases, the censored variable is not 'truly' censored per se; rather, the bounded nature is an intrinsic characteristic of the variable under examination. While

the use of fractional logistic regression was first addressed by Wagner (2001) as a means to model the FSTS ratio, it has seldomly been used in previous international entrepreneurship studies.

Thus, following Papke and Wooldridge (1996, 2008) and its application to the FSTS ratio (Wagner, 2001), fractional regression modeling is the premier choice of technique when addressing a fractional outcome variable. Unlike alternative solutions available for fractional outcomes such as beta regression, it allows for proper handling of all values within the unit interval, including tail values of 0s and 1s. Moreover, it does not make out-of-bounds predictions and ensures the data are examined using its original scale (and not requiring any transformation).

The fractional logistic regression model, as specified in Papke and Wooldridge (1996), is expressed as follows:

$$E(y = 1|x) = G(\beta_x)$$

$$G(\cdot) = \frac{\exp(\beta x_i)}{1 + \exp(\beta x_i)}$$

where G(·) is a known nonlinear function satisfying $0 \leq G(\cdot) \leq 1$. In this particular case, I opted to use a logit model, and therefore G(·) takes on the form of the logistic distribution. The vector x_i is comprised of the same innovation attributes and firm characteristics used in the logistic regression model.

Again, three different models were tested following the same logic applied to test the hypotheses pertaining to the first dependent variable, internationalization propensity. First, I tested for the individual effect of service innovation while controlling for other types of innovation as well as firm characteristics. The second model tested for a positive relationship between service innovation in combination with other types of innovation, while again controlling for firm characteristics. Lastly, I tested whether open innovation modes had a positive association with internationalization intensity and, too, controled for the firm's age, size, and sector.

4.7 Overview of QCA Analytical Approach

4.7.1 Brief Introduction on Qualitative Comparative Analysis (QCA)

Qualitative Comparative Analysis, or QCA, is relatively new to the broad field of strategic management (Greckhamer, Misangyi, Elms, & Lacey, 2007). Very few studies in innovation (e.g., Cheng,

Chang, & Li, 2013; Ganter & Hecker, 2014; Gupta, Malhotra, Czinkota, & Foroudi, 2016; Ordanini, Parasuraman, & Rubera, 2014; Poorkavoos, Duan, Edwards, & Ramanathan, 2016; Stanko & Olleros, 2013; Valaei, Rezaei, & Ismail, 2017) have made use of this novel method, and even fewer in international business (e.g., Fan, Cui, Li, & Zhu, 2016; Felício, Duarte, & Rodrigues, 2016; Ott & Kimura, 2016; Skarmeas, Lisboa, & Saridakis, 2016). Yet in recent years, QCA has made important innovations to become a novel tool with which researchers may adopt a hypothetico-deductive logic all the while adopting an approach that embraces configurational thinking (Fiss, 2011; Greckhamer, 2015; Greckhamer et al., 2013; Ragin, 2008). QCA brings forward these two important methodological features when studying innovation as a determinant for internationalization, thus allowing to emphasize diversity in organizations (Fiss, 2007, 2011).

QCA was developed by Charles Ragin in the late 1980s as a means of "preserving the integrity of cases as complex configurations of causal factors while concurrently allowing for the systematic examination of similarities and differences in causal factors across many cases" (Greckhamer et al., 2007, p. 697). QCA differs fundamentally from conventional statistical methods as it seeks to group cases that exhibit similar configurations of conditions to explain the presence or absence of an outcome (Fiss, 2011; Ragin, 2008). The interest of configurational thinking is in looking at 'recipes' of conditions rather than the net effects of single variables on a dependent variable (Ragin, 2008). To achieve this, cases that share the same outcome are systematically compared to one another with the intent of finding common causal conditions—might that be a single factor or a combination of multiple factors—that are present across the cases. To do so, the researcher applies principles of Boolean algebra to identify the necessary and sufficient conditions[11] that explain the presence or absence of the outcome of interest.

When applying QCA, the outcome and the conditions are represented by using fuzzy sets (fs), multi value sets (mv), or crisp sets (cs); all may be used simultaneously (Ragin, 2009). As an overview, in this study, both fuzzy and crisp sets are utilized. I continue to use the term 'QCA' to refer to the overall approach and specify fsQCA or csQCA when necessary to refer to the type of technique I have applied in

[11] An important distinction should be made here between necessary and sufficient conditions (Ragin, 2008; Schneider & Wagemann, 2012). A condition X is necessary if whenever the outcome Y is present, the condition X is also present. Thus, Y cannot be achieved without the presence of X, no case of Y displays the absence of X (~X), and when ~X is present Y is impossible. Graphically speaking, when looking at a Venn diagram, Y is then a subset of X. Sufficiency is the mirror image of necessity: a condition X is sufficient if whenever the outcome is present, the condition is also present. Thus, of importance in the analysis for sufficiency of X on Y are only cases that display X, for we would expect all cases displaying X to have the outcome Y. Graphically speaking, X is then a subset of Y.

a particular instance. Additional information on the analytical procedure and guidelines follow later in this chapter while the calibration procedure is explained in Chapter 5.

4.7.2   *Comparing QCA to Conventional Statistical Techniques*

Four basic oppositions are proposed between conventional correlation-based statistical methods and set-theoretic analysis (Ragin, 2008).

(1) *Set-theoretic versus correlational connections.* Causal conditions are not necessarily symmetrical. Causal asymmetry captures the notion that the causes that lead to the presence of an outcome under study may be different from those that lead to the absence of said outcome. Thus, though we find that internationalized firms are more innovative than their domestic counterparts through the use of traditional statistical analyses such as linear regression, it may be incorrect to assume that domestic firms do not innovate. The preponderant use of correlation-based models pushes forward this logic, which is often incorrect, as correlations are fundamentally symmetrical. The pervasive use of conventional statistical tools further permeates to theory development and testing (Woodside, 2013, 2016): the way hypotheses and conceptual models are constructed implicitly suggest they are causally symmetrical. Little attention has been given to the idea they may not be as such, and as a result, notable theoretical assumptions are made without the appropriate basis for such claims.

(2) *Calibration versus Measurement.* The conventional ways by which data are gathered and analyzed make them sensitive to averages; outliers and high leverage points must be thoroughly examined, as their weight may be influential to the results of conventional correlation-based techniques such as multiple regression. QCA differs from these techniques as measures are calibrated to external standards. Thus, they are embedded with meaning that is not derived from the sample mean. Cases otherwise regarded as outliers or high leverage points do not negatively influence the robustness of the analysis, as QCA makes use of Boolean algebra to group subsets of cases that exhibit similar configurations of conditions to explain the same outcome. Rather, cases otherwise deemed as outliers or high leverage points may make interesting contrarian cases that help further refine understanding of the phenomenon under study. In this way, QCA merges the advantages of large-N quantitative studies with the benefits of qualitative cross-case analysis in qualitative ones.

(3) *Configurations of conditions versus independent variables.* The conventional understanding of independent variables is that they are analytically distinct: one can separate the effect of a variable among others and determine its contribution to the dependent variable's variance. QCA departs from this

assumption by examining cases as configurations of causes and conditions. Instead of examining the variance explained in the dependent variable, the research is interested in identifying "a causal recipe—a specific combination of causally relevant ingredients linked to an outcome" (Ragin, 2008, p. 9). Configurations are increasingly seen as pivotal in the understanding of complex phenomena in organizations (Fiss, 2011; Woodside, 2016). To date, no study examining the influence of innovation on small firm internationalization has made use of configurations to explore this question. It is yet unknown whether configurations of innovation types (e.g., product/service, process, management, marketing) and other innovation attributes are linked to internationalization.

(4) Analysis of causal complexity versus analysis of net effects. The estimate of net effects assumes that each predictor variable influences the dependent variable independently. These influences can be additive, where multiple predictor variables can affect a dependent variable. Causation is then assumed to be quite simplistic. Conversely, set-theoretic analysis assumes that causation is quite complex. It builds on the notion of equifinality: that the same outcome may be generated from different combinations of conditions. Causal complexity is often opposed to net effect analyses in a similar way that set-theoretic relationships are opposed to correlational relationships (Ragin, 2008). Causal complexity is concerned with the examination of all possible logical combinations of causal conditions. QCA examines subset relations to determine causal complexity: if cases share multiple causally relevant conditions to exhibit the same outcome, then they constitute a subset of instances of the outcome (Ragin, 2000, 2009). Such a subset relation may then indicate a specific combination of causally relevant conditions that is sufficient to explain the outcome. There may be multiple sets of cases that share other causally relevant conditions: if these cases also uniformly agree in displaying the outcome, then other combinations of conditions are too interpreted as sufficient for the outcome. The notion of equifinality then provides greater depth for theoretical extension and refinement.

4.7.3   QCA as an Appropriate Tool in IE Research

Why is QCA an appropriate tool in IE Research? Management theories have long used conventional statistical techniques such as multiple regression analyses to test the underlying relationship between core constructs. The predominant use of these conventional correlation-based techniques has forged how we, as a community, examine and think about these constructs and relationships (Woodside, 2013). The conceptual and theoretical models against which empirical data are analyzed are indeed not impermeable to the influence of conventional statistical thinking: the logic with which we build our hypotheses and models relates to the techniques that will be later used to determine whether these same

hypotheses should or should not be rejected. At its core, the ways by which we construct and test our hypotheses impacts, often implicitly though sometimes explicitly, how we reconcile theory testing with statistical application (Fiss, 2007; Woodside, 2014, 2016). On this topic, scholars are now directing attention towards the perverse and persistent effects such widely adopted practices bore on the advancement of knowledge and the improvement of theories, alike.

In his commentary published in the *Journal of Business Research* in late 2016, Woodside (2016) strongly advocates for changes in generally accepted research practices pervasive among most management subspecialties. His central thesis brings forth the idea that some of the most widely cited published articles suffer from bad practices, some of which relate to significant limitations or disconnects brought on by using conventional statistical analyses. These include a mismatch between theory and analysis, ignoring or not modeling contrarian cases, and focusing on net effects only rather than equifinal solutions from different configurations of causal conditions. Worth noting is also the lack of consideration for asymmetric modeling and the prevalent assumption for causal symmetry. The use of QCA allows for the alleviation of these problems. Similarly, Fiss (2007, 2011), Ragin (2000, 2008) and others who champion the adoption of set-theoretic methods center their narrative on the need to depart from the restrictive assumptions brought on by variance-based analyses.

What are the implications for contemporary IE research on innovation and internationalization? The review of the literature brought forward in Chapter 2 sheds light on a few of the limitations that are encountered when studies adopt these common practices in their empirical work. The first pertains to the use of simple measures to capture innovation. While innovation is defined as a complex phenomenon involving many inputs and processes, innovation is most often examined as an outcome and captured by a single measure. One of the limitations from previous empirical work that I underscored in the literature review was that so few studies examined non-technological innovation types; that there exists a strong predominant penchant towards technological innovation results (product, process innovations) which reinforces the assimilation perspective of innovation study. Not only is this a significant limitation concerning advancements made in the innovation of services literature, and more specifically, our understanding of service innovation, it further subscribes the theoretical conceptualization of innovation within the IE context to the assimilation perspective (Coombs & Miles, 2000). Such a perspective neither takes into consideration the idiosyncrasies of service firms, nor the changing global landscape which is shifting from a dominance of manufacturing and high-technology sectors to a 'servitization' across most advanced industrialized economies (Toivonen & Tuominen, 2009).

The second pertains to the assumptions of additive models and their disconnect to configurational thinking which underlays innovation theory. Many studies have used conventional statistical techniques to investigate questions related to how configurations of innovation activities are linked to various outcomes. For example, Lewandowska et al.'s (2016) study of the effect of innovation complementarities on new product export is one of several. Though contemporary in their configurational thinking and part of an important line of questioning, these studies employ conventional statistical tools which impose considerable limits to their works, particularly concerning multicollinearity (Fiss, Marx, & Cambré, 2013). Indeed, of the empirical studies reviewed in Chapter 2, scholars do note the potential bias in their results due to such a concern (Lachenmaier & Woessmann, 2004). By veering away from correlation-based analyses and looking towards set-subset relationships, it then becomes possible to develop models which are inherently interactive and are no longer irked by issues of collinearity.

The third pertains again to the assumptions of additive models, yet this time due to problems of endogeneity. The difficulties which surround the empirical examination of innovation as a determinant to internationalization using conventional statistical tools are further compounded by a problem of simultaneous causality. A common strategy to rectify this problem is the use of an instrumental variable which is highly correlated with the independent variable (innovation) but has no independent effect on the dependent variable (internationalization). Without the use of an instrumental variable, the use of ordinary least square regression and other variance-based tools would provide systematically biased coefficients, thus rendering the results of these analyses highly unreliable. However, a significant limit to the use of instrumental variables is that the accuracy of the results rests on the validity of the measures used to replace the problematic endogenous variable. Not only is this analytical strategy difficult to implement without a robust instrumental variable, it further departs from configurational thinking and assumes linearity, additive effects, and unifinality.

The fourth and last limitation pertains to the general practice of examining net effects. The notion of equifinality is central in IE theories; at its core, the concept of trajectories in small firm internationalization is one characterized as idiosyncratic and influenced by many variables at the entrepreneur, firm, and macro levels (Kuivalainen et al., 2012). By departing from the assumption of net effects and examining configurations of conditions which explain an outcome—here, internationalization—it becomes possible to identify larger patterns that account for the phenomenon at hand without imposing strict restrictions.

Why is QCA an appropriate tool to examine the proposed research question in this thesis? To date, the question of the influence of innovation on small firm internationalization has been

predominantly examined using conventional statistical techniques. The theoretical literature reviewed supported by a considerable body of empirical work suggests that small firms with high levels of innovation are most likely to internationalize. When this statement is considered by adopting a set-theoretic lens, it may be rephrased as 'internationalized firms are a subset of highly innovative small firms.'

How does this change in method impact our current understanding of the phenomenon at hand? First and foremost, changing the methodological lens allows for the examination of the configurations of conditions which are present to explain this outcome rather than the net effects of individual independent variables on the dependent variable. By also changing this lens, it too becomes possible to examine the configurations of conditions that are deemed 'contrarian' to the outcome. Cases that fall outside the norm are further examined to establish whether they form another subset of cases, or whether they are truly outliers or deviate from the norm, as assumed by conventional statistical analyses. It then becomes possible to establish more fine-tuned theories, as this method works to extend and refine existing theoretical assumptions and causal mechanisms.

For example, in this case, the counterfactual cases of interest are the firms that are not innovative per se but report a high degree of internationalization. What are the configurations of conditions that explain their internationalization? Do these firms perform innovation activities—inputs into the innovation process—yet record very little innovation outcome? Are these mature firms, and no longer require a high innovation output to sustain their internationalization? These are all questions that can be further explored and deciphered using the QCA technique and may help to fine-tune contemporary IE theories. These questions resemble in nature those posed by experimental research designs that seek to establish whether treatment and control groups differ in their outcome. By examining subgroups of cases that share configurations of predictor variables, is become possible using Boolean logic to ascertain which configurations of predictor variables lead to the absence of an outcome. Thus, the assumption of causal symmetry is avoided, and further refinement to existing theories is made possible.

4.7.4   *Detailed Description of QCA Procedure and Guidelines*

Two software were used in tandem to run all QCA analyses: the fuzzy program for Stata 15.0 (Longest & Vaisey, 2008) and fsQCA 3.0 (Ragin & Davey, 2016). The calibration was completed in Stata, while the analyses were performed in fsQCA 3.0. Each model to be tested was determined ahead of time per the hypotheses posed at the onset of this research project.

As this is a relatively new technique in management research, I provide greater insight into each of the steps followed to facilitate understanding of how I arrived at the research findings that follow. It should also be noted here that during the QCA process, the researcher is expected to go through cycles of testing between the 'upstream' work, the 'analytical moment,' and the 'downstream' work: moving from calibration to necessity testing, to sufficiency testing, and then, while keeping in mind substantive theoretical knowledge and the previously derived results, fine tuning where necessary (Ragin, 2008; Schneider & Wagemann, 2012). The process is thus iterative in nature.

For each hypothesis set, I follow five general steps. It should be noted that these steps are completed successively for each outcome and may loop back to a previous step depending on the results of the analysis. Once the analysis for an outcome (Y) is resolved, I follow the same steps to analyze for the absence of the outcome (y).

(1) Calibrating variables and calculating set membership scores. Calibration is akin to adjusting an instrument to match known standards, where in an ideal situation, the researcher has externally validated data points with which to calibrate their instrument (Ragin, 2008). Simply put, transforming variables into sets requires specifying the values associated with full membership, full non-membership, and a crossover point. This crossover point is where there exists the most ambiguity regarding the case's membership in that set. These three values act as 'anchors' and allow the transformation of raw variable scores into sets. Crisp set calibration results in set scores that are either of 0, indicating full non-membership, or 1, indicating full membership. Fuzzy set calibration results in set scores that range from 0.00 to 1.00, where a case's membership to that set may vary between fully out ($<$ 0.05) to fully in ($>$ 0.95). Calibration of fuzzy sets is analogous to performing a z-scale transformation in conventional statistical analyses (Ragin, 2008; Woodside, 2013). However, it differs from its conventional counterpart, as substantive and theoretical knowledge are used to anchor fuzzy set scores. As a result, calibration goes beyond simply positioning cases in relation to one another but rather against external standards that hold a theoretical qualitative meaning.

(2) Testing for necessity. The test of necessity should always precede the test for sufficiency (Ragin, 2000, p. 106). A reminder: "a condition X is necessary if, whenever the outcome Y is present, the condition is also present" (Schneider & Wagemann, 2012, p. 69). Two parameters of fit are used in this analysis: necessity inclusion and necessity coverage (Thiem & Dușa, 2013). *Necessity inclusion* examines how often the condition or configuration of conditions is present given the presence of the outcome in relation to the overall presence of the outcome. Conversely, *necessity coverage* examines how often the condition or configuration of conditions is present given the presence of the outcome in relation to the

overall presence of the condition(s). A necessity inclusion score above a certain threshold defined at the onset by the researcher supports the hypothesis that the condition is necessary for the outcome. Only when the necessity coverage score of a relation with high necessity inclusion score attains the predetermined parameter threshold is the condition then determined to be not trivially necessary to the outcome.

I follow the steps outlined by Thiem and Dusa (2013, pp. 34–38) to complete this first procedure. I follow others (Ragin, 2008) in allowing for benchmark inclusion and coverage parameters of 0.9 and 0.6, respectively. Doing so also mitigates against risks of condition error, as setting high consistency and coverage parameter indices at the onset of an analysis ensures only configurations that are deemed consistent and of satisfactory coverage are considered in further analyses (Maggetti & Levi-Faur, 2013). I also mitigate against deviant case error by setting a frequency threshold of at least 3 cases per considered configuration row, as the sampled population is of sufficient size to warrant support from a larger number of empirical cases. Doing so limits the effect of infrequent combinations of conditions that may stem from measurement or coding error, and thus provides inconsistent or weak evidence of a set relation (Maggetti & Levi-Faur, 2013).

(3) Testing for sufficiency. The test of sufficiency seeks to find conditions that are present across cases when the outcome is also present (Ragin, 2008; Schneider & Wagemann, 2012). Thus, "if X then Y" or "X implies Y" are statements that encapsulate sufficiency. Again, two parameters of fit are used in the analysis: sufficiency inclusion and sufficiency coverage (Thiem & Duşa, 2013). *Sufficiency inclusion* examines how often the outcome is present given the presence of the condition or configuration of conditions, in relation to the overall presence of condition(s). Conversely, *sufficiency coverage* examines how often the outcome is present given the presence of the condition or configuration of conditions in relation to the overall presence of the outcome.

Constructing the Truth Table. The analysis for sufficiency requires many more steps than the analysis for necessity. It begins by constructing the truth table. The truth table is a matrix comprised of all 2_k possible combinations of configurations and populated using each case's membership score along all condition variables and the outcome variable. The sufficiency inclusion and coverage scores are derived from this data. Similar to the test of necessity, I also mitigate against deviant case error by setting a frequency threshold of at least 3 cases per considered configuration row (Greckhamer, 2015; Greckhamer et al., 2013). This threshold is applied when deriving all three types of solutions (e.g., complex, intermediate, and parsimonious). Again, so doing limits the effect of infrequent combinations of conditions that may stem from measurement or coding error (Maggetti & Levi-Faur, 2013).

Identifying and Resolving Contradictory Rows. Contradictory rows are identified by examining the raw consistency scores in the truth table; they identify configurations where cases in the same configuration exhibit different outcomes (e.g., presence and absence of internationalization). They may be related to measurement error or improperly specified scope conditions in the QCA model (Rubinson, 2013). Contradictory configurations weaken the researcher's ability to draw inferences on the causal relationships between configurations and outcome, as they imply the causal model tested by the QCA and represented by the truth table does not capture all paths to the outcome (Greckhamer, 2015). Yet near perfect consistency is more likely to be achieved in small-n than large-n QCA analyses (Greckhamer et al., 2013). While in small-n settings it is highly recommended for raw consistency scores to be as close to 1 as possible—where a single contradictory case is sufficient to identify the configuration as contradictory—such is not the case in large-n settings. Such a restrictive definition leads to analytical problems that are difficult if not impossible to resolve (Rubinson, 2013). That said, it is recommended to set the raw consistency score threshold to greater than 0.8 to ascertain that a configuration exhibits an appropriate level of consistency (Ragin, 2006). Despite these recommendations, some large-n studies have used the threshold of 0.75 (Greckhamer, 2015) given the natural heterogeneity in configurations that occur in large-n settings, particularly for individual-level data in management research.

In all likelihood, it is impossible to eliminate all contradictory rows in large-n QCA studies. Five strategies are available to the researcher to eliminate contradictory rows. These include (1) reviewing the criteria used to determine the relevant sample population[12], (2) reviewing the model by removing, replacing or adding new conditions based on extant theory and knowledge, (3) reviewing how sets have been operationalized and calibrated, (4) developing a greater understanding of the contradictory cases, and (5) relying on a frequency criterion (Greckhamer, 2015; Greckhamer et al., 2013; Ragin, 2008; Rihoux & Ragin, 2009). The process of resolving contradictory rows then strongly promotes an inductive analysis process, where the researcher is required to re-examine choices made in previous steps (Rubinson, 2013). As these steps are iterative and require a back-and-forth process between 'upstream' QCA work and the 'analytical moment,' I only report the final analysis. Once contradictory rows have been addressed, it then becomes possible for the researcher to move onto logical minimization to derive the three QCA solutions.

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[12] Indeed, it became apparent once the initial QCAs were performed that the original sample population was too broad; that the firms did not share sufficient background characteristics. Thus, following the strategies outlined by Greckhamer et al. (2013) for large-n studies, the original sample was revised, as explained in subsection 4.2.6.

Deriving the Complex (or Conservative) Solution. The complex solution is found using the Boolean minimization procedure, as outlined by Thiem and Dusa (2013, p. 40). This solution makes no assumption about empty configurations; it only considers 'true' configurations which are guided by the empirical data at hand (Schneider & Wagemann, 2012). As is standard practice, the complex solution will not be presented in the results, as it is often considered too difficult for interpretation.

Deriving the Parsimonious Solution. In social science data, there are always configurations that remain empty. Configuration rows that have no or too few cases are called logical remainders (Ragin, 2000, 2008; Schneider & Wagemann, 2012; Thiem & Duşa, 2013). They provide the researcher with the opportunity to make assumptions about the plausibility of the remaining configurations. The parsimonious solution is derived by making simplifying assumptions on all remaining logical remainders including hard and easy counterfactuals (Ragin, 2008; Schneider & Wagemann, 2010b, 2012). Counterfactuals are either easy or difficult: those that are in line with existing theoretical knowledge, or those that are undefined or are counterintuitive.

Deriving the Intermediate Solution. The intermediate solution differs from the parsimonious one as the simplifying assumptions that hold theoretical or substantive meaning are imposed during the logical minimization process (Ragin, 2008; Schneider & Wagemann, 2012; Thiem & Duşa, 2013). When considering which logical remainders to consider in the solution, it is important to remember that regardless of which are included, the application of logical minimization at the heart of QCA ensures all solutions derived do not contradict the empirical information at hand (Schneider & Wagemann, 2012, p. 161). Here, only easy counterfactuals are included in the logical minimization process.

(4) Assessing the results. Once the two sets of analyses (necessity, sufficiency) are complete, it then becomes important to assess whether the solutions derived are coherent and consistent. In management research as elsewhere in the social sciences, it has become proper convention to report a combination of intermediate and parsimonious solutions, as introduced by Ragin and Fiss (2008) and exemplified in Fiss (2011). A comparative analysis is then performed, examining which configurations are represented in both the intermediate and parsimonious solutions. These are dubbed 'core elements[13]' of the solution, while those that are only found in the intermediate solution are 'complementary elements.' Measures of coverage and consistency are also provided for the intermediate solution (Greckhamer, 2015).

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[13] Maggetti and Levi-Faur (2013) report that 'core elements' are less sensitive to measurement error than are peripheral elements.

A Note on Sample Size, Model Testing, and QCA. Large-N applications of QCA are considered appropriate above 50 cases, although studies mobilizing much larger samples have previously been completed. For example, Greckhamer and colleagues (2007) used crisp set (cs)QCA in a sample of 2,841 business units, and Fiss (2011) used fuzzy set (fs)QCA in a sample of 205 high-technology manufacturing firms. Of importance when testing QCA models is to consider the sample size of a large-N QCA study such that the ratio between the number of cases to the number of causal conditions in the model does not fall below a certain point. Marx (2010) provides some tentative guidelines to this ratio, suggesting that in studies of more than 50 cases, the ratio should be 4 cases to 1 condition. However, the complexity of large-N analyses exponentially increases with the addition of each condition, a point that will be discussed in greater detail in the next subsections. As such, with 9 causal conditions and a subsample size of 122 internationally active firms, the study maintains a minimum ratio of approximately 13:1, well over the proposed threshold.

4.8   Chapter Summary

In this chapter I brought forward a research design that acknowledges and builds upon the previous empirical work completed on the topic of innovation and internationalization, while proposing important amendments to the way by which we examine this question. Specifically, building upon the theoretical assumptions laid out in Chapter 2 and in alignment with current IE theories, I propose to test a series of hypotheses that further decompose the innovation construct into distinct innovation inputs and results while examining their conjunctural effect on multiple operationalization of internationalization.

Most empirical studies that have examined the relationship between innovation and internationalization have done so using conventional statistical techniques. In my review of the empirical literature, I point to important limitations associated with these techniques, particularly those associated with endogeneity and the availability of appropriate instrumental variables. Moreover, I highlight the underrepresentation of samples of SMEs and firms outside manufacturing and high technology sectors.

The research design proposed in this chapter overcomes some of these challenges by examining this question in a sample of small KIBS firms. Moreover, I propose the use of a novel method popular elsewhere in the social sciences that makes use of Boolean algebra to determine the configurations of necessary and sufficient conditions that explain both the presence and the absence of an outcome. As discussed at length, four assumptions made in QCA make it fundamentally different from conventional statistical analyses: (1) the assumption of asymmetry, (2) the use of measurement calibration to external

standards, (3) an examination of cases as configurations of causes and conditions, and (4) the analysis of causal complexity rather than that of net effects (Ragin, 2000, 2008).

Taken as a whole, this new perspective provides fresh insight into a question that has received ample empirical attention, yet leaves many questions under examined, particularly with respect to which innovation attributes work in conjunction with one another to explain internationalization as an outcome.

CHAPTER 5   EMPIRICAL RESULTS

5.1   Chapter Overview

In the previous chapter, I provided an overview of the two methodological approaches used in this thesis. In this chapter, I analyze the empirical data following the procedure explained in Chapter 4. I begin by analyzing the data using techniques from the conventional statistical camp. I then analyze the data using fuzzy and crisp set QCA. The chapter ends by comparing these results to those found using traditional statistical analyses. It should be noted that in doing so, I strive to complement the findings from multiple methodological perspectives which, inevitably, differ in their ontological and epistemological approaches (Vis, 2012). The aim is not to underscore the limitations of each particular method, but instead, make use of the diversity and complementarity of the results in furthering our theoretical understanding and discussion of the phenomena under observation.

5.2   Results: Conventional Statistical Approaches

The following sections are divided as such. The next subsection identifies the innovation modes exhibited by the sampled firms. This is done for two reasons: first, to identify innovation modes using conventional methods used widely in the innovation literature, results of which will then be used in subsequent regression analyses to formally test the last set of hypotheses (H3a and H6a); and second, as a means of comparing the results of traditional clustering methods to the results from the QCA analysis. The following subsections detail the results from the logistic and fractional logit regressions.

5.2.1   Identifying Innovation Modes

5.2.1.1   Factor Analysis

To identify the innovation modes of the sampled firms I follow the methodological steps adopted by Holleinstein (2003) as well as others (Corrocher et al., 2009; Doloreux & Shearmur, 2013; Filippetti, 2011; Frenz & Lambert, 2009).

The first step consists of identifying through factor analysis the variables that are correlated to one another, and thus likely reflect an underlying firm-level factor. To do so, a principal component analysis with promax rotation was completed on a total of 19 indicators, of which 6 comprised internal innovation activities and 13 external information sources. Following the literature on innovation modes, these indicators provide a more holistic understanding of innovation, capturing the 'softer' side of innovation as well as its technological one. The result of this analysis is a series of diagonal factors representing composite variables highly correlated with one another at the firm-level. Its original purpose is to first reduce the number of variables that are inputted in the cluster analysis. In the following step, the component scores derived from the principal component analysis become the inputs to the non-hierarchal cluster analysis as a means to identify firms with similar innovation profiles. It should be noted that the four innovation result variables were omitted from this first step, as I did not want them to load on a composite factor together. Rather, the objective of the forthcoming cluster analysis is to identify groups of firms which may differ based on their innovation results, and thus could vary by type of innovation.

Table 24 Factor Identification: Internal Innovation Activities and External Information sources

	Factor Description
Factor 1	Research Information Sources
Factor 2	General Information Sources
Factor 3	Internal Information Sources
Factor 4	Knowledge Exploitation
Factor 5	Knowledge Generation
Factor 6	Market Information Sources

From the 19 indicators inputted into the analysis, one indicator—training—was removed given its poor loading onto all factors. From there on, indicators with communalities close to or greater than 0.4 were retained. Six principal components with eigenvalues greater than 1 were extracted and accounted for 59.16% of the total variance. Overall, these factors demonstrated high interpretability and were aligned with theory. Four of the six factors aligned based on well-established types of external information sources and reflected the same loading pattern as the previously completed factor analysis on external information sources. These factors were given the same headings: internal (F3), market (F6), research (F1), and general (F2) information sources. The variables pertaining to internal innovation activities loaded appropriately on two variables, reflecting knowledge generation (F4) and knowledge exploitation

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(F3) activities. The main takeaway from this analysis is that external information sources and internal innovation activities do not load jointly on any factors but rather remain distinct from one another.

Table 25 Factor Analysis: Internal Activities and External Information Sources

Type	Indicator	Research	General	Internal	K. Expl	K. Gen	Market
EIS	Commercial laboratories	**0.71**	0.046	-0.104	-0.016	0.067	0.187
EIS	Universities	**0.689**	-0.018	0.267	-0.14	0.067	-0.187
EIS	Cegep	**0.848**	-0.065	0.189	-0.014	0.015	-0.171
EIS	Governmental laboratories	**0.795**	0.027	-0.121	0.07	0.003	0.063
EIS	Private research institutes	**0.692**	0.025	-0.181	0.133	-0.159	0.068
EIS	Conferences, expos and fairs	-0.06	**0.828**	-0.084	-0.029	0.013	-0.03
EIS	Internet	-0.1	**0.721**	0.17	-0.019	0.104	-0.058
EIS	Investors	0.198	**0.52**	-0.071	0.044	-0.115	0.127
EIS	Others within group	0.17	**0.506**	-0.038	-0.034	0.094	0.073
EIS	Staff	0.01	-0.038	**0.811**	0.027	0.033	0.186
EIS	Clients	-0.005	0.026	**0.876**	0.04	-0.107	0.022
IA	Marketing of new services	-0.016	0.048	0.001	**0.863**	-0.176	-0.101
IA	Knowledge management	0.09	-0.111	0.066	**0.762**	0.166	0.115
IA	RD	-0.097	0.087	0.061	0.387	**0.526**	-0.101
IA	Acq. of equip. and software	0.09	0.16	-0.074	-0.039	**0.435**	-0.338
IA	Acq. of external knowledge	-0.005	-0.014	-0.061	-0.089	**0.812**	0.252
EIS	Suppliers	-0.027	0.215	0.247	-0.004	-0.186	**0.537**
EIS	Consultants	0.017	-0.067	0.04	-0.012	0.236	**0.797**
Eigenvalue		3.574	2.086	1.532	1.3	1.144	1.014
Variance		19.853	11.586	8.512	7.223	6.356	5.633
Total variance		59.16					
Bartlett's	χ^2	1249.811					
	P (χ^2 = 153)	0.000					
KMO test	Overall MSA	0.710					

Note: Factor loadings > .4 are in bold. Extraction Method: Principal Component Analysis. Rotation Method: Promax with Kaiser Normalization. Rotation converged in 7 iterations. EIS: External Information Source; IA: Internal Innovation Activity

More specifically, the first factor, which captures 19.85% of the variance, groups together sources of information with a technological or research foundation. The second factor (11.59%) captures sources of information that are fairly general to the firm, such as conferences, commercial expositions and fairs, as well as the Internet, the firm's investors, and other firms within the group. The third factor (8.51%) groups together internal sources of information, such as the firm's staff and its clients. The fourth factor

(7.22%) highlights the firm's ability to exploit its knowledge, either through its implementation of an explicit knowledge management policy or strategy, as well as through its marketing of new or improved services. The variables that make up this factor lend themselves well to the current understanding of how KIBS professionals apply their established knowledge base towards new client problems (Starbuck, 1992; von Nordenflycht, 2010). The fifth factor (6.36%) groups together internal activities related to the generation of new knowledge. These activities include R&D, the acquisition of software and equipment as well as the acquisition of other external knowledge. The final factor (5.63%) groups together market information sources, including the firm's suppliers as well as hired consultants.

5.2.1.2 *Cluster Analysis*

To identify the innovation modes of the sampled firms I used a two-step cluster analysis.[14] The six previously identified innovation factors were used as inputs, as were three additional categorical variables characterizing the firm's openness to external collaboration and knowledge sourcing, and four binary variables capturing the firm's innovation results, one for each type of innovation new to the firm.

As I am using both continuous and ordinal variables, the use of the two-step algorithm in SPSS version 23 is appropriate as the distance measures used in hierarchical clustering or k-means are not suitable when both types of variables are used (Norušis, 2012, p. 378). Moreover, this method has been used frequently in recent innovation mode studies (Apanasovich, Alcalde-Heras, & Parrilli, 2017; Battisti & Stoneman, 2010; De Martino & Magnotti, 2018; Peneder, 2010) as well as in organizational configuration research (e.g., Fiss, 2011; Raymond & St-Pierre, 2013). Overall, this approach aims to group firms together into clusters such that each cluster's membership is as homogeneous as possible across certain attributes while ensuring that each cluster differs from the others based on these same characteristics.

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[14] This analysis was completed in SPSS version 23.

Table 26 Two-Step Cluster Analysis Inputs

Input	Variable type	Values
Innovation Results		
Service innovation	Dichotomous	0: absence of new-to-firm innovation
		1: presence of new-to-firm innovation
Process innovation	Dichotomous	0: absence of new-to-firm innovation
		1: presence of new-to-firm innovation
Management innovation	Dichotomous	0: absence of new-to-firm innovation
		1: presence of new-to-firm innovation
Marketing innovation	Dichotomous	0: absence of new-to-firm innovation
		1: presence of new-to-firm innovation
Information Sources		
Research Information Sources	Continuous	Min: -1.18; Max: 3.99
Internal Information Sources	Continuous	Min: -6.18; Max: 1.34
General Information Sources	Continuous	Min: -2.82; Max: 2.37
Market Information Sources	Continuous	Min: -2.90; Max: 2.74
Internal Innovation Activities		
Knowledge Exploitation	Continuous	Min: -1.77; Max: 1.80
Knowledge Generation	Continuous	Min: -3.00; Max: 1.62

Cluster solutions were analyzed based on the following criteria: a) assessment of the statistical properties regarding within-cluster and between-cluster distances (e.g., silhouette measure); b) minimization of the Bayesian inference criteria (BIC) value; c) interpretability and plausibility of the identified clusters; and d) cluster sizes. The proposed six-cluster solution proved to be highly interpretable and demonstrated meaningful patterns of relationships among clustering variables. Moreover, the six clusters were of sufficient size while demonstrating good within-cluster homogeneity and between-cluster distance.

Table 27 Assessment of Cluster Solutions

Number of Clusters	Schwarz's Bayesian Criterion (BIC)	BIC Change[a]	Ratio of BIC Changes[b]	Ratio of Distance Measures[c]
1	3033.282			
2	2672.696	-360.586	1.000	1.704
3	2499.211	-173.485	.481	1.251
4	2379.055	-120.156	.333	1.383
5	2317.754	-61.300	.170	1.001
6	**2256.584**	**-61.170**	**.170**	**1.645**
7	2255.648	-.936	.003	1.010
8	2255.623	-.026	.000	1.033
9	2258.512	2.889	-.008	1.253
10	2279.474	20.962	-.058	1.116
11	2307.889	28.415	-.079	1.178
12	2345.948	38.060	-.106	1.073
13	2387.683	41.735	-.116	1.240
14	2439.228	51.544	-.143	1.091
15	2494.180	54.952	-.152	1.216

[a.] The changes are from the previous number of clusters in the table.

[b.] The ratios of changes are relative to the change for the two-cluster solution.

[c.] The ratios of distance measures are based on the current number of clusters against the previous number.

The validity of the clusters was assessed by examining whether there are statistical differences between the variables used to develop the clusters (Hair Jr. et al., 2014; Ketchen Jr. & Shook, 1996). I performed Kruskall-Wallis tests for all continuous variables used to determine the clusters. A non-parametric test was chosen given the non-normal distribution of some of the factors used as inputs in the two-step cluster analysis.[15] Results demonstrated that there exist significant differences between the variable means for all types of information sources, namely internal ($\chi_2(5) = 14.736$, p = 0.012), research ($\chi_2 (5) = 11.476$, p = 0.043), market ($\chi_2 (5) = 10.694$, p = 0.058), and general ($\chi_2 (5) = 30.143$, p = 0.000). Results for mean differences between clusters for knowledge generation ($\chi_2 (5) = 9.696$, p = 0.084) and knowledge exploitation ($\chi_2 (5) = 8.759$, p = 0.119) activities were weakly significant and insignificant,

[15] While cluster analysis assumes a normal distribution of variables used, the Two-Step algorithm in SPSS is robust against non-normal distributions (Norušis, 2012).

respectively. Furthermore, I performed χ_2 tests on the four categorical variables. Results show that there is a significant relationship between the innovation mode clusters and all types of innovation: service (χ_2 (5) = 209.055, p = 0.000), process (χ_2 (5) = 257.030, p = 0.000), management (χ_2 (5) = 286.891, p = 0.000), and marketing (χ_2 (5) = 240.901, p = 0.000).

I further assessed the validity of the clusters by examining whether there existed differences between the clusters with respect to variables that were theoretically related to the clusters, yet not used in the definition of said clusters (Ketchen Jr. & Shook, 1996). Four variables were used: one pertaining to the breadth of information sources and another its depth, a third pertaining to the breadth of internal innovation activities in which the firm invests, and lastly another pertaining to the firm's international performance. Results from the Kruskall-Wallis test demonstrated there exist significant differences between innovation modes in terms of information source breadth ($\chi_2(5)$ = 10.369, p = 0.065) and depth ($\chi_2(5)$ = 16.822, p = 0.005), breadth of internal innovation activities ($\chi_2(5)$ = 14.430, p = 0.013), as well as internationalization intensity (FSTS ratio; $\chi_2(5)$ = 12.248, p = 0.032).

Table 28 Innovation Modes Resulting from Two-Step Cluster Analysis: Frequencies and Mean Factor Scores

Label	Cluster 1 (n = 95)	Cluster 2 (n = 42)	Cluster 3 (n = 52)	Cluster 4 (n = 47)	Cluster 5 (n = 48)	Cluster 6 (n = 36)
	Non-Innovator	**Management Innovator**	**Soft Innovator**	**Service Innovator**	**Complex Innovator**	**Process Innovator**
Categorical variables			*Frequent Category (%)*			
Service Innovation	0 (98.9)	0 (100)	0 (58.7)	1 (100)	1 (86.8)	0 (52.8)
Process Innovation	0 (100)	1 (57.8)	0 (100)	0 (100)	1 (92.5)	1 (100)
Management Innovation	0 (100)	1 (100)	0 (78.3)	0 (100)	1 (100)	0 (100)
Marketing Innovation	0 (100)	0 (100)	1 (100)	0 (100)	0 (50.9)	0 (97.2)
Continuous variables[16]			*Mean*			
Research Sources	**0.25**	-0.01	**-0.39**	-0.01	-0.08	-0.02
Internal Sources	-0.24	-0.03	**0.31**	-0.11	0.17	0.17
Market Sources	0.13	-0.17	**-0.34**	0.16	-0.03	0.13
General Sources	**-0.33**	-0.01	0.16	-0.13	**0.51**	0.08
Knowledge Exploitation	-0.22	-0.05	**0.27**	0.02	0.14	0.08
Knowledge Generation	-0.24	0.02	0.06	0.01	0.17	0.26

[16] The continuous variables are factor scores derived previously from the factor analysis. Factor scores are standardized and should be interpreted in the following manner. A score of 0.00 represents the average value for all firms on that factor. The scores vary by standard error, such that a score of 0.5 suggests firms in that cluster score 0.5 standard errors more than the average firm for that factor. It is interpreted as indicating firms in that cluster are more innovative than the average firm. Scores ± 0.25 are bolded for ease of interpretation.

Table 29 Description of Innovation Mode Clusters

Cluster	1	2	3	4	5	6
Label	Non-innovator	Management innovator	Soft innovator	Service innovator	Complex innovator	Process innovator
Orientation	Inward	Outward	Outward	Inward	Outward	Outward
Innovation Types (description)	None	Mgt Mgt + P	Mkt Mkt + S Mkt + Mgt Mgt + S + Mkt	S	S + Mgt P + S + Mgt P + Mgt + Mkt P + S + Mgt + Mkt	P P + S P + Mkt
Collaboration $_c$	14.7	46.7	58.7	48.9	75.5	69.4
Collaboration (# of types) $_b$	0.2	0.98	0.98	1.05	1.79	1.86
Breadth $_a$	Very high	Very high	High	Very high	Very high	Very high
Depth $_a$	Low	Moderate	Moderate	Low	Moderate	Moderate
Information sources	High research Low internal Avg. market Low general	Avg. research Avg. internal Avg. market Avg. general	Low research High internal Low market Avg. general	Avg. research Avg. internal Avg. market Avg. general	Avg. research Avg. internal Avg. market High general	Avg. research Avg. internal Avg. market Avg. general
Innovation Activities	Low k. exploit Low k. gen	Avg. k. exploit Avg. k. gen	High k. exploit Avg. k. gen	Avg. k. exploit Avg. k. gen	Avg.k. exploit Avg.k. gen	Avg.k. exploit High k. gen
Size $_b$	15.44	19.31	14.11	17.19	21.75	24.69
Age $_b$	20.38	22.42	17.71	14.55	19.85	17.83
Diploma $_b$	58.03	55.91	63.15	53.62	61.58	46.03
TKIBS $_c$	61.1	64.4	65.2	68.1	67.9	63.9
Metro $_c$	68.4	77.8	67.4	78.7	75.5	66.7

$_a$. Cluster mode. $_b$. Cluster mean. $_c$. Dichotomous variable; percentage of firms in '1' category.

The clusters exhibited high interpretability and demonstrated heterogeneous innovation profiles.[17] The first cluster—the inward-oriented non-innovator—grouped firms that displayed no innovation result. While they had a very high breadth of information sources and made greater use of research information sources, they made lesser use of internal and general sources and were quite selective to which sources they attributed high importance. Moreover, they also scored lower than average in terms of knowledge generation and exploitation activities. This cluster gathered the highest percentage of professional KIBS.

The second cluster—the outward-oriented management innovator—grouped firms that performed management innovations, either as a standalone type or coupled with process innovations. While they did not often collaborate with innovation partners, they displayed a very high breadth of information sources from which they sourced information. They considered a moderate number of important sources and were average users of all but market information sources. This cluster had the highest percentage of firms from metropolitan areas and grouped firms with the highest mean age.

The third cluster—outward-oriented soft (non-technological) innovator—grouped firms that performed mostly marketing or managerial innovations. These types of innovations were performed either coupled together or with service innovation. Most completed an innovation in collaboration with an innovation partner. Most firms reported having a high breadth of information sources from whom they gathered information, of which a moderate number were thought to be important sources. These firms were above average users of internal information sources, namely their staff and clients; research and market sources were used much less than in firms of other clusters. Firms from this cluster also recorded above average knowledge exploitation activities. This group had the highest mean average of staff with higher education diplomas and was comprised of a relatively high percentage of professional KIBS.

The fourth cluster—inward-oriented service innovator—grouped firms that performed only service innovation. Most completed this innovation type without the help of an innovation partner, and as a whole, the cluster could be characterized as being relatively closed to external information. While the firms reported using a large number of information sources, few were identified as important. Moreover, firms from this cluster scored average or slightly below average on all types of external information sources. Their internal innovation investments were also of average scale relative to the other clusters.

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[17] The firm's relative openness to external information was gauged using the three categories or variables: the ones pertaining to the different information sources, indicating the kind of information used by the firm; the ones pertaining to the breadth and depth of information source, indicating the degree of use exhibited by the firm; and the one pertaining to collaboration; indicating whether relationships with partners external to the firm were fostered to perform innovation.

Firms from this cluster had the youngest mean age and the highest percentage of firms located in metropolitan areas.

The fifth cluster—outward-oriented complex innovator—grouped together firms that performed multiple types of innovation in conjunction with one another. They all recorded process and management innovations with which some coupled either service or marketing innovations, or both. This cluster captured the firms that exhibited the most complex innovation behavior: not only did they record the highest number of distinct innovation types, but they also performed these innovations in collaboration with partners. They reported having a very high breadth of external information sources, of which a moderate number were of high importance. They also scored highest for use of general information sources. This cluster had the highest percentage of technological KIBS and grouped firms with a relatively larger size than clusters 1 through 4.

The last cluster—outward-oriented process innovator—grouped firms that recorded process innovation either as a standalone innovation or in conjunction with service or marketing innovations. They performed these innovations in collaboration with innovation partners. Similar to cluster 5, they reported having a very high breadth of external information sources, of which a moderate number were of high importance. In comparison to other clusters, they were average users of all types of innovation sources, and above average investors in their knowledge generation activities. This cluster had the lowest mean of employees with higher education while having the largest mean size.

Taken together, these six innovation modes exemplify the heterogeneous behavior exhibited by the sampled firms with respect to information sourcing, investments in internal innovation activities and innovation results. These innovation modes will be used in Hypothesis Set 3 to test whether the adoption of an open innovation mode rather than a closed one is associated with internationalization.

5.2.2   Binary Logistic Regression

I first set out to test whether there was a positive relationship between a firm performing service innovation and its internationalization propensity, controlling for the presence of other types of innovation and firm characteristics. I further tested whether it was the presence of multiple types of innovation including service innovation that was conducive to internationalization, thus suggesting complementarity between innovation types. Finally, I tested whether certain innovation modes are more conducive for internationalization. The hypotheses taken from Chapter 3 are restated formally as such:

H1a: There is a positive relationship between recording a service innovation and the internationalization propensity of small KIBS firms.

H2a: There is a positive relationship between recording a service innovation in conjunction with other types of innovation and the internationalization propensity of small KIBS firms.

H3a: There is a positive relationship between adopting an open innovation mode and the internationalization propensity of small KIBS firms.

A series of logistic regressions were completed to test these hypotheses. I assessed the linearity of the continuous variables, age and size, compared to the logit of the dependent variable, internationalization propensity, using the Box-Tidwell (1962) procedure. Based on this assessment, the continuous independent variables were found to be linearly related to the logit of the dependent variable.

I began testing the relationship using the dependent variable internationalization propensity, as operationalized by an FSTS ratio greater or equal to 1. The model fit was assessed following the instructions of Hardin and Hilbe (2018), Hosmer et al. (2013) and Agresti (2013). Goodness of fit of the model was assessed using the Model χ_2 test. It is calculated by taking the difference between the -2LL (minus two times the log likelihood) of the fitted model and the null hypothesis model (empty model). The likelihood ratio statistic follows a chi-square distribution and tests whether all the parameters in the full model are equal to 0; a significant p-value indicates good model fit. A Block χ_2 test was also performed between models to ascertain the significance of the variables added to the new models. Following the same logic, a significant p-value suggests the newly added parameters add to the explanatory power of the nested model. Goodness of fit of all models was also assessed using the Hosmer-Lemeshow test, which examines the fit between predicted and observed frequencies. A good fit yields a large p-value and thus non-significance. I also considered other measures such as the overall classification rate which represents the model's predictive ability as well as the pseudo R_2.

Table 30 and Table 31 report the results of the two series of logistic regression, each pertaining to a different operationalization of the dependent variable, internationalization propensity. The dependent variable was 'calibrated' two ways, dubbed liberally and conservatively, in alignment with the operational understanding of the two distinct fields of study: innovation studies and international entrepreneurship. Where in innovation studies any firm that operates abroad (and thus, has a positive FSTS ratio) is included in the group of international firms, studies in international entrepreneurship are more conservative in their categorization. There, scholars most often use 25% as the FSTS ratio threshold that delimits domestic from international firms. Thus, where Table 30 reports on the results as they relate to a

more liberal understanding of internationalization (0 = domestic if FSTS = 0; 1 = international if FSTS $\geq$ 1), the second, Table 31, reports those calculated for a more conservative understanding of internationalization, as understood by the IE community (0 = domestic if FSTS = 0 or ad hoc international if $1 \leq$ FSTS ≤ 24; 1 = international if FSTS ≥ 25).

When internationalization propensity is operationalized liberally, results show that all four models provide poor fit. For all, the Model χ_2 statistics are insignificant at the $p > 0.05$ mark. Moreover, the Pseudo R_2 and classification measures are inferior to those of the next table, which capture internationalization more conservatively. Indeed, this was the rationale in testing different operationalizations of the dependent variable, as understanding of what constitutes an 'international' firm varies across bodies of literature. Thus, going forward, the hypotheses are tested using the second set of models (identified as Model 1' (…) Model 4'). The revised models with the alternative operationalization of the dependent variable provide a significant improvement in model fit. All models save for the first with only controls are significant at a $p < 0.05$ mark and all have a high p-value when calculating their Hosmer-Lemeshow statistic. Moreover, all provide improvements in terms of Pseudo R_2 and classification measures.

The base model (Model 1') of only control variables, while not statistically significant at $p < 0.05$, provides the necessary comparison to test for nested models.

Model 2' tests whether the introduction of service innovation improves the likelihood of internationalization (H1a) while controlling for the presence of other types of innovations as well as firm characteristics. The model is a significant improvement over the base model, $p < 0.01$. Results of the Wald test confirm that the presence of service innovation (b = 0.691, $p < 0.05$) is positively associated with the propensity to internationalize. When service innovation is recorded, the odds of internationalizing are twice as high ($e_{0.691}$ = 2.00) as when there is no service innovation. The results also point to the importance of other types of innovations. Firms that record management innovation (b = 1.002, $p < 0.05$) are almost three times more likely ($e_{1.064}$ = 2.72) to internationalize than firms that do not record management innovation. That said, not all types of innovations are positively related to internationalization propensity. Firms that record a marketing innovation (b = -0.903, $p < 0.05$) hinder their odds of internationalizing, as suggested by the parameter's negative coefficient. Taken together, the results provide support to accept H1a when internationalization propensity is operationalized conservatively; H1a is rejected when internationalization propensity is operationalized liberally.

Model 3' tests whether the introduction of service innovation in conjunction with other types of innovation results improves the likelihood of internationalization (H2a).[18] While the model is statistically significant at $p < 0.05$, the results should be read with caution as the Block χ^2 test is weakly significant ($p < 0.1$). That said, the results lend further support to those found while testing for H1a. Compared to firms that do not innovate, firms that record service innovations only ($b = 1.312$, $p < 0.05$) are almost four times ($e^{1.312} = 3.71$) more likely to internationalize. Results further demonstrate that firms that record service innovation in conjunction with process, management and marketing innovation for a total of three types of innovation ($b = 1.868$, $p < 0.01$) are more than six times more likely ($e^{1.860} = 6.42$) to internationalize than firms that do not innovate at all. Interestingly, the dummy variable capturing pairs of innovation that include a service innovation as well as the one capturing all types of innovation are insignificant, suggesting there may be limited returns on innovations, or that the costs and risks of some types of innovations may be too great to transfer to international markets. This is an interesting avenue for future work. With that in mind, the results provide partial support for H2a when internationalization is operationalized conservatively. Again, similar to H1a, H2a is rejected when internationalization propensity is operationalized liberally as the model is insignificant.

Model 4' tests for the presence of a positive relationship between the adoption of an open innovation mode and internationalization propensity. I remind the reader that as was determined in section 5.2.1.2 Cluster Analysis, Modes 2 (management innovators), 3 (soft innovators), 5 (complex innovators) and 6 (process innovators) were categorized as 'outward' or 'open.' However, openness is not a true dichotomy, and the relative degree of openness of these firms cannot be ascertained. That said, of the description given for each cluster, modes 5 (complex innovators) and 6 (process innovators) fit best with the open archetypes described in the open innovation literature (e.g., Keupp & Gassmann, 2009).

The results demonstrate that firms that adopt an outward posture to innovation are not always more likely to internationalize. Rather, the results point towards a need for coherence between the firm's innovation inputs and results. There is likely an important trade-off to being open to outside information sources and successfully translating this information into innovation results. In comparison to not innovating (Mode 1), three innovation modes are positively associated with internationalization

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[18] As reported in Chapter 2, while other studies have used interaction terms to test this type of hypothesis, problems of multicollinearity are often reported and discussed. Indeed, running additional post hoc tests, while I found that testing for two-way interactions between service provided interpretable results, testing for three-way and four-way interactions outputted large coefficients and standard-errors affected by collinearity. To avoid these issues, I opted instead to create a categorical variable inspired by the logic behind configurational thinking of mutually exclusive combinations representing the innovation results reported by the firm.

propensity, of which two were characterized as 'open.' Management (Mode 2) innovators (b = 1.473, p < 0.01; $e_{1.473}$ = 4.36) and complex (Mode 5) innovators (b = 1.453, p < 0.01; $e_{1.453}$ = 4.28) are both more than four times more likely than non-innovators (Mode 1) to internationalize, thus providing partial support for H3a. However, and again in support of H1a, service (Mode 4) innovators (b = 1.368, p < 0.05) who were characterized as closed innovators are, too, almost four times more likely ($e_{1.368}$ = 3.93) than non-innovators to internationalize.

These results also suggest that service innovations are not necessarily a prerequisite for internationalization, as only some complex innovators recorded service innovations while all management innovators recorded no service innovations at all. As such, there may be equifinality in how a firm invests its resources into innovation to promote internationalization. Taken together, the results thus provide partial support for H3a when internationalization is operationalized conservatively. Again, as with H1a and H2a, H3a is rejected when internationalization propensity is operationalized liberally as the model is insignificant.

Table 30 Logistic Regression: Liberal Operationalization of Internationalization Propensity

Dependent Variable: Internationalization Propensity, Liberal Operationalization (FSTS ≥ 1)

	Model 1			Model 2			Model 3			Model 4		
	Coef.	S.E.		Coef.	S.E.		Coef.	S.E.		Coef.	S.E.	
Constant	0.501	0.247		0.347	0.182	*	0.331	0.182	*	0.304	0.165	*
Control Variables												
Age	0.908	0.085		0.921	0.089		0.937	0.092		0.933	0.091	
Size	1.171	0.141		1.227	0.153		1.172	0.145		1.206	0.151	
TKIBS	1.390	0.343		1.370	0.342		1.312	0.330		1.353	0.339	
Innovation Results												
Service Innovation				1.769	0.435	*						
Process Innovation				0.599	0.183	†						
Management Innovation				1.417	0.423							
Marketing Innovation				1.096	0.310							
Innovation Combinations a												
(2) Service only							2.416	0.902	*			
(3) Process, Mgt or Mkt only							1.369	0.482				
(4) All pairs w/ service							1.141	0.498				
(5) All pairs w/out service							0.883	0.404				
(6) All combos w/ service							2.385	1.044	*			
(7) Process, Mgt and Mkt							1.444	1.177				
(8) All innovation types							1.577	0.826				
Innovation Modes b												
(2) Management Innovator										1.253	0.487	
(3) Soft Innovator										1.650	0.624	
(4) Service Innovator										2.582	0.970	*
(5) Complex Innovator										1.853	0.668	†
(6) Process Innovator										0.796	0.355	
n	322			322			322			322		
Log-likelihood	-211.312			-207.290			-206.582			-206.168		
Model χ2(df)	4.68 (3)		ns	12.72 (7)		†	14.14 (10)		ns	14.97 (8)		†
Hosmer-Lemeshow χ2 (df)	4.36 (8)		ns	8.61 (8)		ns	9.26 (8)		ns	13.16 (8)		ns
Nested LR test χ2 (df) b				8.04 (4)		†	9.46 (7)		ns	10.29 (5)		†
Pseudo-R2	0.0109			0.0298			0.0331			0.035		
Overall correct classifications	0.621			0.630			0.643			0.630		

a Reference category: No innovation. b Reference category: Innovation Mode 1 (Non-innovators). c The between-model likelihood ratio is calculated using the loglikelihood of the base model.
"†" p < 0.10; "*" p < 0.05; "∗∗" p < 0.01; "∗∗∗" p < 0.001

Table 31 Logistic Regression: Conservative Operationalization of Internationalization Propensity

Dependent Variable: Internationalization Propensity, Conservative Operationalization (FSTS ≥ 25)

	Model 1'			Model 2'			Model 3'			Model 4'		
	Coef.	S.E.		Coef.	S.E.		Coef.	S.E.		Coef.	S.E.	
Constant	-1.591	0.685	*	-1.937	0.734	**	-2.317	0.808	**	-2.341	0.805	**
Control Variables												
Age	-0.215	0.134		-0.267	0.144	†	-0.229	0.144		-0.223	0.143	
Size	0.146	0.162		0.169	0.172		0.120	0.170		0.087	0.168	
TKIBS	0.565	0.357		0.553	0.365		0.465	0.367		0.543	0.364	
Innovation Results												
Service Innovation				0.691	0.333	*						
Process Innovation				-0.104	0.395							
Management Innovation				1.002	0.397	*						
Marketing Innovation				-0.903	0.446	*						
Innovation Combinations a												
(2) Service only							1.312	0.552	*			
(3) Process, Mgt or Mkt only							0.871	0.562				
(4) All pairs w/ service							0.945	0.649				
(5) All pairs w/out service							1.000	0.651				
(6) All combos w/ service							1.868	0.589	**			
(7) Process, Mgt and Mkt							1.704	0.970	†			
(8) All innovation types							0.424	0.868				
Innovation Modes b												
(2) Management Innovator										1.473	0.561	**
(3) Soft Innovator										0.280	0.676	
(4) Service Innovator										1.368	0.552	*
(5) Complex Innovator										1.453	0.541	**
(6) Process Innovator										1.001	0.630	
n	322			322			322			322		
Log-likelihood	-134.183			-126.928			-127.520			-127.303		
Model χ^2(df)	6.28 (3)		†	20.79 (7)		**	19.6 (10)		*	20.04 (8)		*
Hosmer-Lemeshow χ^2 (df)	6.12 (8)		ns	4.61 (8)		ns	6.40 (8)		ns	4.70 (8)		ns
Nested LR test χ^2 (df) b				14.51 (4)		**	13.32 (7)		†	13.76 (5)		*
Pseudo-R^2	0.0229			0.0757			0.0714			0.0729		
Overall correct classifications	0.848			0.848			0.848			0.848		

a Reference category: No innovation. b Reference category: Innovation Mode 1 (Non-innovators). c The between-model likelihood ratio is calculated using the loglikelihood of the base model.
"†" $p < 0.10$; "*" $p < 0.05$; "**" $p < 0.01$; "***" $p < 0.001$

Post-Hoc Sensitivity Analysis. Given the above-stated results, an additional set of post hoc analyses were run to ascertain the degree to which the results were sensitive to different operationalization of the dependent variable, internationalization propensity. I ran a sensitivity analysis with six different operationalization of internationalization propensity capturing varying thresholds of FSTS ratio, ranging from 1% to 25% in increments of 5%. This analytical strategy is similar to the one adopted by Martinez-Gomez et al. (2010).

The results for each model show that overall, as the operationalization of internationalization propensity becomes more conservative (i.e., the threshold for a firm to be considered 'international' depends on a more substantial proportion of its sales coming from abroad), the better the model fits, as demonstrated by the Model χ_2 statistics, the pseudo R_2 measures, and the classification rate. This is true for all four models explored.

The first model confirms that the three control variables identified as theoretically important offer little help in explaining internationalization propensity in small KIBS firms, irrespective of how international firms are defined. The second model confirms the importance of service innovation as an important predictor of internationalization. As the operationalization of international firms becomes more conservative, however, additional types of innovation become important predictors of internationalization, namely management innovation as a positive predictor, and marketing innovation as a negative one. The third model again confirms that service innovation alone and in conjunction with two other types of innovation results are positive predictors of internationalization. However, consistently throughout the six models, the categorical variable for innovation combination does not pass the likelihood ratio test, and thus, these results are interpreted with caution. The fourth and final model proposes additional nuances to the effect of service innovation on internationalization. As the dependent variable is operationalized more conservatively, additional innovation modes—of which Mode 2, management innovator, excludes any service innovation—become positive and significant predictors of internationalization.

Overall, the incremental jump in FSTS threshold demonstrates a sensitivity to how the dependent variable is operationalized in explaining the phenomena at hand. When internationalization propensity is captured liberally, new relationships between the dependent and independent variables go unnoticed. This is exemplified in Model 2 as the propensity of firms to internationalize is also influenced by management and marketing innovations. It can also be seen in Model 4 as the adoption of a management innovator (Mode 2) innovation mode becomes a significant predictor of internationalization propensity over the last three models when the dependent variable is increasingly operationalized conservatively.

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Table 32 Sensitivity Analysis Logistic Regression Model 1

Model 1: Baseline Model, Internationalization Propensity

Dependent Variable	FSTS ≥ 1			FSTS ≥ 5			FSTS ≥ 10			FSTS ≥ 15			FSTS ≥ 20			FSTS ≥ 25		
	Coef.	S.E.		Coef.	S.E.		Coef.	S.E.		Coef.	S.E.		Coef.	S.E.		Coef.	S.E.	
Constant	0.501	0.247		-0.881	0.514	†	-1.264	0.542	*	-1.326	0.641	*	-1.397	0.655	*	-1.591	0.685	*
Control Variables																		
Age	0.908	0.085		-0.121	0.098		-0.110	0.103		-0.268	0.127	*	-0.266	0.130	*	-0.215	0.134	
Size	1.171	0.141		0.155	0.124		0.216	0.130	†	0.197	0.151		0.187	0.154		0.146	0.162	
TKIBS	1.390	0.343		0.420	0.259		0.320	0.272		0.628	0.335	†	0.655	0.344	†	0.565	0.357	
n		322			322			322			322			322			322	
Log-likelihood		-211.312			-200.345			-186.216			-148.245			-143.821			-134.183	
$\chi 2$(df)		4.68 (3)	ns		5.91 (3)	ns		5.28 (3)	ns		10.22 (3)	*		9.91 (3)	*		6.28 (3)	†
Hosmer-Lemeshow $\chi 2$(df)		4.36 (8)	ns		8.42 (8)	ns		3.64 (8)	ns		10.96 (8)	ns		10.13 (8)	ns		6.12 (8)	ns
Pseudo-R2		0.0109			0.0115			0.014			0.0333			0.0333			0.0229	
Overall correct classifications		0.621			0.637			0.727			0.817			0.826			0.848	

"†" $p < 0.10$; "*" $p < 0.05$; "**" $p < 0.01$; "***" $p < 0.001$

Table 33 Sensitivity Analysis Logistic Regression Model 2

Model 2: Internationalization Propensity and Innovation Types

Dependent Variable	FSTS ≥ 1			FSTS ≥ 5			FSTS ≥ 10			FSTS ≥ 15			FSTS ≥ 20			FSTS ≥ 25		
	Coef.	S.E.		Coef.	S.E.		Coef.	S.E.		Coef.	S.E.		Coef.	S.E.		Coef.	S.E.	
Constant	0.347	0.182	*	-1.151	0.542	*	-1.547	0.572	**	-1.647	0.681	*	-1.693	0.695	*	-1.937	0.734	**
Control Variables																		
Age	0.921	0.089		-0.109	0.101		-0.107	0.107		-0.298	0.134	*	-0.305	0.137	*	-0.267	0.144	†
Size	1.227	0.153		0.190	0.128		0.237	0.134	†	0.240	0.159		0.218	0.162		0.169	0.172	
TKIBS	1.370	0.342		0.409	0.261		0.301	0.274		0.619	0.340	†	0.647	0.350	†	0.553	0.365	
Innovation Results																		
Service Innovation	1.769	0.435	*	0.467	0.252	†	0.481	0.264	†	0.709	0.308	*	0.635	0.314	*	0.691	0.333	*
Process Innovation	0.599	0.183	†	-0.377	0.313		-0.283	0.325		-0.317	0.375		-0.218	0.380		-0.104	0.395	
Management Innovation	1.417	0.423		0.248	0.307		0.403	0.320		0.775	0.373	*	0.836	0.379	*	1.002	0.397	*
Marketing Innovation	1.096	0.310		-0.040	0.294		-0.087	0.311		-0.793	0.406	†	-0.722	0.409	†	-0.903	0.446	*
n	322			322			322			322			322			322		
Log-likelihood	-207.290			-198.139			-183.775			-142.471			-138.342			-126.928		
χ^2(df)	12.72 (7)		†	10.33 (7)		ns	10.16 (7)		ns	21.77 (7)		**	20.87 (7)		**	20.79 (7)		**
Hosmer-Lemeshow χ^2 (df)	8.61 (8)		ns	10.71 (8)		ns	6.46 (8)		ns	10.07 (8)		ns	5.98 (8)		ns	4.61 (8)		ns
LR test χ^2 (df) [a]	8.04 (4)		†	4.41 (4)		ns	4.88 (4)		ns	11.55 (4)		*	10.96 (4)		*	14.51 (4)		**
Pseudo-R^2	0.0298			0.0254			0.0269			0.0778			0.0701			0.0757		
Overall correct classifications	0.630			0.671			0.727			0.817			0.826			0.848		

[a] The between-model likelihood ratio is calculated using the loglikelihood of the base model.

"†" p < 0.10; "*" p < 0.05; "**" p < 0.01; "***" p < 0.001

Table 34 Sensitivity Analysis Logistic Regression Model 3

Model 3: Internationalization Propensity and Innovation Type Configurations

Dependent Variable	FSTS $\geq$ 1			FSTS $\geq$ 5			FSTS $\geq$ 10			FSTS $\geq$ 15			FSTS $\geq$ 20			FSTS $\geq$ 25		
	Coef.	S.E.		Coef.	S.E.		Coef.	S.E.		Coef.	S.E.		Coef.	S.E.		Coef.	S.E.	
Constant	0.331	0.182	*	-1.171	0.573	*	-1.842	0.624	**	-1.872	0.729	**	-1.921	0.746	**	-2.317	0.808	**
Control Variables																		
Age	0.937	0.092		-0.101	0.103		-0.081	0.110		-0.257	0.135	†	-0.268	0.138	†	-0.229	0.144	
Size	1.172	0.145		0.162	0.129		0.201	0.136		0.196	0.157		0.175	0.160		0.120	0.170	
TKIBS	1.312	0.330		0.350	0.264		0.233	0.280		0.543	0.341		0.570	0.350		0.465	0.367	
Innovation Results a																		
(2) Service only	2.416	0.902	*	0.763	0.380	*	1.184	0.409	**	1.168	0.467	*	1.071	0.488	*	1.312	0.552	*
(3) Process, Mgt or Mkt only	1.369	0.482		0.246	0.364		0.740	0.394	†	0.409	0.490		0.532	0.501		0.871	0.562	
(4) All pairs w/ service	1.141	0.498		-0.163	0.473		0.034	0.532		0.364	0.597		0.490	0.607		0.945	0.649	
(5) All pairs w/out service	0.883	0.404		-0.301	0.492		0.258	0.512		0.416	0.600		0.545	0.609		1.000	0.651	
(6) All combos w/ service	2.385	1.044	*	0.886	0.442	*	1.185	0.470	*	1.299	0.530	*	1.422	0.541	**	1.868	0.589	**
(7) Process, Mgt and Mkt	1.444	1.177		0.533	0.820		1.075	0.833		1.065	0.934		1.209	0.941		1.704	0.970	†
(8) All innovation types	1.577	0.826		0.138	0.555		0.444	0.598		0.288	0.726		0.416	0.734		0.424	0.868	
n	322			322			322			322			322			322		
Log-likelihood	-127.520			-195.366			-179.117			-143.021			-139.075			-127.520		
χ_2(df)	19.6 (10)		*	15.87 (10)		ns	19.48 (10)		*	20.67 (10)		*	19.40 (10)		*	19.6 (10)		*
Hosmer-Lemeshow χ_2 (df)	6.40 (8)		ns	11.19 (8)		ns	7.17 (8)		ns	4.41 (8)		ns	9.49 (8)		ns	6.40 (8)		ns
LR test χ_2 (df) b	13.32 (7)		†	9.96 (7)		ns	14.2 (7)		*	10.45 (7)		ns	9.49 (7)		ns	13.32 (7)		†
Pseudo-R2	0.0714			0.039			0.0516			0.0674			0.0652			0.0714		
Overall correct classifications	0.848			0.668			0.73			0.814			0.826			0.848		

a Reference category: No innovation. b The between-model likelihood ratio is calculated using the loglikelihood of the base model.
"†" p < 0.10; "*" p < 0.05; "**" p < 0.01; "***" p < 0.001

Table 35 Sensitivity Analysis Logistic Regression Model 4

Model 4: Internationalization Propensity and Innovation Modes

Dependent Variable	FSTS ≥ 1			FSTS ≥ 5			FSTS ≥ 10			FSTS ≥ 15			FSTS ≥ 20			FSTS ≥ 25		
	Coef.	S.E.		Coef.	S.E.		Coef.	S.E.		Coef.	S.E.		Coef.	S.E.		Coef.	S.E.	
Constant	0.304	0.165	*	-1.286	0.566	*	-1.941	0.615	**	-1.895	0.724	**	-1.945	0.741	**	-2.341	0.805	**
Control Variables																		
Age	0.933	0.091		-0.094	0.102		-0.075	0.108		-0.258	0.134	†	-0.268	0.137	*	-0.223	0.143	
Size	1.206	0.151		0.178	0.129		0.210	0.135		0.179	0.156		0.157	0.159		0.087	0.168	
TKIBS	1.353	0.339		0.396	0.262		0.288	0.277		0.607	0.340	†	0.635	0.349	†	0.543	0.364	
Innovation Modes a																		
(2) Management Innovator	1.253	0.487		-0.030	0.414		0.532	0.439		0.896	0.499	†	1.024	0.511	*	1.473	0.561	**
(3) Soft Innovator	1.650	0.624		0.270	0.396		0.531	0.437		-0.047	0.586		0.070	0.596		0.280	0.676	
(4) Service Innovator	2.582	0.970	*	0.830	0.381	*	1.244	0.410	**	1.230	0.468	**	1.132	0.489	*	1.368	0.552	*
(5) Complex Innovator	1.853	0.668	†	0.621	0.368	†	0.946	0.401	*	0.976	0.471	*	1.104	0.483	*	1.453	0.541	**
(6) Process Innovator	0.796	0.355		-0.215	0.462		0.344	0.483		0.373	0.575		0.506	0.586		1.001	0.630	
n	322			322			322			322			322			322		
Log-likelihood	-206.168			-195.967			-180.425			-142.480			-138.566			-127.303		
χ^2(df)	14.97 (8)		†	14.67 (8)		†	16.86 (8)		*	21.75 (8)		**	20.42 (8)		**	20.04 (8)		*
Hosmer-Lemeshow χ^2 (df)	13.16 (8)		ns	7.71 (8)		ns	7.78 (8)		ns	3.51 (8)		ns	5.49 (8)		ns	4.70 (8)		ns
LR test χ^2 (df) b	10.29 (5)		†	8.75 (5)		ns	11.58 (5)		*	11.53 (5)		*	10.51 (5)		†	13.76 (5)		*
Pseudo-R^2	0.035			0.0361			0.0446			0.0709			0.0686			0.0729		
Overall correct classifications	0.630			0.689			0.727			0.814			0.826			0.848		

a Reference category: Innovation Mode 1 (Non-innovators). b The between-model likelihood ratio is calculated using the loglikelihood of the base model.
"†" $p < 0.10$; "*" $p < 0.05$; "**" $p < 0.01$; "***" $p < 0.001$

5.2.3 Fractional Logistic Regression

The same logic used to test the previous three hypotheses on internationalization propensity was again applied to testing the three hypotheses using internationalization intensity as the dependent variable, and using fractional logistic regression as the statistical technique. Again, I first set out to test whether there was a positive relationship between a firm performing service innovation and its internationalization intensity, controlling for the presence of other types of innovation and firm characteristics. I further tested whether it was the presence of multiple types of innovation including service innovation that was conducive to attaining a higher internationalization intensity, thus suggesting a complementarity between innovation types. Finally, I tested whether certain innovation modes were more conducive for higher internationalization intensity. The hypotheses taken from Chapter 3 are restated formally as such:

H4a: There is a positive relationship between recording a service innovation and the internationalization intensity of small KIBS firms.

H5a: There is a positive relationship between recording a service innovation in conjunction with other types of innovation and the internationalization intensity of small KIBS firms.

H6a: There is a positive relationship between adopting an open innovation mode and the internationalization intensity of small KIBS firms.

The model fit was assessed following the instructions of Hardin and Hilbe (2018). The link function (logit) used in the four models was verified for appropriateness using the linktest. All models returned a negative p-value for the newly created covariates equal to the squares of the linear predictors for each respective model.

Goodness of fit of the model was assessed using commonly used fit statistics, as identified in Long (1997) and reiterated in Hardin and Hilbe (2018). I used the AIC statistic, looking at the difference between the null and full models as well as between full models. When comparing models, the one with a lower AIC statistic was preferred, and the difference in AIC statistics was assessed using Hilbe's (2009) guidelines. A Wald test was also performed between models to ascertain the significance of the variables added to the base model. A significant p-value indicates the newly added parameters add to the explanatory power of the nested model.

While the model coefficients do provide an indicator of the size and direction of the relationship, the results are best expressed in terms of average marginal effects and discrete changes (Hardin & Hilbe,

2018). This is because there is a non-linear association between the independent and dependent variables with a binomial link function (Papke & Wooldridge, 1996). Thus, for a continuous dependent variable, the average marginal effect is interpreted as the rate of change a one unit increase in the independent variable is expected to generate on the dependent variable, as expressed by a change in percentage. For a categorical variable, the average discrete change represents the change in the dependent variable for a change in value [1, 0] of the independent variable. The average marginal and discrete effects are discussed after a general discussion of the model results.

Before I elaborate on my results, let me begin by stating that the results outputted by the fractional logistic models provide, in essence, a more nuanced picture to the one painted by the binary logistic regressions. Moreover, while the results demonstrate relatively good fit to the data, the addition of innovation variables to the base model provides little explanation of the firm's internationalization intensity, as indicated by weakly significant Wald tests and an increase in AIC between the base model and those that follow.

With that in mind, the models do offer interesting findings. First, age is negative and significant across all four models, suggesting that younger firms have a greater probability of having a higher internationalization intensity than older firms.

Moreover, the results paint a picture of service innovation as the only type of innovation important for internationalization. In Model 6, service innovation is positive and weakly significant (b = 0.524, p = 0.080). In Model 7, in comparison to no innovation (reference category), service innovation as a standalone is positive and significant (b = 1.115, p = 0.012). This finding further supports accepting hypothesis 4a of a positive relationship between service innovation and internationalization intensity.

Here, it is also worthwhile noting that service innovation in combination with two other types of innovation is significant (b = 0.695, p = 0.071) at a higher alpha threshold. A trio of innovation types, all excluding services, is also weakly significant and positive (b = 1.473, p = 0.068). While there may be theoretical benefits to recording multiple types of innovations, hypothesis 5a is not supported by this model.

Finally, in Model 8 and similar to the other models, only Innovation Mode 4 (service innovators), defined as a closed innovation mode, is positive and significant (b = 1.173, p = 0.008). It is again noteworthy to mention that Innovation Mode 5 (complex innovators), an open innovation mode, is significant at a higher alpha threshold (b = 0.656, p = 0.080) suggesting the interplay between innovation type, openness to external information sources, and the use of formal knowledge management practices

may have a weak positive effect on international intensity in knowledge-intensive business services. However, hypothesis 6a is not supported by this model.

The interpretation of model coefficients expressed as average marginal effects is largely the same. In the base model (Model 5), age is a significant negative predictor of internationalization intensity: as the firm ages, its internationalization intensity decreases. A change of one unit of age decreases internationalization intensity by 2.23% (p = 0.015). This finding supports the notion that 'advantages of newness,' as hypothesized by Autio et al. (2000) and Baum et al. (2015), do play an important role in KIBS internationalization, perhaps in their ability to learn more quickly and be more flexible in foreign markets than their older, more mature counterparts.

The four types of innovation results are added in Model 6. Again, age is a significant negative predictor of international intensity, and service innovation is weakly positively significant. In terms of average marginal effects, the model predicts that an increase in one unit of age represents a decrease in internationalization intensity of -2.23% (p = 0.023) while the presence of service innovation increases it by 4.58% (p = 0.089).

Model 7 adds to the base model the different mutually exclusive innovation combinations a firm may record. Again, the firm's size is significant and negative; the average marginal effects predict that a one unit increase in age represents a decrease in internationalization intensity of 2.08% (p = 0.048). Using the configuration of no innovation as reference category, of all eight possible innovation combinations, only Combination 2 capturing the use of service innovation alone is positive and significant. The average discrete change predicted from adopting this innovation configuration is an increase in internationalization intensity of 10.3% (p = 0.027).

Model 8 adds to the base model the different innovation modes that represent distinctly different innovation behaviors. Like in the previous models, age is negative and significant at a 10% alpha level; the average marginal effects predict that an increase in one unit of age represents a decrease in internationalization intensity of -1.92% (p = 0.063). Using Mode 1 (non-innovator) as the reference category, of all identified innovation modes only innovation Mode 4 (service innovator) is positive and significant. The average discrete change predicted from adopting this innovation mode is an increase in internationalization intensity of 11.1% (p = 0.02). Noteworthy as well is that innovation Mode 5 is significant at a 10% alpha level. The model predicts that adopting this mode leads to an increase in 4.96% in internationalization intensity (p = 0.087). That said, I opt to reject the hypothesis at a more conservative alpha level of 5%.

Table 36 Fractional Logistic Regression: Internationalization Intensity and Innovation

Model 5-6: Internationalization Intensity and Innovation

Variable	Model 5			Model 6		
	Coef.	S.E.		Coef.	S.E.	
Constant	-1.970	0.559	***	-2.205	0.634	***
Control Variables						
Age	-0.261	0.103	*	-0.263	0.110	*
Size	0.248	0.136	†	0.265	0.145	†
TKIBS	0.244	0.290		0.227	0.290	
Innovation Results						
Service Innovation				0.524	0.299	†
Process Innovation				-0.099	0.344	
Management Innovation				0.273	0.291	
Marketing Innovation				-0.424	0.316	
n		322			322	
log-likelihood		-99.756			-98.490	
χ^2 (df)		9.12 (3)	*		22.16 (7)	**
Wald test χ^2 (df) [a]					8.52 (4)	†
Pseudo-R^2		0.021			0.0335	
AIC		207.512			212.980	
BIC		222.610			243.176	

[a] The Wald test χ^2 is calculated by adding the new variables to the base model (Model 1).
"†" $p < 0.10$; "*" $p < 0.05$; "**" $p < 0.01$; "***" $p < 0.001$

Table 37 Fractional Logistic Regression: Internationalization Intensity and Innovation (Continued)

Model 7-8: Internationalization Intensity and Innovation

Variable	Model 7			Model 8		
	Coef.	S.E.		Coef.	S.E.	
Constant	-2.404	0.756	***	-2.529	0.755	***
Control Variables						
Age	-0.247	0.120	*	-0.229	0.118	†
Size	0.232	0.137	†	0.232	0.140	†
TKIBS	0.159	0.286		0.207	0.288	
Innovation Combinations a						
(2) Service only	1.116	0.445	*			
(3) Process, Mgt or Mkt only	0.155	0.386				
(4) All pairs w/ service	0.469	0.532				
(5) All pairs w/out service	0.560	0.550				
(6) All combos w/ service	0.695	0.385	†			
(7) Process, Mgt and Mkt	1.473	0.807	†			
(8) All innovation types	0.019	0.516				
Innovation Modes b						
(2) Management Innovator				0.589	0.440	
(3) Soft Innovator				0.040	0.449	
(4) Service Innovator				1.173	0.442	**
(5) Complex Innovator				0.656	0.375	†
(6) Process Innovator				0.434	0.519	
n		322			322	
log-likelihood		-96.932			-97.275	
χ^2 (df)		29.54 (10)	***		27.94 (8)	***
Wald test χ^2 (df) c		12.35 (7)	†		10.66 (5)	†
Pseudo-R^2		0.0488			0.0454	
AIC		215.864			212.551	
BIC		257.384			246.522	

[a] Categorical Variable. Reference category: No innovation. [b] Categorical Variable. Reference category: Innovation Mode 1 (Non-innovators). [c] The Wald test χ^2 is calculated by adding the new variables to the base model (Model 1).

"†" $p < 0.10$; "*" $p < 0.05$; "**" $p < 0.01$; "***" $p < 0.001$
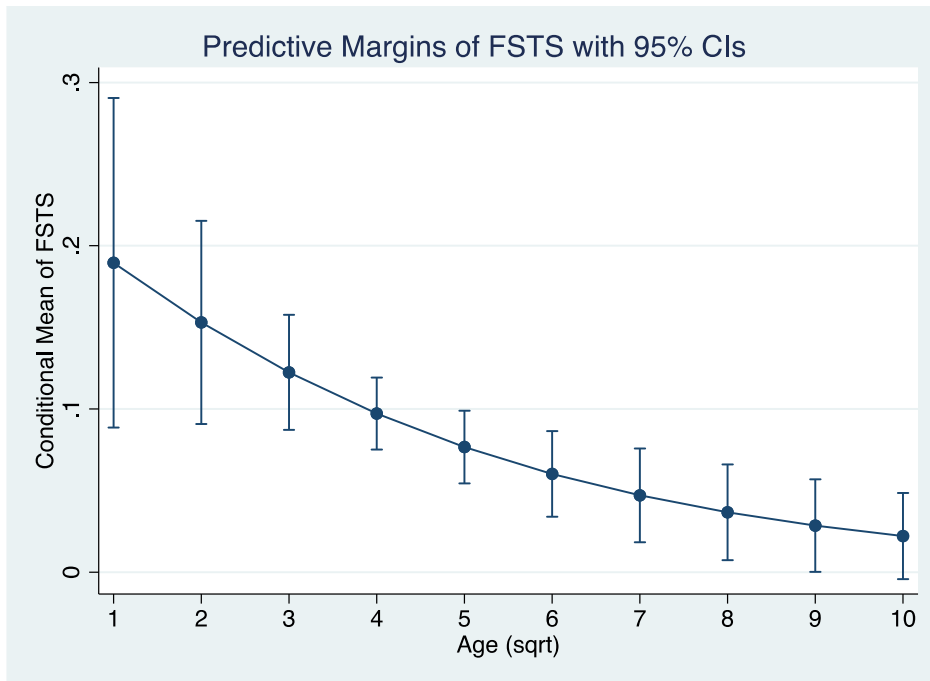
Figure 3 Average Marginal Effects of Age on Internationalization Intensity (Model 5)
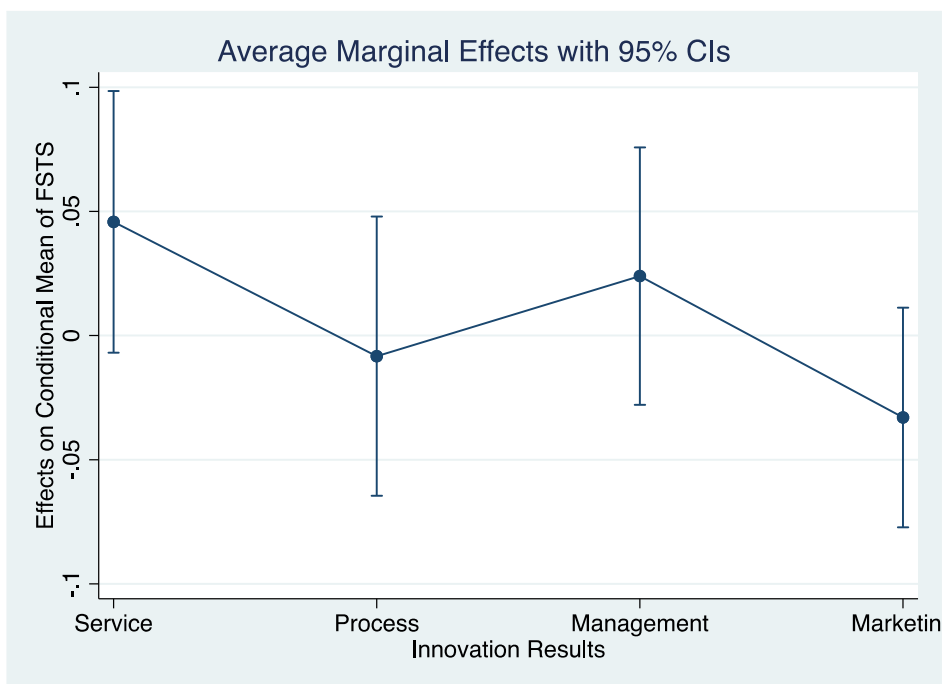
Figure 4 Discrete Effects of Innovation Results on Internationalization Intensity (Model 6)
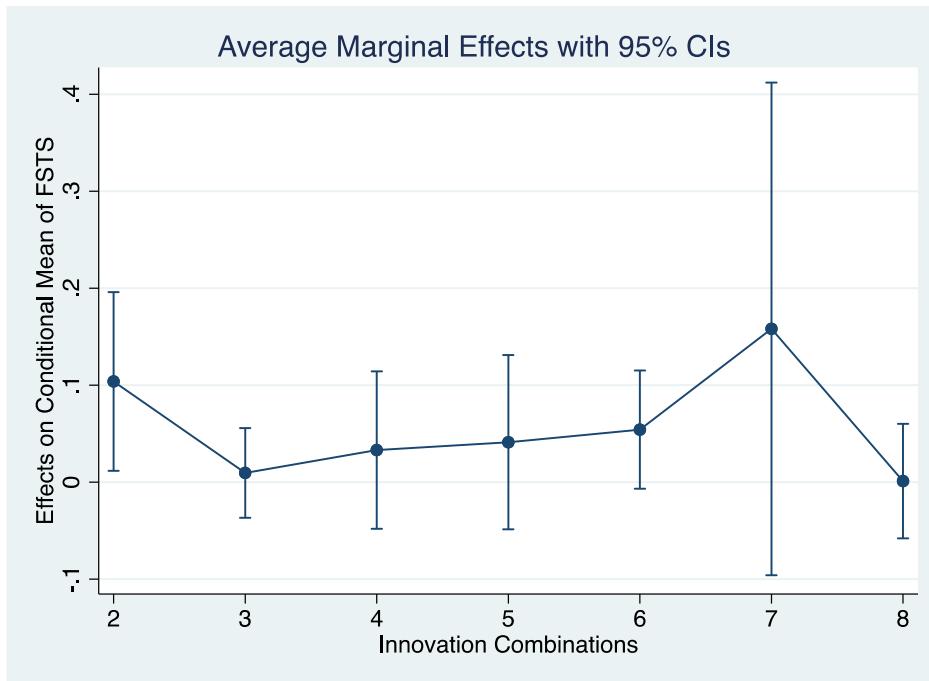
Figure 5 Discrete Effect of Innovation Combinations on Internationalization Intensity (Model 7)
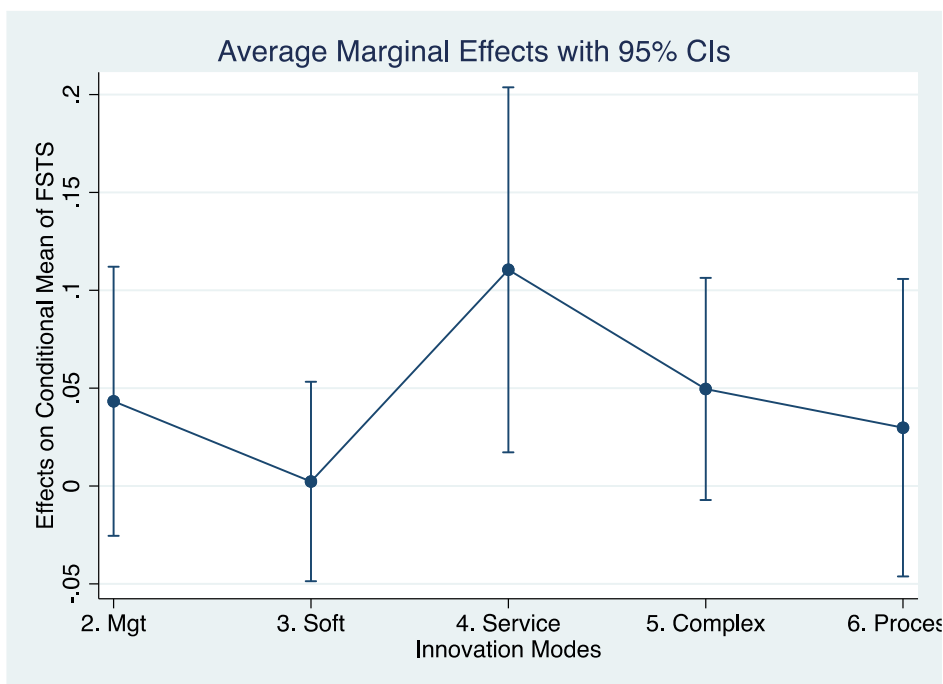
Figure 6 Discrete Effect of Innovation Modes on Internationalization Intensity (Model 8)

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5.3 Results: Qualitative Comparative Analysis

I begin by providing the reader with a thorough description of the variable calibration process. I then go on to test the hypotheses using crisp set and fuzzy set QCA.

5.3.1 QCA Variable Calibration

I begin with an overview of the procedural rules that dictated the calibration process, per the recommendations of Ragin (2000, 2008) and Schneider and Wagemann (2012). I then offer an overview of what each anchor (full non-membership, crossover point, and full membership) represents for all variables. Table 39 and Table 40 provide an overview of all variables and their calibration used in the subsequent analyses.

That said, first and foremost, the raw variables were thoroughly examined to understand their distribution prior to calibration, as summarized in Table 38. Two types of calibration were done on the raw variables, as the hypotheses test both crisp and fuzzy set QCAs. I began the variable calibration process by first calibrating the fuzzy sets. This was done to identify the appropriate middle anchors, which were then adopted again for the crisp sets. To calibrate the fuzzy sets, I adopted the direct calibration technique for all variables. The use of theoretical anchors was used when available. In instances where no external standards could be applied to the calibration process, I examined the distribution of the variable and assessed whether certain natural cut points in the data lent themselves as anchors to the set. In both instances, I made certain that each anchor retained its qualitative meaning, and that cases relative to one another were appropriately classified. In the case of variables measured along an ordinal scale, I ensured that the end-result of the calibration process was faithful to the original meaning of the scale. This was particularly salient when calibrating the information sources conditions, which were initially captured using a scale assessing the relative importance of each source. In all cases, the chosen crossover point ensured that no case was attributed a fuzzy score of 0.5, which would have eliminated the case from the analysis, while retaining the appropriate meaning between full non-membership and full membership.

Table 38 Distribution of Raw Variables Prior to Calibration

Variables	Min	25th	Median	Mean	75th	Max
Outcome						
Internationalization (FSTS ratio)	0	0	0	9.612	10	100
Conditions						
Innovation Results						
Service innovation novelty	0	0	1	1.547	3	4
Process innovation novelty	0	0	0	0.851	2	3
Management innovation novelty	0	0	0	0.823	2	3
Marketing innovation novelty	0	0	0	0.671	1	3
Information sources						
Information source breadth	0	6	8	8.578	11	13
Information source depth	0	2	3	3.227	4	9
General information sources	0	1	1.25	1.385	1.75	3
Internal information sources	0	2.5	3	2.735	3	3
Market information sources	0	1.5	1.5	1.739	3	3
Research information sources	0	0	0.6	0.629	1	3
Internal Innovation Activities						
Collaboration	0	0	0	0.991	2	7
Internal innovation activities breadth	1	3	4	4.034	5	6
Knowledge generation activities	0	3	3	3.109	4	4
Knowledge exploitation activities	0	0	1	0.925	2	2
Firm Characteristics						
Age	2	11	18	19.06	24	99
Size	1	5	9	18.12	23	95

5.3.2 Outcome Variables

Internationalization Intensity. Concerning the calibration of the fuzzy sets for internationalization intensity, two outcome variables were created. The two share the same full non-membership and full membership anchors but differ in their crossover points. Where the first is indicative of a more liberal understanding of internationalization, the second is more conservative in how an international firm is defined. This calibration is reminiscent of the logic behind the two sets of models that were tested in the traditional analyses using two different operationalization of the dependent variable. Thus, INTL—denoting internationalization intensity, liberal—is calibrated using 0, 1 and 25 as anchors, while INTC—

denoting internationalization intensity, conservative—is calibrated using 0, 10 and 25 as its anchors. Moreover, the use of an FSTS ratio of 25% as the full membership anchor is aligned with Statistics Canada's definition of low internationalization firms, which are those with international sales ranging from 1 to 25% of total revenues (Statistics Canada, 2015). Thus, however calibrated, membership in the set of firms with low internationalization sales is understood as membership in the set of firms with at least low internationalization intensity, as firms with an FSTS ratio greater than 25% are attributed full membership to the set.

Internationalization Propensity. Similar in logic to the fuzzy sets, two crisp set condition variables were created for internationalization propensity using different crossover points. Where the first, INTA, is more liberal in nature, using an FSTS of 1% as the full membership anchor the second, INTB, is more conservative and uses a full membership anchor of 25%.

5.3.3   Condition Variables

Innovation Results. I used the question pertaining to the degree of novelty of each innovation type to calibrate the fuzzy sets for each innovation result. The full non-membership anchor was set to 0, indicating 'no innovation,' while the full membership anchor was set to 3 or 4 depending on the type of innovation, but always indicating 'new-to-world' innovation. The crossover point was set to 1.5, which is between 'adaptation' and 'new-to-firm innovation.' As such, a firm recording an adaptation was given a score below 0.5, and thus was not considered in the set of firms having innovated. A firm recoding a new-to-firm innovation was given a score above 0.5, and thus was considered in the set of firms having innovated. With respect to calibration of the crisp sets, the four innovation results were again calibrated using the same rule: firms having recorded no innovation or an adaptation scored 0 (full non-membership), while firms having recorded a new-to-firm or new-to-world innovation scored 1 (full membership).

Two additional variables were created to captured technological and non-technological innovation. Technological innovation was calculated as the sum of service and process innovation, while non-technological innovation the sum of management and marketing innovation. The calculations were done based on whether the firm had recoded at least a new-to-firm innovation for that type of innovation result. Thus, a firm having recoded both service and process innovations scored 2, while a firm having recoded either a service or process innovation scored 1. The same logic held for non-technological innovation. The variable was calibrated for fuzzy sets as such: the full non-membership anchor was set to 0, the full membership anchor was set to 2, and the crossover point was set to 0.9. This crossover point

allowed for a positive set membership for firms that recoded only 1 of 2 innovation types for that category. The same qualitative meaning was kept for the crisp set calibration: firms having recoded no technological innovation received a score of 0 (full non-membership) while firms having recorded at least one type of technological innovation received a score of 1 (full membership). The same calibration rules were applied to non-technological innovation.

Innovation Activities. Innovation activities were examined two ways: first, by degree of use characterizing the breadth and depth of knowledge search and internal innovation activities; second, by kind of use examining what activities and information sources were adopted and deemed important to the firm.

In the first approach, I computed variables for the breadth and depth of the firm's information sourcing using the same method as Laursen and Salter (2006). A similar logic was applied to compute a variable capturing the breadth of the firm's internal innovation activities. These three variables—information source breadth, information source depth, and internal innovation activities breadth—were transformed into fuzzy sets using the following calibration rules. With respect to internal innovation activities, firms with a very low activity breadth (count of 1 activity out of a potential 6) were considered fully out of the set, while firms with a high breadth (count of 5) were considered fully in. The crossover point was set to 2.5, such that firms with 3 or more activities received fuzzy scores above 0.5.

With respect to knowledge sourcing, whereas the variable for breadth of information sources captured the number of sources identified as at least minimally important to the firm, the variable for depth of information sources captured the number of sources identified as important to the firm. For the most part, the sampled firms demonstrated using a wide variety of information sources which they deemed being at least minimally important. Firms with a moderate information sourcing breadth (using 5 sources of a potential 13) were considered fully out of the set, while firms with a very high breadth of sources (count of 11) were considered fully in. The crossover point was set to 7.5, such that firms with 8 or more information sources received fuzzy scores above 0.5. The sampled firms reported a much smaller number of important information sources. Firms with a low depth of high important sources (count of 2 of a potential 13) were considered fully out of the set, while firms with a relatively high depth (count of 6) were considered fully in the set. The crossover point was set to 3.5, such that firms with 4 or more important sources received fuzzy scores greater than 0.5.

In the second approach, I computed variables for each of the information sources or groupings of internal activities that were originally recovered in the factor analysis, in Section 5.2.1.1. The factor analysis provided strong evidence in support of 4 types of information sources—internal, market, research

and general—and two types of internal innovation activities—knowledge generation activities and knowledge exploitation activities. These groupings were adopted again as they withheld theory and were in line with substantive knowledge.

The internal innovation activities were originally captured as dichotomous variables, a positive score indicating the firm had performed the activity in question. The composite variables were then created by summing the score for each activity aligned with that heading. Firms that had not performed any of the two activities which comprised the knowledge generation activity variable were considered fully out of the set, while firms having performed both activities were considered fully in. The crossover point was set to 0.9, such that firms that had recorded one of the two would receive a fuzzy score above 0.5. Similarly, firms that had not performed any of the four activities which comprised the knowledge exploitation activity variable were considered fully out of the set, while firms having performed all four activities were considered fully in. The crossover point was set to 1.9 such that firms that had performed at least two of the four activities received fuzzy scores above 0.5.

The information sources were originally captured using an ordinal scale measuring the relative importance attributed to each source. The composite variables were created by summing the totals for each indicator included in that variable and retaining the average. For each of the four information source variables, the following calibration rules were applied: firms that had a score of 0 were considered fully out of the set, while firms that had a score of 3 (representing an average of high importance across all included information sources) were considered fully in. The crossover point was set to 1.4, just above the mark of 'low importance,' such that firms with an average closer to 1 would be given a fuzzy score below 0.5 and firms with an average closer to 1.5 would be given a fuzzy score above 0.5.

Firm Characteristics. The same three variables were used to characterize the firm: its age, size, and sector classification. The firm's age and size were calibrated for fuzzy sets using benchmarks from Statistics Canada. Firms that were very young having been operating for only two years were considered fully out of the set, while firms that had been in business for more than 40 years were considered fully in the set. The crossover point was set to 19.5 years, such that firms of 20 years or more were given fuzzy scores above 0.5. Similarly, firms that were very small having 5 or less employees were considered fully out of the set, while firms that had 50 or more employees were considered fully in the set. The crossover point was set to 9.5, such that firms with 10 or more employees received fuzzy scores above 0.5. The sector variable was only calibrated using crisp sets, as the dichotomized variable did not lend well to 'fuzzification.' It was used as a crisp set in the fuzzy set analyses, which poses no problem in obtaining a fsQCA solution.

Table 39 Description of Crisp Set Calibration

Variable Description	Short	Range	0 (full non-membership)		1 (full membership)	
	Short	*Range*	*Values*	*Qualitative Description*	*Value*	*Qualitative Description*
Outcomes						
Internationalization propensity	INTA	0 – 100	0	Domestic only	1 – 100	Liberal understanding of internationalization
Internationalization propensity	INTB	0 – 100	0 – 24	Domestic and 'ad hoc' international	25 – 100	Conservative understanding of internationalization
Conditions						
Innovation Results						
Service innovation	SERV	0 – 4	0 – 1	No innovation or adaptation	2 – 4	New-to-firm or new-to-world innovation
Process innovation	PROC	0 – 3	0 – 1	No innovation or adaptation	2 – 3	New-to-firm or new-to-world innovation
Management innovation	MGT	0 – 3	0 – 1	No innovation or adaptation	2 – 3	New-to-firm or new-to-world innovation
Marketing innovation	MKT	0 – 3	0 – 1	No innovation or adaptation	2 – 4	New-to-firm or new-to-world innovation
Technological innovation	TECH	0 – 2	0	No technological innovation	1 – 2	Either or both types of technological innovation
Non-technological innovation	NTECH	0 – 2	0	No non-technological innovation	1 – 2	Either or both types of non-technological innovation
Innovation Activities						
Breadth of internal activities	ACT	1 – 6	1 – 2	Very low activity breadth	3 – 6	Moderate to high activity breadth
Breadth of information sources	BIS	0 – 13	0 – 5	Very low to moderate breadth	8 – 13	High to very high breadth
Depth of information sources	DIS	0 – 9	0 – 3	Very low to low depth	4 – 9	Moderate to very high depth
Internal information sources	IIS	0 – 3	0	Not used	1 – 3	Low to high importance
Market information sources	MIS	0 – 3	0	Not used	1 – 3	Low to high importance
Research information sources	RIS	0 – 3	0	Not used	1 – 3	Low to high importance
General information sources	GIS	0 – 3	0	Not used	1 – 3	Low to high importance
Knowledge generation activities	KGA	0 – 2	0	Not used	1 – 2	Moderate to high use
Knowledge exploitation activities	KEA	0 – 4	0 – 1	Not used or low use	2 – 4	Moderate to high use
Firm Characteristics						
Age	AGE	2 – 99	2 – 19	Young firm	20 – 99	Established or very-well established firm
Size	SZE	1 – 95	1 – 9	Micro to very small firm	10 – 95	Small firm
Sector	TKI	0 – 1	0	Professional KIBS	1	Technological KIBS

Table 40 Description of Fuzzy Set Calibration

Variable Description	Short	0 (full non-membership)		0.5 (cross-over point)		1.0 (full membership)	
		Value	Qualitative Description	Value	Qualitative Description	Value	Qualitative Description
Outcome							
Internationalization intensity, liberal calibration	INTL	0	Domestic	0.5	Positive FSTS ratio; any internationalization	25	At least low internationalization
Internationalization intensity, conservative calibration	INTC	0	Domestic	9.5	Positive FSTS; at least very low internationalization	25	At least low internationalization
Condition							
Innovation Results							
Service innovation	SERV	0	No innovation	1.5	Between adaptation and new-to-firm	4	New-to-world innovation
Process innovation	PROC	0	No innovation	1.5	Between adaptation and new-to-firm	3	New-to-world innovation
Management innovation	MGT	0	No innovation	1.5	Between adaptation and new-to-firm	3	New-to-world innovation
Marketing innovation	MKT	0	No innovation	1.5	Between adaptation and new-to-firm	3	New-to-world innovation
Tech innovation	TECH	0	No innovation	0.9	Between 0 and 1 type	2	Both types
Non-tech innovation	NTECH	0	No innovation	0.9	Between 0 and 1 type	2	Both types
Innovation Activities							
Breadth of internal activities	ACT	1	Very low activity breadth	2.5	Moderate activity breadth	5	High activity breadth
Breadth of information sources	BIS	5	Moderate breadth	7.5	High breadth	11	Very high breadth
Depth of information sources	DIS	2	Low depth	3.5	Moderate depth	6	High depth
Internal information sources	IIS	0	Not used	1.4	Just above low importance	3	High importance
Market information sources	MIS	0	Not used	1.4	Just above low importance	3	High importance
Research information sources	RIS	0	Not used	1.4	Just above low importance	3	High importance
General information sources	GIS	0	Not used	1.4	Just above low importance	3	High importance
Knowledge generation activities	KGA	0	No activity adopted	0.9	Between 0 and 1 activity adopted	2	Both activities adopted
Knowledge exploitation activities	KEA	0	No activity adopted	1.9	Between 1 and 2 activity adopted	4	All four activities adopted
Firm Characteristics							
Age	AGE	2	Very young firm	19.5	Established firm	40	Very well-established firm
Size	SZE	5	Micro firm	9.5	Very small firm	50	Small firm

Table 41 Mean, SD and Correlation Table of Variables (Fuzzy Set Scores)

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. INTC	0.339	0.388	1.000														
2. INTL	0.270	0.360	0.926	1.000													
3 SER	0.433	0.373	0.139	0.129	1.000												
4. PRO	0.319	0.343	0.000	0.032	0.266	1.000											
5. MGT	0.310	0.313	0.080	0.091	0.172	0.518	1.000										
6. MKT	0.251	0.292	0.049	0.011	0.175	0.087	0.174	1.000									
7. ACT	0.739	0.208	0.055	0.053	0.168	0.093	0.109	0.163	1.000								
8. KGA	0.842	0.159	0.056	0.068	0.133	0.072	0.119	0.048	0.820	1.000							
9. KEA	0.508	0.375	0.001	-0.012	0.100	0.107	0.030	0.232	0.645	0.161	1.000						
10. BIS	0.582	0.322	0.089	0.093	0.051	0.173	0.030	-0.033	-0.004	0.030	-0.035	1.000					
11. DIS	0.394	0.260	-0.005	-0.003	0.038	0.161	0.061	0.141	0.200	0.147	0.168	0.292	1.000				
12. MIS	0.617	0.232	0.038	0.054	-0.001	0.051	-0.054	0.008	0.015	-0.001	0.086	0.190	0.319	1.000			
13. IIS	0.899	0.134	0.016	0.006	0.031	0.124	0.088	0.129	0.099	0.061	0.073	-0.018	0.266	0.142	1.000		
14. RIS	0.198	0.194	0.018	0.020	-0.105	-0.055	-0.057	-0.126	-0.007	0.030	-0.076	0.670	0.391	0.062	-0.053	1.000	
15. GIS	0.482	0.247	0.067	0.077	0.203	0.242	0.185	0.187	0.187	0.167	0.109	0.655	0.521	0.184	0.052	0.412	1.000

5.3.4   Crisp-Set QCA

5.3.4.1   Analysis of Sufficiency (H1b)

The first hypothesis tests whether service innovation is a necessary condition for internationalization propensity. Internationalization propensity is first calibrated using an FSTS ratio greater than 0 as the cut point between full non-membership (0) and full membership (1). Specifically, I test for a relationship of necessity because, as observed in the literature review detailed in Chapter 2, both traditional internationalization process theory as well as the INV perspective make the assumption that service (product) innovation is a requisite condition for internationalization. Stated formally, I posit: service innovation is a necessary condition for internationalization propensity in small KIBS firms (H1b).

While only two are shown below—the ones explicated in the previous subsection—multiple calibration options for the outcome variable were tested. As a singular condition, service innovation was not found to be a necessary condition in both analyses. I thus opted to widen the scope of the test and examined whether service innovation in conjunction with other types of innovation gave way to a significant finding. I tested for the presence of a necessary condition by examining service innovation with the other three innovation types using Boolean multiplication ("*"; logical AND, takes the intersect of two subsets) and addition ("+"; logical OR, joins two subsets). I thus created macro variables of innovation results. I also tested for the absence[19] of all four types of innovation results. No condition or configuration of conditions withstood the cut-off values of 0.9 consistency and 0.6 coverage defined at the onset of the analyses.

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[19] Outcome or condition variables that are 'present' are identified using the upper case notation; 'absent' conditions are identified using the lowercase notation. For example, 'SERV' would represent the presence of service innovation, and 'serv' its absence.

Table 42 Analysis of Necessity (H1b)

Condition	INTA (1 if FSTS ≥ 1)		INTB (1 if FSTS ≥ 25)		Decision
	Consistency	*Coverage*	*Consistency*	*Coverage*	
SERV	0.484	0.454	0.551	0.207	Reject
serv	0.516	0.328	0.449	0.115	Reject
PROC	0.328	0.360	0.449	0.198	Reject
proc	0.672	0.389	0.551	0.128	Reject
MGT	0.361	0.407	0.490	0.222	Reject
mgt	0.639	0.365	0.510	0.117	Reject
MKT	0.254	0.426	0.163	0.110	Reject
mkt	0.746	0.365	0.837	0.165	Reject
LogicalOR					
SERV + PROC	0.590	0.395	0.714	0.192	Reject
SERV + MGT	0.656	0.430	0.816	0.215	Reject
SERV + MKT	0.615	0.455	0.635	0.188	Reject
SERV + PROC + MGT	0.689	0.410	0.857	0.205	Reject
SERV + PROC + MKT	0.689	0.402	0.755	0.177	Reject
SERV + MGT + MKT	0.746	0.433	0.837	0.195	Reject
SERV + PROC + MGT + MKT	0.770	0.412	0.878	0.189	Reject
LogicalAND					
SERV * PROC	0.221	0.458	0.286	0.237	Reject
SERV * MGT	0.189	0.442	0.225	0.212	Reject
SERV * MKT	0.123	0.395	0.082	0.105	Reject
SERV * PROC * MGT	0.172	0.500	0.204	0.238	Reject
SERV * PROC * MKT	0.066	0.421	0.041	0.105	Reject
SERV * MGT * MKT	0.082	0.400	0.061	0.120	Reject
SERV * PROC * MGT * MKT	0.066	0.421	0.041	0.105	Reject

5.3.4.2   *Analysis of Sufficiency (H2b)*

The second hypothesis questions whether there exist configurations of innovation types that explain internationalization propensity. Formally, I posit: service innovation in combination with other types of innovation are conducive to internationalization propensity in small KIBS firms.

To test this hypothesis, I completed an analysis of sufficiency. Given how the hypothesis was stated initially, I ran a QCA using four conditions—all four innovation results—as well as the three firm characteristics—age, size, and sector—to explain internationalization propensity as the outcome. Both

liberal and conservative calibrations (FSTS ≥ 1 and FSTS ≥ 25, respectively) of the outcome variable, internationalization propensity, were explored to assess whether this change affected the results.

The solution table is populated using the notation brought forward by Ragin and Fiss (2008), whereby a large black circle ("●") indicates the presence of a core condition, a large white circle ("○") the absence of a core condition, a small black circle ("•") the presence of a peripheral condition, and a small white circle ("○") the absence of a peripheral condition. A reminder to the reader: core conditions are those that are part of both the parsimonious and intermediate solutions, while peripheral conditions are those that are only found in the intermediate solution (Fiss, 2011; Ragin & Fiss, 2008). Moreover, the solution tables[20] only list those configurations that consistently led to the outcome of interest, as listed in the heading above the solution, and per the consistency threshold that was determined at the onset of the analyses. Solutions are grouped by their core condition when neutral permutations arise. Thus, the table excludes the configurations that did not lead to the presence (or absence) of the outcome, that did not pass the frequency threshold of three cases, or that exhibited an inconsistent pattern, as detected by a consistency score less than 0.8.

Presence of the Outcome. I first began examining the model explaining the presence of INTA, the liberal calibration of internationalization propensity. This model was comprised of seven condition variables: the four innovation results and the three firm characteristics. Two configurations met the requirements of a consistency score greater than 0.8 and a case count greater or equal to three. Taken together the two solutions suggest that configurations that consistently lead to the outcome are dependent on firm characteristics: where the first solution, configuration 1, applies to young and very small professional KIBS, the other applies to older, larger technological KIBS. Moreover, similarities between the two make the point that service innovation is neither necessary nor sufficient for internationalization propensity. Rather, its absence combined with the presence of management innovation are consistent elements in both configurations: where configuration 1 pairs these elements with the absence of marketing innovation (serv * MGT * mkt * age * sze * tkibs), the second pairs them with the absence of process innovation (serv * proc * MGT * AGE * SZE * TKIBS). The solution table thus exhibits two equifinal solutions sufficient for the outcome INTA to occur. Both configurations lend support to reject the hypothesis that service innovation in conjunction with other types of innovation results are sufficient for internationalization propensity, as service innovation is stated as absent in both paths. It should be

[20] The solution table is populated by configurations that were identified as adhering to the consistency and case count threshold in the Truth Table analysis, and that have gone through the Quine-McCluskey minimization algorithm.

noted, however, that the solution covers only 6 percent of outcome membership. While the truth table did capture a wide variety of configurations adopted by internationalized firms, most displayed variability with their associated outcome and thus had insufficient consistency scores.

Concerning the second more conservative calibration of internationalization propensity, the examination of the truth table determined that no configuration exceeded the consistency threshold of 0.8 while having a minimum case count of three. As such, all configurations were coded '0' for *INTB* and the analysis ended there. Thus, I reject the hypothesis stated above when using the conservative calibration of internationalization propensity.

Absence of Outcome. To complete a QCA analysis, it is also important to assess the configurations that explain the absence of the outcome. In this case, the analysis then asks: what are the configurations of innovation results and firm characteristics that explain the absence of internationalization? Two truth tables were drawn to answer this question, one using the liberal calibration of international propensity (*inta*) and the other the conservative calibration (*intb*).

The first model using the outcome *inta* outputted two configurations meeting the requirements of a consistency score greater than 0.8 and at least three cases demonstrating this configuration. It captures a relatively small portion of the sampled firms covering almost 24 percent of outcome membership; no configuration captures a large share of the outcome. That said, it offers interesting insight with respect to the diversity of configurations adopted by domestic firms. The data suggest there are five equifinal paths that lead to remaining a domestic firm, as defined by an FSTS ratio equal to zero, of which configuration 4 exhibits two neutral permutations. Overall, the solution table points to two larger trends. The first is exemplified in configurations 1 through 3 which exhibit the absence of all types of innovation results, combined with the absence or presence of all three firm characteristics. Irrespective of whether the firm is very small or small, is young or mature, operates in a PKIBS or TKIBS sector, the absence of innovation results consistently leads to the outcome *inta.* The last two configurations, 4 and 5, exemplify a second trend and suggest that firms with membership in the absence of internationalization (therefore, domestic firms) may, too, be innovative. The absence of service and management innovation joined with the presence of process innovation leads to *inta* in older, larger TKIBS firm. Likewise, the presence of service and process innovation coupled with the absence of management and market innovation leads to *inta* in younger, larger TKIBS firms.

The second model using the outcome variable *intb* is much more informative. The solution captures a larger percentage of firms identified as being part of the non-international (domestic) subset, covering 70 percent of the outcome membership. This more conservative calibration groups together

firms that are truly restrained in their geographic scope to their regional or national markets as well as those that have a relatively small percentage of their sales from foreign markets.

Interestingly, these two otherwise distinct subgroups of firms (e.g., domestic firms, very low-intensity 'ad hoc' international firms) share many attributes. The data point to eight paths of which 4 have neutral permutations that lead to remaining domestic, as defined here by an FSTS ratio less than 25 percent. Interestingly, the first configuration's three permutations reflect closely the first three configurations identified in the first model analyzed using the liberal operationalization of the outcome variable. Overall, a similar trend in the configurations is detected, whereby a first group of combinations identifies the absence of most innovation results coupled with various firm characteristics, and a second group the presence of some innovation results, although sometimes coupled with the absence of other types of innovation, along with various firm characteristics.

Two comments are worthwhile. First, the difference in coverage between the two operationalizations is quite remarkable, suggesting that firms with a low percentage of foreign sales adopt similar innovation behaviors consistent to those of firms that are domestic. Second, while much of the literature assumes that domestic firms do not innovate, a notion best represented by configuration 1c (serv * proc * mgt * mkt) which covers the largest proportion of firms, there are also a variety of configurations (e.g., configurations 5 though 8) that cover albeit much smaller proportions of firms in the membership outcome but that provide theoretically significant counterexamples. As these configurations capture innovative firms, they counter current assumptions inferred using symmetrical modeling techniques such as logistic regression. Moreover, the lack of any configuration of innovation results and firm characteristics explaining with sufficient consistency the presence of internationalization suggests service innovation or any combination of innovation results for that matter are not sufficient conditions for internationalization when it is calibrated conservatively. As such, while there are many ways for firms to innovate and internationalize, none lead consistently to a positive outcome; conversely, there are several consistent configurations that are conducive to a firm remaining in its domestic market or having a very low FSTS ratio.

Table 43 Analysis of Sufficiency (H2b), Liberal Calibration, Crisp Set QCA

Outcome	INTA		inta					
Solution	1	2	1	2	3	4a	4b	5
Innovation Results								
Service innovation (SERV)	○	○	○	○	∘	○	○	●
Process innovation (PROC)		○	○	∘	○	●	●	●
Management innovation (MGT)	●	●	○	○	○			○
Marketing innovation (MKT)	∘		∘	∘	∘	○	○	∘
Firm Characteristics								
Age	∘	•		●	○	●	●	○
Size	○	●	●		∘		•	●
TKIBS	○	●	○	○	•	•		•
Raw coverage	0.025	0.041	0.065	0.060	0.020	0.055	0.070	0.030
Unique coverage	0.025	0.041	0.035	0.030	0.020	0.020	0.035	0.030
Consistency	1.000	0.833	0.929	0.857	1.000	0.917	0.933	0.857
Solution coverage	0.066		0.235					
Solution consistency	0.889		0.922					

"●" indicates the presence of a core condition; "○" the absence of a core condition; "•" the presence of a peripheral condition; "∘" the absence of a peripheral condition; and, an empty space indicates a "don't-care" condition

Table 44 Analysis of Sufficiency (H2b), Conservative Calibration, Crisp Set QCA

Outcome	INTB	intb												
Solution	N/A	1a	1b	1c	2a	2b	3	4	5a	5b	6a	6b	7	8
Innovation Results														
Service innovation (SERV)		○	○	○		○	○		○	○	●	●	●	
Process innovation (PROC)		○	○	○	○	○		○	●	●	●	○	●	
Management innovation (MGT)		○	○	○	○			○			●	●	○	
Marketing innovation (MKT)				○		●	○	○		○	○		○	●
Firm Characteristics														
Age			○		○	○			●	●	●	●	○	○
Size		●			○	○	●	○	●		●	●	●	○
TKIBS		●	●		○	●	○	●	●	●		●	●	○
Raw coverage		0.110	0.150	0.322	0.106	0.073	0.114	0.172	0.040	0.040	0.059	0.011	0.026	0.036
Unique coverage		0.011	0.029	0.026	0.029	0.015	0.051	0.066	0.015	0.015	0.026	0.011	0.026	0.015
Consistency		0.968	0.891	0.936	0.906	0.833	1.000	0.887	0.917	0.917	1.000	1.000	1.000	0.909
Solution coverage	No solution	0.703												
Solution consistency		0.941												

"●" indicates the presence of a core condition; "○" the absence of a core condition; "•" the presence of a peripheral condition; "○" the absence of a peripheral condition; and, an empty space indicates a "don't-care" condition

The third hypothesis questions whether there are certain configurations of innovation results, internal innovation activities, and external information sources that explain internationalization propensity. Here, the interest is in examining whether configurations analogous to an open innovation posture lead to internationalization. Formally, I state: A combination of moderate internal innovation activities and use of external information sources in conjunction with technological or non-technological innovation results—all indicative of an open innovation mode—are conducive to internationalization propensity in small KIBS firms.

Two models were tested for each outcome; I used condition variables that differed in nature but sought to examine the same phenomena. The first model (Model A) brought together condition variables that captured the type of innovation activity and information sources used, such that the model tested whether it was a variation in kind of use that explained the outcome. The second model (Model B) brought together condition variables that captured the breadth and depth of innovation activity and information source, such that the models tested whether it was a variation in the degree of use that explained internationalization. The findings are discussed as a whole per outcome variable.

Presence of outcome: INTA. When using the liberal calibration of internationalization propensity (*INTA*) to test Model A, the analysis outputted two configurations that met the parameter requirements. Both solutions specify the absence of knowledge exploitation activities: implementation and use of knowledge management policies or strategies, and the marketing and commercialization of new or improved services. Where one configuration finds both technological and non-technological innovation results as 'do-not-care' conditions, the other finds the presence of technological innovation and the absence of non-technological innovation as core conditions. The two resemble one another in that they find most information sources important: where the first configuration finds research sources as a core condition, the second finds general sources as a core condition. In both, collaborations are either not important or the absence of collaboration is specified as a core condition for the outcome. Altogether, these configurations provide some insight, though again they should be interpreted with caution given the very small percentage of firms they cover. Nonetheless, both configurations suggest that an openness towards external information sources is important for internationalization, but not the use of external innovation collaboration partners. Moreover, a firm must not be an innovator per se to achieve internationalization, as exemplified by configuration 1. Both configurations do imply, however, a need for investment in internal innovation activities.

When using the same outcome variable to test Model B, the analysis outputted only one configuration that met the parameter requirements. The solution states a combination of non-technological innovation and breadth of information sources, as well as the absence of technological innovation, depth of information sources, and collaboration. The model also specifies as a peripheral element the presence of internal innovation activities breadth. While the results from the two models differ in the innovation requirements that are sufficient for internationalization to occur, they do complement understanding of the phenomena at hand by suggested that gaining new knowledge from a wide variety of sources is an important attribute in firms that internationalize. However, as the coverage values of both models are quite low, accounting for 9 and 3 percent of membership in the outcome of Models A and B, respectively, these fit values suggest that there are significant idiosyncrasies in the configurations adopted by firms that internationalize. Moreover, there exist other configurations that do not always lead to an outcome of internationalization as they are often also adopted by domestic firms. These remaining configurations were not retained for further modeling and are largely ignored in this analysis given their low consistency scores. That said, the configurations that are underscored in the solution tables provide support for hypothesis H3b, and as such, I partially accept it as it applies to the liberal calibration of the outcome variable.

Absence of Outcome: inta. Results from Model A run with the outcome variable, *inta*, suggest that multiple pathways explain a domestic geographic scope. However, none captured a large percentage of firms, as seen by the low raw coverage scores across the solution table. Despite these rather low coverage figures, it is interesting to note that there are a variety of configurations that explain the absence of internationalization, and these configurations do not necessarily resemble one another. Where most specify the absence of internal innovation activities, some do specify the presence of collaboration or knowledge exploitation activities as core conditions. Where most specify the absence of information sources, some specify the presence of research or general information sources. Where most specify the absence of innovation results, some specify their presence. All this to say: there are many pathways to the absence of internationalization, and while some resemble each other, others are distinctly different indicating important heterogeneity in the innovation behaviors of domestic firms.

A similar assessment can be made by examining the absence of internationalization propensity in Model B. Four pathways explain the absence of internationalization propensity all with consistency scores greater than 0.75, but yet again none capture a large percentage of firms. Indeed, the solutions together cover only 11.5% of outcome membership. That said, these configurations offer striking differences between one another in terms of all categories of variables investigated. Where most specify the absence

of innovation results, one specifies the presence of both technological and non-technological innovation. Where half suggest the presence of a wide breadth of information sources, the other half specifies its absence. Similar comments can be made for both collaboration and breadth of internal innovation activities. Thus, again, the data suggest that there are distinct, equifinal configurations that all lead to remaining in the domestic market.

Table 45 Analysis of Sufficiency (H3b), Model A, Liberal Calibration, Crisp Set QCA

Outcome	INTA		inta						
Solution	1	2	1	2	3	4	5	6	7
Innovation Results									
Technological innovation		●	●		○		∘	∘	∘
Non-technological innovation		○	○		∘	○	∘	●	∘
Information sources									
Internal	•	•							
Market	•	•	○	○					
General	•	●		∘	●	●		○	
Research	●		∘	∘	○	○	●	∘	∘
Internal Activities									
Knowledge generation	•	•							○
Knowledge exploitation	○	○		○	○	○	●	○	○
Collaboration		○		○		●	∘	○	∘
Raw coverage	0.057	0.033	0.075	0.035	0.030	0.025	0.020	0.020	0.015
Unique coverage	0.057	0.033	0.070	0.030	0.030	0.025	0.020	0.020	0.015
Consistency	0.778	0.800	0.938	0.700	0.857	0.833	1.000	0.571	0.750
Solution coverage	0.090		0.215						
Solution consistency	0.786		0.860						

"●" indicates the presence of a core condition; "○" the absence of a core condition; "•" the presence of a peripheral condition; "∘" the absence of a peripheral condition; and, an empty space indicates a "don't-care" condition

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Table 46 Analysis of Sufficiency (H3b), Model B, Liberal Calibration, Crisp Set QCA

Outcome	INTA	inta			
Solution	1	1	2	3	4
Innovation Results					
Technological innovation	◯	◯	◯		●
Non-technological innovation	●			○	●
Information sources					
Information source depth	◯	○	●	○	◯
Information source breadth	●	●	◯	◯	●
Internal Activities					
Internal activities breadth	•	◯		◯	
Collaboration	◯		●	●	◯
Raw coverage	0.033	0.055	0.015	0.025	0.020
Unique coverage	0.033	0.055	0.015	0.025	0.020
Consistency	0.800	0.846	0.750	1.000	0.800
Solution coverage	0.033	0.115			
Solution consistency	0.800	0.852			

"●" indicates the presence of a core condition; "◯" the absence of a core condition; "•" the presence of a peripheral condition; "○" the absence of a peripheral condition; and, an empty space indicates a "don't-care" condition

Table 47 Analysis of Sufficiency (H3b), Model A, Conservative Calibration, Crisp Set QCA

Outcome	INTB	intb										
Solution		1a	1b	2a	2b	3a	3b	4	5a	5b	6	7
Innovation Results												
Technological innovation				○		◯	◯	◯	●	●		●
Non-technological innovation			○		○	○	○	◯	◯	◯	●	●
Information Sources												
Internal							•					•
Market		◯	◯					•	•		•	•
General		○		◯	◯	○		•	•		●	●
Research		○		○	○	◯	◯			○	○	○
Internal Activities												
Knowledge generation				●	●		•	●				•
Knowledge exploitation						◯	◯	●	◯	◯	●	●
Collaboration				◯	◯	◯	◯	○	●	●	●	○
Raw coverage		0.165	0.117	0.209	0.223	0.077	0.212	0.048	0.033	0.062	0.128	0.044
Unique coverage		0.051	0.015	0.033	0.044	0.011	0.022	0.015	0.011	0.026	0.128	0.044
Consistency		0.978	0.970	0.950	0.953	0.955	0.983	1.000	1.000	1.000	0.854	0.923
Solution coverage	No solution	0.689										
Solution consistency		0.935										

"●" indicates the presence of a core condition; "◯" the absence of a core condition; "•" the presence of a peripheral condition; "○" the absence of a peripheral condition; and, an empty space indicates a "don't-care" condition

Table 48 Analysis of Sufficiency (H3b), Model B, Crisp Set QCA

Outcome	INTB	intb							
Solution	N/A	1	2	3	4	5	6	7	8
Innovation Results									
Technological innovation		○	○	○				●	
Non-technological innovation		○			○	○	●	●	
Information Sources									
Information source depth			○	○	○		○		●
Information source breadth				○	●	○	○	●	
Internal Activities									
Internal activities breadth			○		●			●	
Collaboration					○	●	○		●
Raw coverage		0.322	0.073	0.154	0.081	0.059	0.081	0.183	0.198
Unique coverage		0.128	0.015	0.015	0.029	0.044	0.040	0.128	0.132
Consistency		0.936	0.952	0.955	0.917	0.842	0.917	0.877	0.871
Solution coverage	No solution	0.821							
Solution consistency		0.911							

"●" indicates the presence of a core condition; "○" the absence of a core condition; "•" the presence of a peripheral condition; "∘" the absence of a peripheral condition; and, an empty space indicates a "don't-care" condition

Presence of Outcome: INTB. Using the conservative calibration of internationalization propensity (*INTB*), the analysis reached an end when coding the truth table, as no configuration met the predetermined parameters for consistency and case count. Similar to Hypothesis 2b, this suggests that while there are many ways to innovate and internationalize, none exhibit a consistent pattern.

Absence of Outcome: intb. The analysis of Model A's solution for the absence of internationalization using outcome variable *intb* is quite interesting and provides a good example of across-type and between-type equifinality. Across-type equifinality is observed as the solution outputs seven different configurations that explain the absence of internationalization propensity, all with consistency scores greater than 0.75. Some configurations are more important than others, in that they capture a larger number of cases. For example, while configurations 2a and 2b both capture more than 20% of membership in the outcome, configuration 7 captures less than 5% only. Overall, the solution table demonstrates that there is significant heterogeneity in the configurations that explain the absence of

the outcome. There are configurations in which firms are innovative, actively invest in their internal innovation activities, and provide resources towards gathering external knowledge. Configurations 6 and 7 best embody these descriptions. However, the configurations that capture firms that do innovate and invest in their innovation inputs have the lowest coverage scores.

Indeed, the majority of firms captured by the configurations in the solution table of Model A are best described by the absence of technological or non-technological innovation, the absence of information sources, and the absence of knowledge exploitation and collaboration. These configurations are aligned with the theoretical assumption that domestic firms are not as innovative as their international counterparts, nor do they invest in their innovation as heavily. The configurations where innovation results are either absent or 'do-not-care' elements provide a good example of neutral permutations or between-type equifinality. Two configurations provide salient use-cases: configurations 2a and 2b differ in the type of innovation result that is absent in combination with the absence of general and research sources and the presence of knowledge generation activities. Configurations 3a and 3b share the same core elements: absence of technological innovation, research sources, knowledge exploitation activities, and collaboration. Where configuration 3a is also combined with the absence of general sources, configuration 3b is combined with the presence of knowledge generation activities and the use of internal information sources.

Model B's solution table resembles Model A's, as multiple configurations combine the absence of innovation results with the absence of most other conditions, while only a few configurations combine the presence of innovation results with a few other conditions. The solution offers another example of cross-type equifinality, as eight distinct configurations all lead to the absence of the outcome variable with consistency scores greater than 0.75. Of these eight, three are noteworthy for theoretical reasons. Configuration 1 captures firms that are aligned with the theoretical assumption that non-innovative firms remain in their domestic markets. An important observation follows: this configuration captures the largest portion of explained membership in the absence of the outcome. Configuration 7 and 8 provide important counterexamples. Configuration 7 captures firms that perform both technological and non-technological innovations, have information source breadth and invest in their internal innovation activities, yet have little to no international sales. Conversely, Configuration 8 combines information source depth and collaboration. Both configurations capture 18 and 19 percent of outcome membership, respectively, and offer opposite views of innovation behaviors to the first configuration discussed. These three configurations paint the picture of the wide variety of combinations that explain firms remaining in

their domestic market and underscore a need to depart from symmetrical modeling and net effects thinking.

Moreover, the increase in coverage for both Models A and B using the conservative calibration of the outcome variable, *intb*, in comparison to the coverage scores from the previous analysis with the liberal calibration, *inta*, provides support to the idea that firms with a low ratio of sales from foreign markets do not differ significantly in their innovation behaviors from firms with no international sales. These findings are echoed from those observed in the previous hypothesis, H2b.

5.3.5   *Fuzzy-Set QCA*

5.3.5.1   *Analysis of Necessity (H4b)*

Similar to the first hypothesis tested on the outcome variable internationalization propensity, the fourth hypothesis seeks to test whether service innovation is a necessary condition for internationalization intensity. Internationalization intensity is first calibrated using the anchors of 0 for full non-membership, 25 for full membership, and 0.5 for the crossover point. I label this the liberal calibration, *INTL*, as any firm with a positive FSTS ratio receives a fuzzy set score greater than 0.5 for the outcome variable. I compare these results to a second calibration, *INTC*, which I label conservative. Though it uses the same full non-membership and full membership anchors, it differs in crossover point. Using this conservative calibration, a firm with a positive FSTS ratio of 9 or less receives a fuzzy score below than 0.5, while a firm with a FSTS ratio of 10 or greater receives a score above 0.5. This calibration then discriminates against firms that have sporadic or ad hoc internationalization.

As I did for hypothesis 1b, I test for a relationship of necessity because both traditional internationalization process theory as well as the INV perspective posit service (product) innovation is a requisite condition for internationalization. Stated formally, I posit: service innovation is a necessary condition to attain at least low internationalization intensity in small KIBS firms (H4b).

As a singular condition, service innovation was not found to be a necessary condition in both analyses. I again opted to widen the scope of the test and examined whether service innovation in conjunction with other types of innovation results was a necessary condition for at least low internationalization intensity. Boolean multiplication ("*"; logical AND, takes the intersect of two subsets) and addition ("+"; logical OR, joins two subsets) were again used to create all possible combinations between service innovation and the other three types of innovation results. I also tested for the absence of all four types of innovation results. Similar to Hypothesis 1b, no condition or configuration

of conditions withstood the cut-off values of 0.9 consistency and 0.6 coverage defined at the onset of the analyses.

Table 49 Analysis of Necessity (H4b)

	INTL		INTC		Decision
Condition	Consistency	Coverage	Consistency	Coverage	
SERV	0.585	0.457	0.605	0.377	Reject
serv	0.586	0.350	0.595	0.283	Reject
PROC	0.414	0.440	0.447	0.377	Reject
proc	0.749	0.373	0.741	0.294	Reject
MGT	0.448	0.489	0.472	0.410	Reject
mgt	0.734	0.361	0.725	0.284	Reject
MKT	0.374	0.506	0.386	0.416	Reject
mkt	0.799	0.361	0.820	0.295	Reject
LogicalOR					
SERV + PROC	0.659	0.418	0.682	0.345	Reject
SERV + MGT	0.701	0.440	0.726	0.363	Reject
SERV + MKT	0.679	0.452	0.694	0.368	Reject
SERV + PROC + MGT	0.727	0.423	0.752	0.349	Reject
SERV + PROC + MKT	0.725	0.415	0.741	0.338	Reject
SERV + MGT + MKT	0.761	0.436	0.777	0.354	Reject
SERV + PROC + MGT + MKT	0.780	0.420	0.797	0.341	Reject
LogicalAND					
SERV * PROC	0.339	0.526	0.370	0.457	Reject
SERV * MGT	0.331	0.551	0.351	0.465	Reject
SERV * MKT	0.279	0.541	0.298	0.458	Reject
SERV * PROC * MGT	0.290	0.592	0.317	0.515	Reject
SERV * PROC * MKT	0.216	0.633	0.243	0.568	Reject
SERV * MGT * MKT	0.235	0.620	0.258	0.543	Reject
SERV * PROC * MGT * MKT	0.207	0.660	0.232	0.590	Reject

5.3.5.2   *Analysis of Sufficiency (H5b)*

The fifth hypothesis questions whether there exist configurations of innovation results that explain internationalization intensity. Formally, I posit: service innovations in combination with other types of innovation are conducive to attaining at least low internationalization intensity in small KIBS firms.

To test this hypothesis, similar to the procedure applied in the previous analysis of H2b and H3b, I completed an analysis of sufficiency. I ran a fuzzy set QCA using the four innovation result conditions as well as three conditions capturing firm characteristics to explain internationalization intensity as the outcome. I ran the model twice—once using the liberal calibration of the outcome variable, and once using the conservative one—to assess whether this change affected the results.

Presence of Outcome: I began by running the fuzzy set QCA on the presence of *INTL*, the liberal calibration. From the truth table, only one configuration was identified as sufficient for the outcome while respecting the consistency and case count thresholds. This configuration differs from the one identified in the crisp set analysis (H2b), as here service innovation in conjunction with other types of innovation results is sufficient for at least low internationalization intensity. However, as the configuration only covers a small subset of firms in the outcome membership at just over six percent, it provides partial support for the hypothesis. While there is a consistent path to internationalization that couples service innovation with other types of innovation results, there are a wide variety of paths adopted by internationalized firms, and almost all do not consistently lead to internationalization. I add another caveat to the findings from the first model: the findings from second model using the conservative calibration of the outcome, *INTC,* failed to output a configuration that passed the predetermined inclusion thresholds. As such, no solution exists for the presence of the outcome using the conservative calibration. Thus, similar to the crisp set QCA, I find that while internationalized firms adopt a variety of configurations of innovation results, there are no (or very little) patterns of innovation results that consistently lead to at least a low internationalization intensity.

Table 50 Analysis of Sufficiency (H5b), Presence of Outcome, Liberal and Conservative Calibrations, Fuzzy Set QCA

Outcome	INTL	INTC
Solution	1	N/A
Innovation Results		
Service innovation (SERV)	●	
Process innovation (PROC)	●	
Management innovation (MGT)	•	
Marketing innovation (MKT)	○	
Firm Characteristics		
Size	•	
Age	•	
TKIBS	○	
Raw coverage	0.062	
Unique coverage	0.062	
Consistency	0.827	
Solution coverage	0.062	No solution
Solution consistency	0.827	

"●" indicates the presence of a core condition; "○" the absence of a core condition; "•" the presence of a peripheral condition; "○" the absence of a peripheral condition; and, an empty space indicates a "don't-care" condition

Absence of Outcome: As was done in the crisp set analyses, I ran two models examining the absence of the outcome using both calibrations. The first model testing the outcome variable *intl* outputted eight configurations meeting the consistency and case count requirements. The eight paths display both across-type and between-type equifinality and cover a substantial proportion of the outcome's membership, capturing more than 62 percent of all domestic firms.

Interestingly, only configuration 2b explicitly states the absence of all types of innovation, and it applies to professional KIBS firms (serv * proc * mgt * mkt * tkibs). That said, configurations 1 through 3 demonstrate the equifinal paths a firm may take to being non-innovative and remaining in its domestic market, as the presence of any innovation result is not explicitly stated. Moreover, paths capturing little to no innovation results are consistent in their outcome across the firm characteristics of age, size and sector, either explicitly stated or left open as a 'do-not-care' element. The solution table further underscores the presence of innovative domestic firms, where a variety of paths lead to remaining in the domestic market.

Configurations identifying one or several innovation results as elements in conditions sufficient for the absence of *intl* are not specific to certain firm characteristics.

The second model testing the outcome variable *intc* also outputted eight configurations that, too, displayed both across-type and between-type equifinality. Configurations found using the liberal calibration are again observed in the solution table, and overall the findings are consistent between both models. The change in calibration improves the consistency and coverage scores of the solution table. From these indicators and the parallel findings from both models, the more conservative calibration is favored. Moreover, the high coverage and consistency scores of all configurations is further evidence of the similarity between domestic and ad hoc international firms. The highest coverage scores are observed in configurations that identify non-innovative firms (e.g., configurations 1b, 1c, 3), in line with theoretical assumptions that domestic firms are not as innovative as internationalized ones.

Given the calibration scheme of the outcome variable, this finding is interpreted slightly differently from the first model using the liberal calibration. It suggests the adoption of these configurations consistently leads to remaining in the firm's domestic market or having a very low FSTS ratio. Moreover, many configurations specify the presence of at least one type of innovation result (e.g., configurations 4, 5 and 7). This interpretation follows the logic that while only one type of innovation result is stated as present, unless explicitly stated as absent, the presence of other types of innovation results are treated as 'do-not-care' elements in the configuration. Each of these configurations and their neutral permutations capture a considerable share of the membership outcome suggesting that, while the coverage scores are lower than those of configurations capturing no innovation, there is nevertheless a sizable number of firms that are innovative and that adopt configurations of innovation conditions that consistently lead to remaining domestic.

Table 51 Analysis of Sufficiency (H5b), Absence of Outcome, Liberal Calibration, Fuzzy Set QCA

Outcome	intl															
Solution	1a	1b	1c	2a	2b	2c	3	4a	4b	4c	5	6	7a	7b	8a	8b
Innovation Results																
Service innovation (SERV)	○			◯	◯	◯	◯	◯	◯	◯	◯	●			○	
Process innovation (PROC)		○	○		○			●	●	●	○	◯	●	●	○	
Management innovation (MGT)	◯	◯	◯		○		◯				●		○		○	
Marketing innovation (MKT)		○	○	○	○	○	◯	○	○		○		◯	◯	●	●
Firm Characteristics																
Size	•	•		•			●		•	•	○	●	●	●	◯	◯
Age	●	●	●			○		•		•	◯	●		•	○	○
TKIBS	•		•	◯	◯	◯		•		•		●	●	●		○
Raw coverage	0.136	0.223	0.222	0.123	0.185	0.154	0.259	0.101	0.160	0.093	0.118	0.101	0.118	0.117	0.125	0.068
Unique coverage	0.003	0.008	0.062	0.006	0.032	0.009	0.017	0.008	0.005	0.004	0.012	0.007	0.013	0.007	0.018	0.025
Consistency	0.807	0.825	0.790	0.898	0.883	0.852	0.835	0.843	0.859	0.819	0.830	0.787	0.821	0.844	0.843	0.815

Solution coverage	0.623
Solution consistency	0.806

"●" indicates the presence of a core condition; "◯" the absence of a core condition; "•" the presence of a peripheral condition; "○" the absence of a peripheral condition; and, an empty space indicates a "don't-care" condition

Table 52 Analysis of Sufficiency (H5b), Absence of Outcome, Conservative Calibration, Fuzzy Set QCA

Outcome								intc							
Solution	1a	1b	1c	2	3a	3b	4a	4b	4c	5	6	7	8a	8b	8c
Innovation Results															
Service innovation (SERV)	○			◯			◯	◯	◯	◯	○	●		○	○
Process innovation (PROC)		○			●	●	●	●	●	○	○	○		○	
Management innovation (MGT)	◯	◯	◯	◯		○				●	○			○	
Marketing innovation (MKT)		○	○	◯	◯	◯	○		○	○	●			○	○
Firm Characteristics															
Size	•		•	●	●	●	•	•		○	◯	●	○		•
Age	●	●	●		•			•	•	◯	○	●	○		
TKIBS	•	•				•		•	•			•	◯	◯	◯
Raw coverage	0.128	0.210	0.232	0.245	0.161	0.108	0.146	0.087	0.092	0.107	0.115	0.095	0.165	0.175	0.115
Unique coverage	0.003	0.062	0.004	0.021	0.010	0.012	0.004	0.004	0.006	0.011	0.017	0.009	0.054	0.035	0.008
Consistency	0.837	0.826	0.848	0.871	0.864	0.831	0.866	0.840	0.846	0.830	0.857	0.816	0.852	0.923	0.932

Solution coverage	0.627
Solution consistency	0.853

"●" indicates the presence of a core condition; "◯" the absence of a core condition; "•" the presence of a peripheral condition; "○" the absence of a peripheral condition; and, an empty space indicates a "don't-care" condition

5.3.5.3   Analysis of Sufficiency (H6b)

The last hypothesis again questions whether there are certain configurations of innovation results, internal innovation activities, and external information sources that explain internationalization, this time using fuzzy sets. I question whether there are configurations reflective of an open innovation posture that lead to at least low internationalization intensity. Formally, I state: a combination of moderate internal innovation activities and use of external information sources in conjunction with technological or non-technological innovation results—all indicative of an open innovation mode—are conducive to attaining at least low internationalization intensity in small KIBS firms.

Two models were tested for each outcome. I used the same condition variables as the ones from the crisp set analysis, this time with their fuzzy set calibration. Similar to Hypothesis 3b, Model A sought to assess whether it was a variation in kind of use that explained the outcome, while Model B sought to assess whether it was a variation in degree of use. The findings are discussed by outcome variable.

Presence of Outcome: INTL. The results displayed in Model A's solution table suggest only one configuration surpassed the parameter thresholds. The configuration has two core elements, the presence of non-technological innovation and the absence of collaboration, while the presence of all other condition variables but for research information sources are peripheral elements and provide a sufficient pathway to low internationalization intensity. This configuration suggests that short of collaborating with an innovation partner, all other innovation inputs and results akin to an open innovation posture are present in the configuration. While the configuration presents good consistency, it only covers 8% of all membership in the outcome. Thus, while the analysis identified a sufficient configuration for the presence of low internationalization intensity, there exist idiosyncrasies and heterogeneity in the way firms innovate and internationalize; configurations that do not consistently lead to the outcome.

As for Model B, results from the solution table display only one configuration that explains the outcome. This configuration has the same core conditions as the one from Model A: presence of non-technological innovation and absence of collaboration. Its peripheral elements include the presence of almost all other condition variables included in the model: technological innovation, information source breadth and depth, and breadth of internal innovation activities. Moreover, it is similar in consistency and coverage to the configuration identified in Model A. From these results, I conclude that while there is one consistent path that explains the outcome variable, there is again significant heterogeneity in the degree to which firms invest in their innovation inputs and outputs. The initial truth table analyzed prior to minimization displayed a variety of other configurations, but none other consistently led to the modeled

outcome following the predetermined inclusion parameters. With that said, when the evidence from both models is taken as a whole, there is sufficient support to partially accept hypothesis H6b.

Absence of Outcome: intl. Three configurations were found to be sufficient for the absence of the outcome *intl*. Whereby configurations 1 and 2 clearly point to firms being non-innovative or closed to external partnership in achieving their innovation results, the third configuration points to firms being technologically innovative and making use of some external information source, notably general information sources. It should be noted, however, that the large majority of firms are covered by configurations where innovation results are either absent or 'do-not-care' conditions. Findings from Model B echo those of Model A. Where five configurations were found as sufficient for the outcome, two state the presence of technological innovation alone or in combination with non-technological innovation, while the other three state the absence of non-technological innovation with or without the absence of technological innovation. Thus, two of the five configurations identify firms that are innovative, while the other three capture those that are not. The absence of other innovation inputs is noted in the three non-innovator configurations, with the exception of the presence of information source depth in configuration 3. Nonetheless, the comparison of configurations that explain the presence versus the absence of the outcome point to a clear trend: an open innovation posture is consistent with the presence of the outcome, while no configuration aligned with an open innovation posture consistently leads to its absence. Or, stated differently, the configurations that explain the absence of the outcome are aligned with a closed innovation posture.

Presence of Outcome: INTC. The analysis for the outcome variable calibrated more conservatively was run for both Models A and B. Both resulted in termination at the Truth Table stage, as all configurations were coded to false. No configuration passed the case count and consistency thresholds.

Absence of Outcome: intc. Overall, the configurations outputted in both Models A and B for the conservatively calibrated outcome variable, *intc*, are in line with those found in the previous analysis using the liberal calibration of internationalization intensity, *intl*. Four configurations were outputted in Model A, three of which offer equifinal configurations linked to the absence of technological or non-technological innovation, often with the absence of collaboration and some types of information sources. Only configuration 4 offers a pathway for the absence of low internationalization intensity in which the presence of both technological and non-technological innovation coupled with the absence of research sources is sufficient for the outcome. Four configurations were, too, outputted in Model B, three of which again offer equifinal configuration linked to the absence of technological and non-technological innovations. Each configuration couples the absence of an innovation result with the absence of another

variable: collaboration in configuration 1, information source breadth in configuration 2, and internal innovation activities breadth in configuration 3.

Similar to the findings from the analysis using the liberal calibration of low internationalization intensity, in both Models A and B the configuration that identifies the presence of innovation results captures the least amount of cases among all identified configurations. As aligned with theoretical expectation, the most populated pathways to remaining domestic or having a very low FSTS ratio is through the absence of innovation results. Importantly, as observed in the crisp set analysis from Hypothesis 3b, the increase in coverage for both Models A and B using the conservative calibration of the outcome variable, *intc*, in comparison to the coverage scores from the previous analysis with the liberal calibration, *intl*, provides additional support to the idea that firms with a low ratio of sales from foreign markets do not differ significantly in their innovation behaviors from firms with no international sales.

Table 53 *Analysis of Sufficiency (H6b), Model A, Fuzzy Set QCA*

Outcome	INTL	intl				INTC	intc				
Solution	1	1a	1b	2	3	0	1	2a	2b	3	4
Innovation Results											
Technological innovation	•		○	◯	●		◯	○			●
Non-technological innovation	●		○	○	○		○	○	○	○	●
Information Sources											
Internal	•										
Market	•			◯	◯					◯	
General	•			◯	●						
Research		○		○	○				○	○	○
Internal Activities											
Knowledge generation	•										
Knowledge exploitation	•			◯			◯			●	
Collaboration	◯	◯	◯					◯	◯		
Raw coverage	0.087	0.459	0.492	0.259	0.147		0.450	0.491	0.447	0.261	0.120
Unique coverage	0.087	0.033	0.070	0.062	0.031		0.108	0.041	0.022	0.034	0.031
Consistency	0.834	0.718	0.725	0.823	0.805		0.795	0.799	0.806	0.847	0.840
Solution coverage	0.087	0.672				No solution	0.770				
Solution consistency	0.834	0.734					0.796				

"●" indicates the presence of a core condition; "◯" the absence of a core condition; "•" the presence of a peripheral condition; "○" the absence of a peripheral condition; and, an empty space indicates a "don't-care" condition

Table 54 Analysis of Sufficiency (H6b), Model B, Fuzzy Set QCA

Outcome	INTL	intl					INTC	intc			
Solution	1	1	2	3	4	5		1	2	3	4
Innovation Results											
Technological innovation	●		○	○	⬤	⬤			○	○	⬤
Non-technological innovation	⬤	○	○	◯		⬤		○	◯	○	⬤
Information Sources											
Information source depth	●			⬤							
Information source breadth	●		◯	◯					◯		
Internal Activities											
Internal activities breadth	●	◯	◯							◯	
Collaboration	◯	◯			◯			◯			
Raw coverage	0.082	0.186	0.206	0.237	0.092	0.128		0.526	0.429	0.281	0.122
Unique coverage	0.082	0.052	0.021	0.078	0.020	0.035		0.201	0.080	0.028	0.040
Consistency	0.803	0.834	0.833	0.812	0.811	0.801		0.794	0.841	0.848	0.840
Solution coverage	0.082	0.429					No solution	0.763			
Solution consistency	0.803	0.800						0.806			

"●" indicates the presence of a core condition; "◯" the absence of a core condition; "•" the presence of a peripheral condition; "○" the absence of a peripheral condition; and, an empty space indicates a "don't-care" condition

5.3.6   *Post Hoc Analysis of International Firms Only*

As QCA is first and foremost a case-based approach, I sought to assess whether the results from the analyses were contingent upon the firm's geographic scope. As the QCA analyses demonstrated strong similarities between domestic firms and those with a very low internationalization intensity, I sought to eliminate the domestic firms from the subsample and examine only those that had recorded a positive FSTS ratio.

Calibration. The outcome variable internationalization intensity was calibrated two ways. The first calibration captured membership in low internationalization intensity (*LINT*), similar to the conservative calibration used in H6b. Full non-membership was set to 1% FSTS, full membership to 25%, and the crossover point to 12%. The second calibration captured membership in moderate internationalization intensity (*MINT*), with full non-membership set to 1%, full membership set to 50%, and the crossover point to 24%.

Hypothesis 4b: Similar to the findings from the full analysis, service innovation as a standalone or in combination with other types of innovation was not a necessary condition for the outcomes LINT or MINT to occur.

Table 55 Necessity Analysis (H4b), International Subsample Only, Fuzzy Set QCA

Condition	LINT		MINT		Decision
	Consistency	Coverage	Consistency	Coverage	
SERV	0.569	0.665	0.607	0.441	Reject
serv	0.540	0.624	0.531	0.381	Reject
PROC	0.387	0.726	0.448	0.522	Reject
proc	0.705	0.594	0.700	0.366	Reject
MGT	0.413	0.712	0.480	0.514	Reject
mgt	0.685	0.601	0.695	0.379	Reject
MKT	0.306	0.641	0.290	0.378	Reject
mkt	0.805	0.648	0.835	0.417	Reject
LogicalOR					
SERV + PROC	0.656	0.670	0.722	0.458	Reject
SERV + MGT	0.705	0.673	0.776	0.460	Reject
SERV + MKT	0.655	0.646	0.676	0.414	Reject
SERV + PROC + MGT	0.733	0.671	0.803	0.457	Reject
SERV + PROC + MKT	0.710	0.649	0.753	0.427	Reject
SERV + MGT + MKT	0.750	0.650	0.792	0.427	Reject
SERV + PROC + MGT + MKT	0.773	0.652	0.819	0.430	Reject
LogicalAND					
SERV * PROC	0.299	0.733	0.333	0.506	Reject
SERV * MGT	0.277	0.715	0.311	0.499	Reject
SERV * MKT	0.219	0.691	0.221	0.432	Reject
SERV * PROC * MGT	0.238	0.740	0.265	0.514	Reject
SERV * PROC * MKT	0.157	0.748	0.153	0.454	Reject
SERV * MGT * MKT	0.173	0.732	0.188	0.494	Reject
SERV * PROC * MGT * MKT	0.144	0.751	0.152	0.493	Reject

Hypothesis 5b: I ran two models to test hypothesis 4b; these models included as condition variables the four innovation results, only.[21] Concerning the configurations that explain low internationalization intensity versus those that explain moderate internationalization intensity, some differences are noted. While two configurations covering more than 45% of the membership outcome explain the presence of *LINT*, only one covering almost 29% of the membership outcome explains *MINT*.

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[21] The model with seven condition variables replicating the test for H5b on the full sample resulted in poor results largely as two of the four models (LINT, mint) did not output any configurations coded as '1.' The two models that did provide configurations did not meet the consistency thresholds and were thus deemed inferior to the four condition variable models analyzed hereafter.

Thus, a significant drop in coverage occurs between the two operationalizations. Moreover, the configurations that explain *LINT* couple the presence of a technological or non-technological innovation with the absence of its opposite: process and management innovation are substitutes for one another when combined with the absence of marketing or service innovation, respectively. Conversely, in the configuration that explains *MINT*, the presence of process innovation is coupled with the absence of service innovation, both technological innovations. The results point to equifinality in the way firms can achieve at least low internationalization intensity. Only one configuration consistently leads to the outcome of study in the sample when calibrated for at least moderate internationalization intensity, thus suggesting a limited pathway for international success.

That said, many other configurations were adopted by firms with at least moderate internationalization intensity; none other, however, passed the thresholds of case count and consistency. Of particular salience to this analysis, too, is that the configuration that explains *MINT* is the same as one of the three configurations that explain both *intl* and *intc* in the full sample analysis. By removing the domestic firms from the sample, the configuration's consistency score greatly improves, and it comes forward as a sufficient pathway for *MINT*. That said, an important observation is thus that the innovation result configurations shared by both domestic and internationalized firms are similar to one another, and often lead to inconsistent results; few configurations lead systematically to the same outcome, and even then, the ones that surpass the consistency threshold imposed in the analysis are, too, adopted by firms with a different geographic scope. Innovation results by themselves are therefore poor condition variables to explain membership in the set of internationalized firms.

With that in mind, I continued on with the analysis. A review of the truth table derived for the absence of low internationalization intensity (*lint)* gave way to all configurations coded as false. As such, the analysis ended there, and no configuration of sufficient conditions were found. An interesting observation stems from this result, as when compared to the analysis of the full model, both the liberal and the conservative calibration of the internationalization intensity outcome variable provided solutions for the absence of the outcome but not for its presence. Two inference can then be made: the consistency of the configurations explaining *lint* are too low without the presence of the domestic firms that are part of the full sample. Again, this suggests that there are heterogeneous pathways to remaining domestic or having a very limited internationalization intensity, and the behaviors shared by these two subgroups of firms are quite similar.

Analysis of the absence of moderate internationalization intensity, however, identified two configurations that explain *mint*: the presence of both service and marketing innovations, and the absence of both process and management innovations coupled with the presence of marketing innovation.

Table 56 Analysis of Sufficiency (H5b), International Subsample Only, Fuzzy Set QCA

Outcome	LINT		lint	MINT	mint	
Solution	1	2	1	1	1	2
Innovation Results						
Service innovation (SERV)		○		○	●	
Process innovation (PROC)	●			●		○
Management innovation (MGT)		●				○
Marketing innovation (MKT)	○				●	●
Raw coverage	0.340	0.283		0.286	0.257	0.279
Unique coverage	0.175	0.118		0.286	0.058	0.080
Consistency	0.787	0.786		0.756	0.812	0.811
Solution coverage	0.458		No solution	0.286	0.337	
Solution consistency	0.760			0.756	0.804	

"●" indicates the presence of a core condition; "○" the absence of a core condition; "•" the presence of a peripheral condition; "○" the absence of a peripheral condition; and, an empty space indicates a "don't-care" condition

Hypothesis 6b: The analysis of the presence of *LINT* using the innovation input variables that assess the types of innovation activities and information sources used by the firm outputs three solutions which differ slightly from each other in terms of internal activities. They paint the picture of sufficient pathways that do not require the presence of technological or non-technological innovation. They suggest that openness to external information sources and investment in activities that support knowledge generation are factors consistently present in paths that explain at least a low internationalization intensity. Thus, as it applies to *LINT*, the results support that the majority of pathways leading to the outcome combine internal innovation activities and the use of external knowledge with the absence of technological or non-technological innovation. As configuration 3 of Model A and configurations 1 and 2 of Model B list innovation results as 'do-not-care' elements in their pathways, the theoretical importance attributed to innovation results as a requirement for internationalization is not reflected in these findings.

Interestingly, only configuration 3 of Model B lists technological innovations as a core present element in the sufficient configuration for *LINT*. It displays a configuration which would likely describe a technological firm that invests heavily in its internal innovation activities and collaborates actively with innovation partners to achieve its innovation results. Of note, however, is that both information sources depth and breadth are listed as 'do-not-care' elements. An outwards posture towards external information sources is not a requirement for this combination to be sufficient for the outcome. As such, no configuration analogous to an archetype outward posture, as hypothesized in H6b, is sufficient for LINT.

Such is not the case for the analysis of the presence of *MINT* using the same variables. Model B outputs only one configuration sufficient for the presence of at least moderate internationalization intensity, and it prescribes well to the understanding of an 'open' firm. It is innovative, it is open to a number of sources to which it attributes high importance, it collaborates with innovation partners to achieve its innovation results, and it invests in its internal innovation activities. This configuration is analogous to Model A's configurations 2 through 4, which provide equifinal configurations of open postures that all lead to the presence of MINT. Interestingly, configuration 1 of Model A provides an equifinal alternative configuration which substitutes technological innovation for non-technological innovation. As such, the results from the analysis on the outcome of at least moderate internationalization intensity supports very well the hypothesis that a combination of moderate internal innovation activities and use of external information sources in conjunction with technological or non-technological innovation results—all indicative of an open innovation mode—are conducive to attaining at least moderate internationalization intensity in small KIBS firms.

As these configurations did not figure in the initial full sample analysis, I infer that their consistency scores were below the threshold parameters. Thus, while these configurations do lead to the presence of the outcome when only international firms are examined, the caveat should be noted that domestic firms also adopt these configurations. Thus, then begs the question whether the nuance between domestic and international firms as captured with the FSTS ratio is sufficient to differentiate them.

Concerning the absence of *lint*, all truth table rows were coded as false and no configuration was found to be sufficient for the outcome. The analysis of the absence of *mint*, however, outputted interesting results. All but one configuration in both Models A and B identify the absence of technological, non-technological, or both as either core or peripheral elements. For example, configuration 3 of Model A paints the picture of non-innovative firms quite closed off from external information sources. These configurations are in line with theoretical expectations of the innovation behaviors adopted by firms that have limited or low internationalization intensity. Configuration 1 of Model A, however, provides a

salient counterexample. There are innovative firms that do not receive a substantial proportion of their sales from foreign markets. This assessment is similar in logic to finding configurations of innovative firms that were sufficient for the absence of internationalization intensity, as I identified in the full sample findings for H5b and H6b.

Some comments on this topic are noteworthy to address. First, neither the growth intentions of the firm nor its expected addressable market are modeled, and thus is become impossible to ascertain whether these firms are performing well against their strategic goals and expectations. Moreover, as these analyses cannot comment on the link between combinations of innovation inputs and results as sufficient conditions for the presence (or absence, for that matter) of internationalization over time, it is impossible to assess whether firms that adhere to these counterexample configurations are in transit from one strategy to another, or from one growth stage to the next. Much could be speculated on this topic, but I will not elaborate further. I will say, however, that while addressing multiple facets of the innovation construct as condition variables for internationalization is informative, these variables could be paired with others capturing the growth intentions of the firm to gather a more complete understanding of the fit between the firm's capabilities, resources, and strategy.

Table 57 Analysis of Sufficiency (H6b), Model A, International Subsample Only, Fuzzy Set QCA

Outcome	LINT			lint	MINT				mint			
Solution	1	2	3		1	2	3	4	1	2a	2b	3
Innovation Results												
Technological innovation	◯				◯	●		•	●	∘		∘
Non-technological innovation		◯			●				●	∘	∘	∘
Information Sources												
Internal	•	•	•		•	•	•	•				
Market	•	•	•		•	•	•	•				◯
General			●			◯	•	●		●	●	∘
Research		◯					●	◯	∘		∘	∘
Internal Activities												
Knowledge generation	•	•	•		•	•	•	•				
Knowledge exploitation	●		◯		•	•	●	∘		◯	◯	
Collaboration	•	●	◯		•	•	•	●		●	●	∘
Raw coverage	0.212	0.325	0.191		0.126	0.144	0.129	0.143	0.161	0.171	0.169	0.218
Unique coverage	0.019	0.133	0.191		0.023	0.031	0.032	0.043	0.049	0.023	0.016	0.170
Consistency	0.805	0.776	0.799		0.791	0.792	0.816	0.795	0.845	0.830	0.788	0.786
Solution coverage		0.535		No solution		0.265				0.458		
Solution consistency		0.782				0.765				0.788		

"●" indicates the presence of a core condition; "◯" the absence of a core condition; "•" the presence of a peripheral condition; "∘" the absence of a peripheral condition; and, an empty space indicates a "don't-care" condition

Table 58 Analysis of Sufficiency (H6b), Model B, International Subsample Only, Fuzzy Set QCA

Outcome	LINT			lint	MINT	mint	
Solution	1	2	3	1	1	1	2
Innovation Results							
Technological innovation			●		●	○	◯
Non-technological innovation						○	○
Information sources							
Information source depth		●			●	●	●
Information source breadth	◯	◯			•	◯	
Internal Activities							
Internal activities breadth	•	•	•		•		
Collaboration	●		•		•		●
Raw coverage	0.207	0.285	0.198		0.172	0.249	0.210
Unique coverage	0.036	0.142	0.076		0.172	0.135	0.135
Consistency	0.800	0.819	0.779		0.757	0.783	0.783
Solution coverage		0.426		No solution	0.172	0.345	
Solution consistency		0.772			0.757	0.799	

"●" indicates the presence of a core condition; "◯" the absence of a core condition; "•" the presence of a peripheral condition; "○" the absence of a peripheral condition; and, an empty space indicates a "don't-care" condition

5.3.7 Robustness Checks

I completed a series of robustness checks using alternative calibration anchors that varied +/– 25 percent for both outcome variables, internationalization propensity and internationalization intensity, as well as +/–10 percent for the condition variables of information source breadth, information source depth, internal innovation activity breadth, internal knowledge, market knowledge, general knowledge and research knowledge. While minor changes were observed in the number of configurations and neutral permutations, the solution tables did not drastically change, and the overall interpretation of the results remained the same.

5.4   *Comparing Results from Traditional Statistical Analyses to QCA*

The use of QCA in tandem to traditional statistical analyses offers two windows from which the researcher can observe her data. Taking two different approaches and testing the same set of hypotheses sheds light on how the choice of method influences the evidence we gather in support for our models.

An important difference is observed when models assume, often implicitly though sometimes explicitly, a relationship of necessity. Testing such a relationship using both correlation-based techniques and QCA offers competing views of how necessity is understood. As Table 59 demonstrates, the results may come to differ significantly from one approach to the other. An example of this is observed when comparing the results of the first hypothesis set pertaining to the relationship between service innovation and internationalization. While the hypotheses using both types of regression techniques were supported (H1a, H4a), no support was found using either crisp or fuzzy sets QCA (H1b, H4b).

The reasons to support or reject hypotheses also differ between methodological approaches. For example, in the second set of hypotheses, I reject both H5a and H5b but for entirely different reasons. The model testing H5a using the conservative operationalization of internationalization intensity exhibited proper goodness-of-fit. While the results only provided support for a positive relationship between service innovation as a standalone (in comparison to no innovation) and internationalization intensity, the variable for service innovation in conjunction with two other types of innovation was weakly significant at an alpha of 0.1. That said, I opted to reject the hypothesis at an alpha of 0.05. When these results are compared to the ones from the 'matching' fuzzy set QCA, the results are quite striking. No condition or configuration of conditions was found to explain the presence of the outcome using either the liberal or conservative calibration. Moreover, upon closer examination of the absence of the outcome using the conservative calibration, configuration 5b proved to be a sufficient configuration similar in description to the one that had almost been accepted in the traditional analysis. The use of 'competing' methodological approaches provides an opportunity to assess whether a case-based approach like QCA provides salient counterexamples to results from traditional statistical analyses. Results like the example underscored above reinforce the need to shift from solely using traditional methods that prescribe to net effects thinking, as called for by Woodside (2013, 2014) and Fiss (2007, 2011).

Specifically, in subsection 4.7.2 Comparing QCA to Conventional Statistical Techniques, I outlined the primary arguments used to contrast QCA to conventional statistical techniques. Indeed, an important point of contention in the review was that traditional correlation-based techniques were ill-suited to assess causal complexity. Indeed, the results of both the crisp and fuzzy set QCAs demonstrate that often there exist equifinal configurations of innovation attributes adopted by firms that are

consistently linked with both the presence and the absence of internationalization, however operationalized.

Relatedly, on the topic of operationalization and calibration, the use of two methodological approaches provided a good opportunity to assess the robustness of the dependent (outcome) variables, internationalization propensity and internationalization intensity. In both sets of analyses, I was confronted by how the results of the analyses hinged upon the definition of an international firm. Moreover, the results of the QCAs using different calibration anchors demonstrated that firms with very low FSTS ratios often innovated and adopted innovation behaviors similar to domestic firms. From this assessment a simple question is evoked: have we created a false dichotomy between international and domestic firms? On this topic, Reuber and colleagues (2017) suggest that hindering theory development in the nascent field of international entrepreneurship is the prevalent use of categorization to label firms based on the scale, timing and speed of their internationalization. Given the high percentage of empirical studies identified in the literature review that have used the FSTS ratio as a single indicator to operationalize internationalization propensity or internationalization intensity, it may be time to reconsider how domestic firms and those with very limited international exposure resemble one another rather than differ in their innovation behavior.

It should also be noted that the simplicity with which the last hypothesis set was tested using set-theoretic methods is rather striking, in comparison to the steps that were taken to test the same hypotheses using traditional statistical methods. Prominent topics in the international business and innovation literature such as open innovation lend well to the inherent configurational logic of QCA. The insight gained is quite salient when contrasted to the results gathered from the traditional regression analyses, as the method allowed for greater flexibility in modeling conjunctive configurations and equifinal solutions.

Finally, the results taken as a whole allowed me to provide new insight to the main overarching research question posed at the onset of this study. *Does a small knowledge-intensive business service firm's innovation influence its propensity and intensity of internationalization?* The results would suggest yes, but the data do not support a relationship as linear as one would expect given the amplitude of empirical examination this relationship has received.

Rather, the results point to a more nuanced picture in which some international firms are quite innovative, but not all. This picture is further supplemented by the notion that while many domestic firms perform very little or no innovation, this is not true for all domestic firms. Rather, the dichotomy between international and domestic firms as it pertains to their innovation patterns requires further nuance and should be depicted as asymmetrical, causally conjunctive, and equifinal.

Table 59 Comparison of Results between QCA and Traditional Statistical Analyses

	Traditional Statistical Analyses			Qualitative Comparative Analysis		
Hypothesis Set	*Hypothesis*	*Method*	*Decision*	*Hypothesis*	*Method*	*Decision*
The Relationship between Service Innovation and Internationalization	H1a: There is a positive relationship between recording a service innovation and the internationalization propensity of small KIBS firms.	Logistic Regression	Accept	H1b: Service innovation is a necessary condition for internationalization propensity in small KIBS firms.	csQCA	Reject
	H4a: There is a positive relationship between recording a service innovation and the internationalization intensity of small KIBS firms.	Fractional Logistic Regression	Accept	H4b: Service innovation is a necessary condition to attain at least low internationalization intensity in small KIBS firms.	fsQCA	Reject
The Conjunctive Effect of Multiple Innovation Results on Internationalization	H2a: There is a positive relationship between recording service innovation in conjunction with other types of innovation and the internationalization propensity of small KIBS firms.	Logistic Regression	Partially Accept	H2b: Service innovation in combination with other types of innovations are conducive to internationalization propensity in small KIBS firms.	csQCA	Reject
	H5a: There is a positive relationship between recording service innovation in conjunction with other types of innovation and the internationalization intensity of small KIBS firms.	Fractional Logistic Regression	Reject	H5b: Service innovations in combination with other types of innovations are conducive to attaining at least low internationalization intensity in small KIBS firms.	fsQCA	Reject
The Relationship between Innovation Modes and Internationalization	H3a: There is a positive relationship between adopting an open innovation mode and the internationalization propensity of small KIBS firms.	Logistic Regression	Partially Accept	H3b: A combination of moderate internal innovation activities and use of external information sources in conjunction with technological or non-technological innovation results—all indicative of an open innovation mode—are conducive to internationalization propensity in small KIBS firms.	csQCA	Partially Accept
	H6a: There is a positive relationship between adopting an open innovation mode and the internationalization intensity of small KIBS firms.	Fractional Logistic Regression	Reject	H6b: A combination of moderate internal innovation activities and use of external information sources in conjunction with technological or non-technological innovation results are conducive to attaining at least low internationalization intensity in small KIBS firms.	fsQCA	Partially Accept

5.5 *Chapter Summary*

In this chapter I examined the relationship between innovation and internationalization in the small KIBS firm context in three sets of hypotheses. In each set, I progressively broadened the conceptualization of innovation to encompass advances made in the innovation literature since the late 1990s. By doing so I sought to expand the role of innovation beyond the traditional focus of product innovation. The findings suggest that broadening the innovation construct provides interesting nuance to the innovation–internationalization relationship. Moreover, I adopted a comparative research design and tested all three sets of hypotheses using two distinct methodological approaches, one relying on correlation-based statistical techniques and the other on set-theoretic methods.

For the most part, the findings from the traditional statistical analyses are in line with long-held views from small firm internationalization theories and in line with previous empirical examination. Evidence further points to the difficulties assessing causal complexity using traditional statistical techniques. The results from the QCAs provide depth, richness, and nuance to the first set of findings. Innovation is not a necessary condition for internationalization. While there are many configurations that consistently explain firms remaining domestic, few explain membership in the internationalization outcome, however calibrated. The findings then acknowledge the importance of asymmetry, causal complexity, and equifinality in assessing the relationship between innovation and internationalization.

CHAPTER 6　　DISCUSSION AND CONCLUSION

6.1　Chapter Overview

The purpose of the final chapter is to summarize the key findings of this thesis and elaborate on the implications of the results. It first provides the reader with an overview of the findings, which is followed by the theoretical, methodological, and managerial contributions. It also discusses the limitations encountered in this research project. Finally, it provides suggestions for future research directions.

6.2　Research Objective

The objective of this study was to test the underlying assumption that innovation was a necessary condition for internationalization in two contemporary international entrepreneurship theories, the Uppsala Model of gradual internationalization and the International New Venture Perspective. The study was framed by the overarching research question that asked whether a knowledge-intensive business service firm's innovation influenced its propensity and intensity of internationalization. Two more specific research questions were posed in relation to this broader question. First, are certain innovation results or combinations thereof associated with internationalization? And second, are certain configurations of innovation inputs and results associated with internationalization?

Two gaps were identified in the literature concerning how innovation is theorized and modelled as a driver of internationalization in contemporary international entrepreneurship theories. The first was theoretical and stemmed from a misalignment in the understanding of innovation between the field of international entrepreneurship and the broader innovation research community. To address this gap, I broadened how innovation was conceptualized and bridged in concepts from three distinct themes in the innovation literature: i) innovation in services; ii) the open innovation paradigm; and iii) innovation modes. The second gap was methodological and stemmed from a disconnect between theory and model testing. I proposed using both traditional statistical techniques as well as set-theoretic methods to assess how the results garnered from contrasting methodologies differed from one another. This comparison

served as a novel analytical approach to examine a relationship that had already received ample empirical examination.

To achieve these objectives, three sets of hypotheses were developed to test the relationship between innovation and internationalization. In each set I broadened the conceptualization of innovation. As each hypothesis was tested using both traditional statistical techniques as well as QCA, I commented on how the use of different methodological philosophies informed our understanding of a complex topic such as the one under review in this thesis. Moreover, I further extended theory testing by examining this relationship in an under-research sample, that of small KIBS firms.

6.3 Summary of Key Findings

The results of the logistic regression and fractional logistic regression were in line with the existing literature on the relationship between innovation and internationalization. The findings therefore support H1a and H4a. However, the results from the analyses examining the conjunctive effect of multiple types of innovation and the effect of various innovation modes influencing internationalization further reinforced the findings that technological innovation, and more specifically service innovation, was the only significant predictor of internationalization. Some nuance was offered by the results of H3a and H6a, but overall the results supported the foundational assumptions of contemporary international entrepreneurship theories that are in line with an assimilation view of innovation.

The results of the QCA analyses brought forward new insight as to how service innovation, either alone or in conjunction with other types of innovation results, was not a necessary condition for internationalization, however operationalized. The data therefore did not support H1b or H4b. The remainder of the analyses offered interesting insights particularly with respect to the heterogeneity that characterizes the paths adopted by internationalized firms. While the analysis of sufficiency for the absence of the outcomes outputted consistent results that covered for the most part the large majority of the outcome membership, such was not the case for the analysis of sufficiency for the presence of the outcome. As such, I concluded that while there were many ways for firms to innovate and internationalize, none led consistently to the presence of the outcome; conversely, there were several consistent configurations that were conducive to a firm remaining in its domestic market or having a very low FSTS ratio. This was observed in hypotheses H2b, H3b, H5b and H6b. Furthermore, the results pertaining to H3b and H6b provided sufficient support to accept the hypotheses. The adoption of a

configuration analogous to an open innovation posture was conducive for internationalization propensity (H3b) as well as attaining at least low internationalization intensity (H6b).

Overall, the adoption of a research design comparing the results from traditional statistical analysis to those from set-methods gave way to interesting secondary findings with respect to model testing. While the hypotheses developed in Chapter 3 generally lend well to testing using traditional statistical analyses, a comparison of the results of the last hypothesis set (H3a, H3b, H6a, H6b) showed the strength and complementarity that can be derived by using both QCA and regression analysis. When modeling configurations of conditions which, together, could lead to equifinal paths to an outcome, QCA was better equipped than regression analysis to provide case-based insight.

Moreover, the concept of causal asymmetry was explored at length. Results from the QCA analyses demonstrated that the assumption of linearity and symmetry between innovation and internationalization did not hold. While many domestic firms were non-innovators, some were quite innovative and adopted a wide variety of innovation configurations. Likewise, while many internationalized firms were very innovative, some were not, and as a whole, internationalized firms adopted a wide variety of configurations of innovation inputs and results. The results of the post hoc analysis where I ran the fuzzy set QCA hypotheses tests a second time using only the subsample of firms with positive FSTS ratios lend further support to this notion. While there were several paths that explained membership in low or moderate internationalization, many differed in the core conditions of innovation results. Thus, the results of the post hoc analysis showed there was equifinality in how firms innovate to attain at least low or moderate internationalization intensity. In some of these paths, innovation results were of little to no importance (e.g., stated as 'do-not-care' elements, or as absent core or peripheral conditions).

As such, the overall finding from the series of tested hypotheses is as follows. While some configurations consistently led to the presence of internationalization, many were adopted by both domestic and internationalized firms, and as such, these configurations were not consistent in their outcome. Thus, while there were many configurations that consistently explained firms remaining solely in their domestic market, few explained membership in the outcome of internationalization, however calibrated.

Table 60 Overview of Research Questions, Hypotheses and Secondary Line of Questioning

Research Question	Primary Line of Questioning (Hypotheses)	Secondary Line of Questioning
(1) Are certain types of innovations—technological ones such as product/service and process innovations, and non-technological ones such as organizational and marketing innovations—or combinations thereof associated with internationalization?	*The Relationship between Service Innovation and Internationalization* H1a (Accepted): There is a positive relationship between recording a service innovation and the internationalization propensity of small KIBS firms. H1b (Rejected): Service innovation is a necessary condition for internationalization propensity in small KIBS firms. H4a (Accepted): There is a positive relationship between recording a service innovation and the internationalization intensity of small KIBS firms. H4b (Rejected): Service innovation is a necessary condition to attain at least low internationalization intensity in small KIBS firms.	Is service innovation a necessary condition for the presence of internationalization? Are other types of innovation necessary for the presence of internationalization? *Theoretical implication: testing for necessity*
	The Conjunctive Effect of Multiple Innovation Results on Internationalization H2a (Partially Accepted): There is a positive relationship between recording a service innovation in conjunction with other types of innovation and the internationalization propensity of small KIBS firms. H2b (Rejected): Service innovation in combination with other types of innovations are conducive to internationalization propensity in small KIBS firms. H5a (Rejected): There is a positive relationship between a recording service innovation in conjunction with other types of innovation and the internationalization intensity of small KIBS firms. H5b (Rejected): Service innovations in combination with other types of innovations are conducive to attaining at least low internationalization intensity in small KIBS firms.	What are the differences between the configurations that explain the presence and the absence of internationalization? *Theoretical implication: assessing causal complexity and asymmetry*

Research Question	Primary Line of Questioning (Hypotheses)	Secondary Line of Questioning
(2) Are certain innovation patterns that capture both innovation inputs and results and that characterize the firm's openness to external information sources associated with internationalization?	*The Relationship between Innovation Modes and Internationalization* H3a (Partially Accepted): There is a positive relationship between adopting an open innovation mode and the internationalization propensity of small KIBS firms. H3b (Partially Accepted): A combination of moderate internal innovation activities and use of external information sources in conjunction with technological or non-technological innovation results—all indicative of an open innovation mode—are conducive to internationalization propensity in small KIBS firms. H6a (Rejected): There is a positive relationship between adopting an open innovation mode and the internationalization intensity of small KIBS firms. H6b (Partially Accepted): A combination of moderate internal innovation activities and use of external information sources in conjunction with technological or non-technological innovation results are conducive to attaining at least low internationalization intensity in small KIBS firms.	What differences are there in the configurations that explain the presence or absence of the two outcome variables when we include internal innovation activities and information sources to the analysis? *Theoretical implication: assessing asymmetry* What can be said of equifinal solutions? Are innovation results—predominantly technological innovations—conditions that are part of a sufficient configuration for the presence of low or moderate internationalization? Are there alternate configurations that include only innovation inputs and no innovation results? *Theoretical implication: assessing equifinality*

6.4   Theoretical Contribution

The primary theoretical contributions made by this study are captured, in essence, with the four questions that were identified in the secondary line of questioning. Their theoretical implications are discussed along the lines of difference in assumption between traditional statistical analyses and QCA: namely, the assumptions of necessity, causal complexity, asymmetry, and equifinality.

Overall, the results from the study point to the strength of using alternative methodological perspectives to test theoretical models. The findings of the study nuance the current understanding of the role played by innovation as a driver of internationalization. They suggest that the import of a broader understanding of innovation—which includes the firm's external knowledge sourcing activities and its internal innovation activities that precede an innovation result—offers insightful additions in understanding the behaviours adopted by firms that have internationalized. The four questions are now discussed in greater detail.

(1) Is service innovation a necessary condition for the presence of internationalization? Are other types of innovation necessary for the presence of internationalization?

Implied in the theories of internationalization in international entrepreneurship is that innovation is a requisite condition for small firms to internationalize and to succeed in foreign markets. Alas, while many studies have previously examined the relationship between innovation and internationalization in the small firm setting, the use of traditional statistical analyses limits testing of necessity. It is instead assumed that results in support of such a relationship are an appropriate indicator for a relationship of necessity.

The results from both logistic regression and fractional logistic regression echo the findings from previous studies and would suggest that there is a positive relationship between service innovation and internationalization. Given the assumption of linearity and symmetry, results from the traditional statistical analysis support the notion that service innovation is positively related to internationalization; that internationalization is unlikely without innovation.

Yet the results from the crisp and fuzzy set QCAs would suggest there are multiple pathways of innovation results a firm may adopt, but very few paths lead to the consistent result of internationalization. The paths that did lead to internationalization in the sampled KIBS did not specify the presence of service innovation; instead, they specified its absence. Results from the post hoc analysis

on only the international sample further confirmed the results: paths leading to membership in the outcome of either low or moderate internationalization intensity include either the absence of service innovation or its representation as a 'do-not-care' condition.

Thus, the results from the QCA lend to an alternate view to the one proposed by the traditional statistical analyses, suggesting that there can be internationalization without service innovation. Moreover, the results further point to the importance of adopting methods that can test the underlying assumption in long-standing theoretical models, as these assumptions are perpetuated over time.

(2) What are the differences between the configurations that explain the presence and the absence of internationalization?

First and foremost, this question cannot be answered with the use of traditional statistical analyses given their assumption of symmetry. Nevertheless, it is worthwhile to note that the results from the traditional statistical analyses mostly follow those of previous studies. Results from both the logistic regression and the fractional logistic regression find a positive and significant relationship between service innovation and internationalization, even when controlling for other types of innovations.

Where they differ, however, is in identifying combinations of innovation results. Findings from the fractional logistic regression do not support the idea that firms that perform multiple types of innovation results are more likely to have a higher internationalization intensity. In contrast, findings from the logistic regression suggest service innovation coupled with two other types of innovations are more than six times more likely to internationalize than firms that do not innovate at all.

It is important to note, here, that a categorical variable was created capturing which combination of innovation results the firm had performed. This analytical strategy was adopted in response to problems related to collinearity, as it was impossible to test the four-way interaction between all types of innovation results. The creation of this categorical variable was the only workaround found. The use of this analytical technique, while informative concerning odds ratios, was unable to model the relationship while taking into account causal complexity and asymmetry.

Conversely, using QCA, issues related to causal complexity and asymmetry were taken into account. The results point to a different narrative. While the solution table only covers a small proportion of firms, taken as a whole, the results point to the importance of the firm's innovation capability as crucial to the firm's internationalization. It puts into question the deterministic assumption made concerning the role of service innovation in particular. A more nuanced picture is painted, in which some international

firms are quite innovative, but not all. This picture is further supplemented by the notion that while many domestic firms perform very little or no innovation, this is not true for all domestic firms.

Thus, while internationalized firms are generally more innovative than domestic firms, the presence of service innovation is not always stated in the configurations sufficient for internationalization. Likewise, while domestic firms are generally less innovative than internationalized firms, a number of configurations consistently sufficient for a domestic scale of activities—indicating the absence of the outcome—specify the presence of innovation results, and in some, specifically the presence of service innovation. Instead, the dichotomy between international and domestic firms as it pertains to their innovation patterns requires further nuance to appropriately depict a relationship that is asymmetrical, causally complex, and equifinal.

(3) What differences are there in the configurations that explain the presence or the absence of the two outcome variables—internationalization propensity and internationalization intensity—when we include internal innovation activities and information sources to the analysis?

By broadening the definition of innovation to capture both innovation inputs and results, we get a different sense of the firm's investment in its innovation process, one that balances the importance attributed to the downstream results of innovation to the upstream innovation activities that led to them.

Again, the assumption of linearity implied with correlation-based methods does not allow for the identification of the conditions variables that explain the absence of the outcome. Generally speaking, across all models, the results suggest that present in the conditions sufficient for internationalization are almost all information sources and knowledge generation activities. In some, innovation results—either technological or non-technological—are present, but not in a consistent fashion across all configurations. The same can be said for knowledge exploitation activities. The presence of investments in internal innovation activities, as well as a wide breadth of information sources, are also noted.

Taken as a whole, the configurations sufficient for internationalization paint a picture similar to the ones proposed by Weerawardena et al. (2007) and Karra et al. (2008) where rather than product (service) or market characteristics, it is instead the firm's dynamic capabilities surrounding its ability to learn from its market, position itself and its services for market access, learn from its activities, and network that are influential to internationalization. These capabilities allow for the firm to identify international opportunities, bridge differing environmental contexts and allow for cross-cultural collaboration. Given the level of cooperation necessary between KIBS and their clients to provide their services, the description of the configurations stated above is consistent with these notions of learning

from multiple information sources with an emphasis on investments in the firm's internal innovation activities which generate new knowledge and build upon its absorptive capacity.

An overall assessment of the configurations that explain the absence of internationalization does not line up as clearly with those of previous studies. In particular, the findings of McDougall et al. (2003) who compare various characteristics of domestic and international new ventures describe domestic firms that are not as inclined toward product innovation, that do not have as strong a product offering as internationalized firms to compete against indigenous firms in foreign markets, and that are not as well-positioned to capitalize on their product offerings outside their domestic market. As the authors used logistic regression to compare international INVs to domestic ones, the assumption of linearity fogs the inferences that can be made to the reference group.

Instead, the results of this study point to a more nuanced understanding of differences between international and domestic firms. Where the configurations explaining internationalization generally suggest consistencies across the presence and the absence of most conditions, the configurations that explain the absence of internationalization are not as homogenous. While most state the absence of innovation results, this is not the case across all configurations. Some paths specify the presence of technological or non-technological innovations, or both. These configurations, however, capture a much smaller proportion of firms than the configurations that capture non-innovative patterns of behaviour. While most state the absence of almost all types of information sources, the ones that state the presence of innovation results also state the presence of general or research information sources. An important distinction between the two subsets is that domestic firms generally do not invest in their innovation activities; at least, these conditions are not present in any of the consistent configurations. Also, in the configurations of non-innovative firms, there is often the absence of information breadth.

Overall, the results point to the importance of allowing for asymmetry in explaining the presence and the absence of internationalization as an outcome. Improper generalizations may be made when inferring that the absence of internationalization implies the absence of the innovation-related condition variables. They highlight a variety of configurations adopted by domestic firms that do not prescribe to the understanding that domestic firms are less innovative than internationalized one. A caveat to note, however, is that as these configurations capture a much small proportion of firms than the ones capturing non-innovative patterns of behaviour. It is therefore no wonder why traditional statistical analyses infer results much like those of McDougall et al. (2003).

(4) What can be said of equifinal solutions? Are innovation results—predominantly technological innovations—conditions that are part of a sufficient configuration for the presence of low or moderate

internationalization? Are there alternate configurations that include only innovation inputs and no innovation results?

As the previous question underscored the importance of allowing for asymmetrical modelling between the presence and absence of internationalization, the findings also support the importance of allowing for equifinality in explaining the paths firms can take to achieve internationalization.

When looking at the results from the post hoc analysis of only internationalized firms, a comparison of the sufficient configurations for at least low internationalization intensity (LINT) and at least moderate internationalization intensity (MINT) puts forward two trends. First, there is equifinality in the solutions that explain LINT and MINT, as the sufficiency of both outcomes are expressed by three and four configurations, respectively. A firm can adopt one of many paths to achieve the same outcome. Moreover, while technological and non-technological innovations are either absent or 'do-not-care' conditions in explaining LINT, such is not the case in MINT, where three of the four configurations specify the presence of at least one type of innovation.

Second, the results point to a possible path leading to MINT that specifies both technological and non-technological innovations as 'do-not-care' conditions. This same configuration, however, states the presence of all information sources and investments in the firm's knowledge generating and knowledge exploiting activities. Thus, while the study found a configuration that does support the idea that the presence of innovation inputs and the absence of innovation results can explain internationalization, such a configuration implies a substantial resource commitment by the firm in its absorptive capacity.

6.5   Methodological Contribution

The analytical protocol followed in this thesis answers the call by Woodside (2016) and Fiss (2011) to make use of methods that can better test for the configurational assumptions made in the theoretical models we propose. Thus, in answering this call, this thesis makes a methodological contribution to the field of international entrepreneurship and more specifically to studies on internationalization in two ways.

First, and more generally, the comparative design between traditional statistical analyses and set-theoretic methods offers the opportunity to further nuance the findings from both sets of results. In testing the underlying assumption in contemporary internationalization theories on the role of innovation as a driver for internationalization using this comparative design, I offer insight into how traditional statistical

analyses are not well equipped to test hypotheses examining relationships of necessity. The two other sets of hypotheses underscore difficulties encountered when modeling causal complexity and in outputting equifinal results using logistic and fractional logistic regressions. Despite these shortcomings, the use of both traditional statistical analyses and QCA offers richer, less deterministic findings to a research question that has received ample empirical examination.

Second, and more specifically, as illustrated in Table 60, the comparative design brings forward a secondary line of questioning that allows the researcher to question fundamental assumptions made by traditional statistical models and assess their influence on the models tested. In essence, this secondary line of questioning evaluates whether the assumption of linearity, additive effects, and unifinality (Fiss, 2007), present when testing theoretical models using traditional correlation-based techniques, affect the results once they are taken away by using Qualitative Comparative Analysis. Doing so may give us a better understanding of how permeable our theoretical models are to the methods we use to test them. Informing the secondary line of questioning are the four main differences in the assumptions held by correlation-based and set-theoretic methods.

(1) *Set-theoretic versus correlational connections.* QCA is built on the assumption that the causes that lead to the presence of an outcome under study may be different from those that lead to the absence of said outcome. Though the findings from the logistic regression and fractional logistic regression both suggest a positive and significant relationship between service innovation and internationalization, it is incorrect to assume that domestic firms do not innovate. Indeed, the results from the QCAs suggest that while many domestic firms adopt innovation configurations that output less innovation results and exhibit trends towards investing less in their innovation inputs, this is not the case for all domestic firms. The symmetrical nature of correlations masks a subgroup of domestic firms that are quite innovative in their own rights, and that do not fall into the statement that internationalized firms are more innovative than domestic ones. As noted by Woodside (2013, 2016): the pervasive use of conventional statistical tools further permeates to theory development and testing. In this thesis, QCA allowed to examine the configurations of conditions that explained the absence of internationalization. The findings further put into question the dichotomy created to distinguish between domestic and internationalized firms, and how innovation behaviors are not so clearly delineated between these two categories of firms.

(2) *Calibration versus Measurement.* An important distinction between traditional and set-theoretic methods is how variables are operationalized and readied for analysis. QCA asks of researchers to calibrate their variables against external standards. The calibration process thus imbues qualitative meaning to the fuzzy or crisp set scores that are given to cases. In comparison to traditional statistical

analyses, QCAs are also less sensitive to outliers and high leverage points as they are embedded with meaning that is not deductively derived from the sample mean. The results from the analyses demonstrate relatively high sensitivity to how we, as a community, define 'international' firms. Particularly, with respect to the dependent variables, the sensitivity analyses that were completed in both the traditional statistical analyses and the QCAs demonstrate that while a liberal understanding of internationalization—understood as any firm having a positive FSTS ratio—provides an easy cut point to demarcate between domestic and international firms, such a distinction may be overly simplified. Rather, the results of the crisp and fuzzy set QCAs suggest that firms with ad hoc (very little) international sales often adopt innovation behaviors similar to those of domestic firms. Thus, I echo the cautionary notes from others (Coombs & Miles, 2000; Reuber et al., 2017; Sullivan, 1994) and suggest the use of more complete measures of internationalization that do not rely on a single indicator (FSTS ratio) and that take into consideration more than the scale (or extent) of internationalization.

(3) *Configurations of conditions versus independent variables*. A comparison of the results between both types of regressions and QCAs underscores the importance of modeling configurations rather than independent variables. While an important contribution made by this thesis is the broadening of the innovation construct to capture a wide variety of innovation inputs and results, so doing further entrenches the need for a methodological approach that can assess configurations of conditions rather than the effect of singular independent variables. The findings of the traditional analyses underscore how difficult a task it is to model complex interactions, particularly when more than three variables are working together, as is the case in this thesis. Modeling an interaction between all four types of innovation results, as examined in this study, was found to be impossible due to collinearity.

(4) Analysis of causal complexity versus analysis of net effects. Relatedly, QCA departs from testing the net effects of independent variables. Rather, it assumes causal complexity, which is concerned with the examination of all possible logical combinations of causal conditions. QCA examines subset relations to determine causal complexity. If cases share multiple causally relevant conditions to exhibit the same outcome, then they constitute a subset of instances of the outcome (Ragin, 2000, 2009). Such a subset relation may then indicate a specific combination of causally relevant conditions that is sufficient to explain the outcome.

The results from the crisp and fuzzy QCAs both highlight how each condition variable may work in conjunction with others to lead to a different outcome. For example, in Table 43, the solution table for H3b Model A, the following two configurations lead to different outcomes yet require the presence (TECH) and absence (ntech) of the same types of innovation results.

$$INTA \leftarrow TECH * ntech * IIS * MIS * GIS * KGA * kea * coll$$
$$inta \leftarrow TECH * ntech * mis * ris$$

The configurations read as such. The first states: the presence of technological innovation, internal information sources, market information sources, general information sources, knowledge generating activities coupled with the absence of non-technological innovation, knowledge exploitation activities and collaboration are sufficient for the presence of internationalization propensity. The second states: the presence of technological innovation coupled with the absence of non-technological innovation, market information sources and research information sources are sufficient for the absence of internationalization propensity.

This example provides salient evidence of the causal complexity that surrounds how innovation results work in conjunction with other innovation attributes to form distinct patterns of innovation behavior that further nuance our understanding of how innovation drives internationalization in small firms. Indeed, as would suggest Woodside (2016) and Fiss (2011), the evidence supports that this phenomenon is best understood using a configurational lens. The conventional understanding of analytically distinct independent variables cannot quite capture the intricacies of the configurations that explain the presence (and absence) of the outcome.

Moreover, under the assumption of causal complexity, multiple configurations can explain the same outcome: there may be multiple paths that lead to the same result. Indeed, most of the QCA solution tables display relevant examples of equifinality (Fiss, 2011). Many configurations exhibit first-order equifinality, where they differ based on their core characteristics. There are also many examples of second-order equifinality, where nested under the same configuration heading there exist multiple paths with neutral permutations of peripheral conditions within the same first-order equifinal configuration. Indeed, an important limitation identified in Chapter 2 was the disconnect between theory and model testing as it pertained to acknowledging equifinal results. The findings support the notion that equifinality is an important consideration when modeling the relationship between innovation and internationalization.

6.6   *Managerial Implications*

This study offers two practical implications, the first pertaining to the paths available for domestic KIBS firms to internationalize, and the second pertaining to the paths available for firms with limited internationalization, looking to improve the scale of their international activities.

These suggestions are offered within the mindset that innovation is costly and surrounded by risk and uncertainty. I frame the idea for CEOs and managers of small KIBS firms looking to either begin venturing abroad or further commit to gaining sales in foreign markets that service innovation may not be a necessity for them to internationalize successfully. There are substitutable configurations of innovation patterns that may better fit with their strategic objectives and resource endowments. Indeed, the findings support the notion of equifinality in arriving at an internationalization outcome: there is no one way of innovating to internationalize.

The results from the QCAs differentiating between domestic and international firms suggest that while there are many ways for firms to innovate and remain domestic, there are few pathways that consistently lead to internationalization. Of the ones that do, when viewed as a whole, they demonstrate considerable heterogeneity.

I focus my commentary on the results from the fuzzy set analysis. The results for the outcome capturing at least low internationalization intensity suggest technological and non-technological innovations are present conditions for the outcome to occur. This is true for all three models tested. The configurations capturing the innovation inputs 'in type' and 'in the degree of use' suggest that it is essential that the firm to be open to a wide variety of information sources and for them to attribute high importance to many of them. That said, while these configurations paint a picture resembling a relatively 'open' firm, I remind the reader that only a small proportion of firms were covered by this solution and thus, I caution again that there are multiple pathways of innovation behaviour that a firm may adopt to internationalize. Moreover, the configurations depicted would require from the firm a considerable resource endowment to sustain such diverse innovation activities and perform a wide gamut of innovation results.

INTL ←   SERV * PROC * MGT * mkt * AGE * SZE * tkibs
INTL ←   TECH * NTECH * IIS * MIS * GIS * KGA * KEA * coll
INTL ←   TECH * NTECH * DIS * BIS * ACT * coll

The results from the post hoc analysis can further inform the reader of the configurations that best differentiate firms with at least low or moderate internationalization intensity from those that have very little. Here, it becomes possible to identify the configurations that consistently lead to the outcome of study in firms with international sales and that could have been previously masked as domestic firms also adopted these configurations, and thus, negatively impacted their consistency scores.

LINT ← (PROC * mkt) + (serv * MGT)

LINT ← (tech * IIS * MIS * KGA * KEA * COLL) +
(ntech * IIS * MIS * ris * KGA * COLL) +
(IIS * MIS * GIS * KGA * kea * coll)

LINT ← (bis * ACT * COLL) +
(DIS * bis * ACT) +
(TECH * ACT * COLL)

MINT ← serv * PROC

MINT ← (tech * NTECH * IIS * MIS* KGA * KEA * COLL) +
(TECH * IIS * MIS * gis * KGA * KEA * COLL) +
(IIS * MIS * GIS * RIS * KGA * KEA * COLL) +
(TECH * IIS * MIS * GIS * ris * KGA * kea * COLL)

MINT ← (TECH * DIS * bis * ACT * COLL)

The results from the analyses using at least low internationalization intensity (LINT) suggest technological and non-technological innovations are substitutable. In no configuration is service innovation a present condition for the sufficiency of the outcome. Again, the configurations points to the importance of being open to external information sources and investing in the firm's ability to incorporate this information to its own knowledge base. Breadth and depth of sourcing may be substitutable, so long as the firm invests in its own innovation activities.

The results from the analyses using at least moderate internationalization intensity (MINT) again suggest technological and non-technological innovations may be substitutable. Service innovation,

specifically, is again absent from any configuration sufficient for the outcome to occur. The firm's openness toward external information sources is again noted, but this time, the presence of depth of sourcing activities is specified. Multiple equifinal paths are sufficient for MINT to occur. Across most, the presence of both knowledge generation and knowledge exploitation activities are noted. As such, it would seem that attaining at least moderate internationalization intensity requires the firm to invest in its internal activities, perhaps to improve its absorptive capacity, and to open itself to opportunities abroad.

6.7   Limitations

6.7.1   Limitations to QCA

Five main limitations were identified at the onset of the analyses for which I put in place steps to mitigate their effect. The first pertains to calibration. The calibration process hinges on the use of external standards against which to anchor the raw data. When possible, I found external standards such as those from Statistics Canada's reporting on SMEs and export. I also relied on previous theoretical benchmarks such as those stated in the field of international entrepreneurship related to cut-off values for internationalization. As I realized that most variables used in this study did not have any external standards against which to calibrate the variables, I tested multiple anchor values for both crisp and fuzzy set calibration. Moreover, I provided justification for the anchors that were selected for the final variable calibration, thus making the calibration process transparent and based on substantive knowledge.

The second relates to case selection. As QCA examines case-based data and outputs solutions that are reflective of actual configurations of data rather than trends in the data, as is done with traditional statistical techniques, it is quite imperative to correctly identify the sample population that frames the analysis. As I first ran the analyses on the full sample originally collected at the onset of this research program, I identified a problem with case selection and took appropriate steps to redefine the sampled population under study (Berg-Schlosser & De Meur, 2009; Greckhamer, 2015; Greckhamer et al., 2013). This redefinition ensured that the sampled population selection exhibited a certain 'domain of investigation' (Berg-Schlosser & De Meur, 2009); an area of homogeneity that delimited and bounded which cases were included in the analysis. The firm's size and legal status were used to delimit and bound the sample. As the QCA process is not probabilistic, it is an acceptable and commonly adopted technique to deliberately select certain cases for analysis (Mahoney & Goertz, 2006). Moreover, this measured approach to case selection is necessary to maintain QCA's internal validity (Jordan, Gross, Javernick-

Will, & Garvin, 2011). In an effort to further mitigate against problems pertaining to case selection, I ran post-hoc analyses on the sample of firms with positive FSTS ratios (n = 122). The results were then compared to those gathered from the full sample (n = 322).

The third relates to model overdetermination. The number of condition variables to be included in the model is not unlimited, given the exponential rate at which the data space increases when another variable is added to the model. Indeed, the data property space is created using every possible configuration coupling all condition variables in the model. Thus, the number of condition variables must be kept in mind, ensuring that each variable included has its theoretical justification and its inclusion is based on substantive knowledge. Too few variables included, the model is not informative; too many, the model is overdetermined. To mitigate against this, a thorough literature review was completed to ascertain which innovation inputs to include in the models. Hypotheses were also established prior to commencing the QCA process. Moreover, as it is important to keep in mind the total number of cases to the number of modeled variables, I ensured the ratio of cases per condition variable remained well above the guideline of 1:4 provided by Marx (2010).

The fourth relates to temporality. An important critique of QCA is that causality cannot be inferred from the results due to the lack of temporality in the analysis. While it is true that some researchers are modeling temporal aspects into their QCA (Hak, Jaspers, & Dul, 2013), my own analyses offer cross-sectional findings. Indeed, the data gathered at the onset of this research project are cross-sectional in nature and thus suffer from this limitation. Accordingly, I make claims of association rather than causality per se, particularly as the relationship between innovation and internationalization is likely circular and causality of which came first, innovation or internationalization, is a topic that remains quite pertinent in the international business and innovation literature (Filipescu et al., 2013).

Finally, the fifth relates to the use of logical remainders. This involves using configurations that have non-observed cases to derive the intermediate and parsimonious solutions. The use of logical remainders was done following best practices offered by Schneider and Wagemann (2010b). First, logical remainders used to derive the intermediate solutions were guided by theory. Innovation results, internal innovation activities and external information sources were assumed present when the internationalization outcome variable was present, and absent when the outcome variable was absent. While these assumptions reflect the symmetricity of theoretical modeling most often encountered in international entrepreneurship studies, such were the assumptions that could guide the analysis. Moreover, while easy and hard logical remainders were used to derive the parsimonious solution, I explicitly reported the

intermediate solutions and juxtaposed the parsimonious solution to the intermediate one with the use of Fiss and Ragin's (2008) notation of core and peripheral elements.

6.7.2   *Limitations to Traditional Statistical Analyses*

As with all studies, the traditional empirical analyses are not without their own limitations. First and foremost, the data are cross-sectional and thus cannot provide any indicator of how the relationship unfolds over time. Moreover, from the data gathered it is impossible to ascertain the direction of causality between innovation and internationalization, and as such the findings are interpreted as a show of association rather than causality per se. Innovation is an endogenous construct, so it is impossible to rule out simultaneity bias in the regression models. On this topic, as identified in Chapter 2, few studies make use of instrumental variables, and of those, the ones that do comment on the imperfect proxy these measures provide for innovation. As such, the results found using QCA provide a complementary view to the relationship, as these analyses are not plagued by the same problems of endogeneity.

Second, the data were gathered from a single source per firm. Associated with this data collection strategy is the risk for common method bias. However, as was determined in Chapter 4, the results from common method bias assessment demonstrate that there are no single factors related to the data collection instrument that can account for a large proportion of the data's variance. Moreover, while the data were collected using questions and scales developed elsewhere and having received ample testing, I cannot rule out that it is free of measurement error. I thus caution the reader to interpret the results of the regression analyses as general trends.

Third, the generalizability of the findings is bound to small firms operating in a limited-sized economy, akin to that of Sweden's, as the Province of Quebec where the total population of KIBS was drawn is comparable to that economy (Doloreux & Shearmur, 2010). While many studies on this topic have examined Western European firms, particularly due to the accessibility of data with the Community Innovation Survey standard across many countries in the European Union, it would be interesting to carry out a similar study in a context outside Western Europe and North America.

Fourth, as KIBS subsectors are quite heterogenous, the innovation patterns may differ between subsectors. As such, intricacies in innovation modes specific to one subsector may not have been addressed when grouped with many other subsectors. Future studies could restrain the number of subsectors examined to ascertain whether the KIBS subsector influences the relationship between innovation and internationalization, operationalized either as innovation results or more holistically as

innovation modes. The current study limited itself to examining whether presence in a technological or professional KIBS subsector was a determinant to internationalization. Alas, such wide and ambiguous demarcation may not be sufficient to discern the heterogeneity between subsectors, as creative KIBS which are in a class of their own (Miles et al., 2017) were not sufficient in count in this study's sample to be considered in their own category. They were therefore lumped in with the respective larger grouping of technological or professional KIBS where they best lined up.

6.8   *Direction for Future Research*

This thesis opens up several new avenues for future research. First, the results of this study point to the richness that can be gained when innovation is defined more broadly. As the innovation process is shrouded with uncertainty and risk, it is valuable to capture the innovation investments made by the firm in its innovation resources. As internationalization is greatly influenced by the knowledge the firm gains (Brennan & Garvey, 2009; De Clercq, Sapienza, Yavuz, & Zhou, 2012; Fletcher & Harris, 2012), and as innovation inputs often bring in new knowledge or improve the firm's ability to incorporate knowledge (Cho et al., 2011; Koch & Strotmann, 2008; Landry, Amara, & Doloreux, 2012), a firm may gain information regarding new foreign opportunities from the upstream innovation activities it accomplishes without actually performing any innovation results. This may be particularly true for KIBS and other service firms, as their innovation processes are informed by so many external actors (Cho et al., 2011; Jimenez, Angelov, & Rao, 2012; Teixeira & dos Santos, 2016). An interesting avenue for future work lies in testing this relationship in samples of firm from other sectors to see if they hold under different boundary conditions.

Second, while innovation is theoretically a critical mechanism for the firm to adapt and change in foreign markets, it makes for a poor variable differentiating internationalized firms from domestic ones as domestic firms may, too, be innovative. Rather, it would be interesting and highly pertinent to explore how innovation patterns coupled with growth intentions, risk aversion, and other firm characteristics explain internationalization. Relatedly, it would also be highly pertinent to explore how this relationship holds when tested using a more complete measure of internationalization.

Lastly, as internationalization research is often characterized as causally complex, many of the models tested in international entrepreneurship would lend well to empirical analysis using set-theoretic methods. For example, the examination of internationalization pathways and the testing of existing typologies of trajectories (Jones et al., 2011) is an essential avenue for theory development in the field of

international entrepreneurship and subscribes well to the previous work in management studies on typology building and testing using QCA (Fiss, 2011).

6.9   Final Summary

The objective of this study was to test the underlying assumption in international entrepreneurship theories that innovation was a necessary condition for internationalization (Chapter 1). A thorough review of the international entrepreneurship and innovation literature brought forward opportunities to further our understanding of this relationship in light of advances made to the innovation construct (Chapter 2). A series of hypotheses were developed to test this relationship and further extend theory testing in a different sample, small KIBS firms, by examining the conjunctural effect of multiple types of innovation as well as the influence of the firm's openness to external knowledge, captured by the concept of innovation modes (Chapter 3). I then addressed the methodological limitations identified in the literature review related to the use of traditional statistical analyses to examine the causally complex relationship between innovation and internationalization.

In response, I proposed the use of a comparative analytical design, whereby each set of hypotheses would be tested using two methodological approaches: the first relying on traditional statistical techniques and the second on set-theoretic methods (Chapter 4). The research findings pointed to two different narratives. Where results from the logistic and fractional logistic regressions supported previous empirical studies that service innovation was a determinant to internationalization, those from the crisp set and fuzzy set QCAs found that service innovation was neither a necessary condition for internationalization, nor a present condition part of configurations sufficient for internationalization. Findings from the two methodological approaches did converge, and both found that an open innovation posture was conducive to internationalization propensity. Findings from the fuzzy set QCA also supported this relationship holding for internationalization intensity (Chapter 5).

In contribution to the field, this study has filled a theoretical gap in the internationalization literature, has extended testing of the relationship between innovation and internationalization by broadening the understanding of innovation and by testing it in a different sample of small KIBS firms, and has imported a new methodological approach used in the study of multidisciplinary phenomena important in international entrepreneurship theories (Chapter 6).

REFERENCES

Agresti, A. (2013). *Categorical Data Analysis* (3rd ed.). Hoboken, NJ: John Wiley & Sons, Inc.

Al-Aali, A., & Teece, D. J. (2014). International Entrepreneurship and the Theory of the (Long-Lived) International Firm: A Capabilities Perspective. *Entrepreneurship Theory and Practice*, *38*(1), 95–116.

Alexy, O., George, G., & Salter, A. (2013). Cui Bono? The Selective Revealing of Knowledge and Its Implications for Innovative Activity. *Academy of Management Review*, *38*(2), 270–291.

Altomonte, C., Aquilante, T., Békés, G., & Ottaviano, G. I. P. (2013). Internationalization and Innovation of Firms: Evidence and Policy. *Economic Policy*, *28*(76), 663–700.

Amara, N., D'Este, P., Landry, R., & Doloreux, D. (2016). Impacts of Obstacles on Innovation Patterns in KIBS Firms. *Journal of Business Research*, *69*(10), 4065–4073.

Amara, N., & Landry, R. (2005). Sources of Information as Determinants of Novelty of Innovation in Manufacturing Firms: Evidence from the 1999 Statistics Canada Innovation Survey. *Technovation*, *25*(3), 245–259.

Amara, N., Landry, R., & Doloreux, D. (2009). Patterns of Innovation in Knowledge-Intensive Business Services. *The Service Industries Journal*, *29*(4), 407–430.

Amara, N., Landry, R., & Traoré, N. (2008). Managing the Protection of Innovations in Knowledge-Intensive Business Services. *Research Policy*, *37*(9), 1530–1547.

Anand, N., Gardner, H. K., & Morris, T. (2007). Knowledge-Based Innovation: Emergence and Embedding of New Practice Areas in Management Consulting Firms. *Academy of Management Journal*, *50*(2), 406–428.

Antonakis, J., Bendahan, S., Jacquart, P., & Lalive, R. (2010). On Making Causal Claims: A Review and Recommendations. *The Leadership Quarterly*, *21*(6), 1086–1120.

Antonakis, J., Bendahan, S., Jacquart, P., & Lalive, R. (2014). Causality and Endogeneity: Problems and Solutions. In D. V Day (Ed.), *The Oxford Handbook of Leadership and Organizations*.

Apanasovich, N., Alcalde-Heras, H., & Parrilli, M. D. (2017). A New Approach to Business Innovation Modes: the 'Research, Technology and Human Resource Management (RTH) model' in the ICT Sector in Belarus. *European Planning Studies*, *25*(11), 1976–2000.

Asikainen, A.-L. (2015). Innovation Modes and Strategies in Knowledge Intensive Business Services. *Service Business*, *9*(1), 77–95.

Aslesen, H. W., & Isaksen, A. (2007). New Perspectives on Knowledge-Intensive Services and Innovation. *Geografiska Annaler: Series B, Human Geography*, *89*(S1), 45–58.

Aspelund, A., & Moen, Ø. (2005). Small International Firms: Typology, Performance and Implications. *Management International Reviewnternational Review*, *45*(3), 37–57.

Autio, E., Sapienza, H. J., & Almeida, J. G. (2000). Effects of Age at Entry, Knowledge Intensity, and Imitability on International Growth. *Academy of Management Journal*, *43*(5), 909–924.

Barney, J. (1986). Types of Competition and the Theory of Strategy: Toward an Integrative Framework. *Academy of Management Review*, *11*(4), 791–800.

Barney, J. (1991). Firm Resources and Sustained Competitive Advantage. *Journal of Management*, *17*(1), 99–120.

Barney, J., Wright, M., & Ketchen Jr., D. J. (2001). The Resource-Based View of the Firm: Ten Years after 1991. *Journal of Management*, *27*(6), 625–641.

Baronchelli, G., & Cassia, F. (2014). Exploring the Antecedents of Born-Global Companies' International Development. *International Entrepreneurship and Management Journal*, *10*(1), 67–79.

Basile, R. (2001). Export Behaviour of Italian Manufacturing Firms Over the Nineties: the Role of Innovation. *Research Policy*, *30*(8), 1185–1201.

Battisti, G., Gallego, J., Rubalcaba, L., & Windrum, P. (2015). Open Innovation in Services: Knowledge Sources, Intellectual Property Rights and Internationalization. *Economics of Innovation and New Technology*, *24*(3), 223–247.

Battisti, G., & Stoneman, P. (2010). How Innovative are UK Firms? Evidence from the Fourth UK Community Innovation Survey on Synergies between Technological and Organizational Innovations. *British Journal of Management*, *21*(1), 187–206.

Baum, C. F. (2008). Stata tip 63: Modeling proportions. *Stata Journal*, *8*(2), 299–303.

Baum, M., Schwens, C., & Kabst, R. (2015). A Latent Class Analysis of Small Firms' Internationalization Patterns. *Journal of World Business*, *50*(4), 754–768.

Becheikh, N., Landry, R., & Amara, N. (2006). Lessons from Innovation Empirical Studies in the Manufacturing Sector: A Systematic Review of the Literature from 1993-2003. *Technovation*, *26*(5–6), 644–664.

Becker, S. O., & Egger, P. H. (2013). Endogenous Product Versus Process Innovation and a Firm's Propensity to Export. *Empirical Economics*, *44*(1), 329–354.

Bell, J., Crick, D., & Young, S. (2004). Small Firm Internationalization and Business Strategy. *International Small Business Journal: Researching Entrepreneurship*, *22*(1), 23–56.

Bell, J., McNaughton, R., Young, S., & Crick, D. (2003). Towards an Integrative Model of Small Firm Internationalisation. *Journal of International Entrepreneurship*, *1*(4), 339–362.

Belso-Martínez, J. A. (2006). Do Industrial Districts Influence Export Performance and Export Intensity? Evidence for Spanish SMEs' Internationalization Process. *European Planning Studies*, *14*(6), 791–

810.

Berg-Schlosser, D., & De Meur, G. (2009). Comparative Research Design: Case and Variable Selection. In B. Rihoux & C. C. Ragin (Eds.), *Configurational Comparative Methods: Qualitative Comparative Analysis (QCA) and Related Techniques* (pp. 19–32).

Berg-Schlosser, D., De Meur, G., Rihoux, B., & Ragin, C. C. (2009). Qualitative Comparative Analysis (QCA) as an Approach. In B. Rihoux & C. C. Ragin (Eds.), *Configurational Comparative Methods: Qualitative Comparative Analysis (QCA) and Related Techniques* (pp. 1–18).

Bettencourt, L. A., Ostrom, A. L., Brown, S. W., & Roundtree, R. I. (2002). Client Co-Production in Knowledge-Intensive Business Services. *California Management Review*, *44*(4), 100–128.

Bettiol, M., De Marchi, V., Di Maria, E., & Grandinetti, R. (2013). Determinants of Market Extension in Knowledge-Intensive Business Services: Evidence from a Regional Innovation System. *European Planning Studies*, *21*(4), 498–515.

Bettiol, M., Di Maria, E., & Grandinetti, R. (2011). Market Extension and Knowledge Management Strategies of Knowledge-Intensive Business Services. *Knowledge Management Research & Practice*, *9*(4), 305–314.

Bloodgood, J. M., Sapienza, H. J., & Almeida, J. G. (1996). The Internationalization of New High-Potential U.S. Ventures: Antecedents and Outcomes. *Entrepreneurship Theory and Practice*, *20*(4), 61–76.

Bouncken, R. B., & Kraus, S. (2013). Innovation in Knowledge-Intensive Industries: The Double-Edged Sword of Coopetition. *Journal of Business Research*, *66*(10), 2060–2070.

Box, G. E. P., & Tidwell, P. W. (1962). Transformation of the Independent Variables. *Technometrics*, *4*(4), 531–550.

Brennan, L., & Garvey, D. (2009). The Role of Knowledge in Internationalization. *Research in International Business and Finance*, *23*(2), 120–133.

Brunswicker, S., & Vanhaverbeke, W. (2015). Open Innovation in Small and Medium-Sized Enterprises (SMEs): External Knowledge Sourcing Strategies and Internal Organizational Facilitators. *Journal of Small Business Management*, *53*(4), 1241–1263.

Bunz, T., Casulli, L., Jones, M. V., & Bausch, A. (2017). The Dynamics of Experiential Learning: Microprocesses and Adaptation in a Professional Service INV. *International Business Review*, *26*(2), 225–238.

Burkhardt, M. E., & Brass, D. J. (1990). Changing Patterns or Patterns of Change: The Effects of a Change in Technology on Social Network Structure and Power. *Administrative Science Quarterly*, *35*(1), 104.

Caldera, A. (2010). Innovation and Exporting: Evidence from Spanish Manufacturing Firms. *Review of World Economics*, *146*(4), 657–689.

Camacho, J. A., & Rodriguez, M. (2008). Patterns of Innovation in the Service Sector: Some Insights from the Spanish Innovation Survey. *Economics of Innovation and New Technology*, *17*(5), 459–471.

Carlborg, P., Kindström, D., & Kowalkowski, C. (2014). The Evolution of Service Innovation Research: a Critical Review and Synthesis. *The Service Industries Journal*, *34*(5), 373–398.

Casillas, J. C., Barbero, J. L., & Sapienza, H. J. (2015). Knowledge Acquisition, Learning, and the Initial Pace of Internationalization. *International Business Review*, *24*(1), 102–114.

Casillas, J. C., Moreno, A. M., Acedo, F. J., Gallego, M. A., & Ramos, E. (2009). An Integrative Model of the Role of Knowledge in the Internationalization Process. *Journal of World Business*, *44*(3), 311–322.

Cassiman, B., & Golovko, E. (2011). Innovation and Internationalization through Exports. *Journal of International Business Studies*, *42*(1), 56–75.

Cassiman, B., Golovko, E., & Martínez-Ros, E. (2010). Innovation, Exports and Productivity. *International Journal of Industrial Organization*, *28*(4), 372–376.

Cassiman, B., & Veugelers, R. (2006). In Search of Complementarity in Innovation Strategy: Internal R&D and External Knowledge Acquisition. *Management Science*, *52*(1), 68–82.

Castaño, M.-S., Méndez, M.-T., & Galindo, M.-Á. (2016). Innovation, Internationalization and Business-Growth Expectations Among Entrepreneurs in the Services Sector. *Journal of Business Research*, *69*(5), 1690–1695.

Castro, L. M., Montoro-Sanchez, A., & Ortiz-De-Urbina-Criado, M. (2011). Innovation in Services Industries: Current and Future Trends. *The Service Industries Journal*, *31*(1), 7–20.

Chandra, Y., Styles, C., & Wilkinson, I. (2009). The Recognition of First Time International Entrepreneurial Opportunities. *International Marketing Review*, *26*(1), 30–61.

Chandra, Y., Styles, C., & Wilkinson, I. (2012). An Opportunity-Based View of Rapid Internationalization. *Journal of International Marketing*, *20*(1), 74–102.

Cheng, C.-F., Chang, M.-L., & Li, C.-S. (2013). Configural Paths to Successful Product Innovation. *Journal of Business Research*, *66*(12), 2561–2573.

Chesbrough, H. (2006). Open Innovation: A New Paradigm for Understanding Industrial Innovation. In H. Chesbrough, W. Vanhaverbeke, & J. West (Eds.), *Open Innovation: Researching a New Paradigm*. Oxford: Oxford University Press.

Chiru, R. (2007). *Innovativeness and Export Orientation among Establishments in Knowledge-Intensive Business Services (KIBS), 2003*. Ottawa.

Cho, I., Park, H., & Choi, J. (2011). The Impact of Diversity of Innovation Channels on Innovation Performance in Service Firms. *Service Business*, *5*(3), 277–294.

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences* (3rd ed.). Mahwah, NJ: Lawrence Erlbaum.

Cohen, W. M., & Levinthal, D. A. (1990). Absorptive Capacity: A New Perspective on Learning and Innovation. *Administrative Science Quarterly*, *35*(1), 128.

Coombs, R., & Miles, I. (2000). Innovation, Measurement and Services: The New Problematique. In J. S. Metcalfe & I. Miles (Eds.), *Innovation Systems in the Service Economy. Economics of Science, Technology and Innovation* (pp. 85–103).

Corrocher, N., Cusmano, L., & Morrison, A. (2009). Modes of Innovation in Knowledge-Intensive Business Services Evidence from Lombardy. *Journal of Evolutionary Economics*, *19*(2), 173–196.

Coviello, N. E. (2006). The Network Dynamics of International New Ventures. *Journal of International Business Studies*, *37*(5), 713–731.

Crick, D. (2009). The Internationalisation of Born Global and International New Venture SMEs. *International Marketing Review*, *26*(4/5), 453–476.

Crossan, M. M., & Apaydin, M. (2010). A Multi-Dimensional Framework of Organizational Innovation: A Systematic Review of the Literature. *Journal of Management Studies*, *47*(6), 1154–1191.

Crossan, M. M., Lane, H. W., & White, R. E. (1999). An Organizational Learning Framework: From Intuition to Institution. *Academy of Management Review*, *24*(3), 522–537.

Cui, T., Ye, H. (Jonathan), Teo, H. H., & Li, J. (2015). Information Technology and Open Innovation: A Strategic Alignment Perspective. *Information & Management*, *52*(3), 348–358.

Cyert, R., & March, J. G. (1963). *A Behavioral Theory of the Firm*. New Jersey: Prentice Hall.

D'Angelo, A. (2010). Technological Resources, External Research Partners and Export Performance: A Study of Italian High-Tech SMEs. In J. Pla-Barber & J. Alegre (Eds.), *Reshaping the Boundaries of the Firm in an Era of Global Interdependence* (pp. 299–326).

D'Angelo, A. (2012). Innovation and Export Performance: A Study of Italian High-Tech SMEs. *Journal of Management and Governance*, *16*(3), 393–423.

D'Angelo, A., Majocchi, A., Zucchella, A., & Buck, T. (2013). Geographical Pathways for SME Internationalization: Insights from an Italian Sample. *International Marketing Review*, *30*(2), 80–105.

Dahlander, L., & Gann, D. M. (2010). How Open is Innovation? *Research Policy*, *39*(6), 699–709.

Dai, L., Maksimov, V., Gilbert, B. A., & Fernhaber, S. A. (2014). Entrepreneurial Orientation and International Scope: The Differential Roles of Innovativeness, Proactiveness, and Risk-taking. *Journal of Business Venturing*, *29*(4), 511–524.

Damanpour, F. (1991). Organizational Innovation: A Meta-Analysis Of Effects Of Determinants and Moderators. *Academy of Management Journal*, *34*(3), 555–590.

Damanpour, F., Walker, R. M., & Avellaneda, C. N. (2009). Combinative Effects of Innovation Types and Organizational Performance: A Longitudinal Study of Service Organizations. *Journal of Management Studies*, *46*(4), 650–675.

Damijan, J. P., Kostevc, Č., & Polanec, S. (2010). From Innovation to Exporting or Vice Versa? *World Economy*, *33*(3), 374–398.

Damijan, J. P., Kostevc, Č., & Rojec, M. (2017). Exporting Status and Success in Innovation: Evidence from CIS Micro Data for EU Countries. *Journal of International Trade and Economic Development*, *26*(5), 585–611.

Davidsson, P., & Wiklund, J. (2000). Conceptual and Empirical Challenges in the Study of Firm Growth. In D. L. Sexton & H. Landström (Eds.), *The Blackwell Handbook of Entrepreneurship* (pp. 26–44). Oxford: Blackwell.

De Clercq, D., Sapienza, H. J., Yavuz, R. I., & Zhou, L. (2012). Learning and Knowledge in Early Internationalization Research: Past Accomplishments and Future Directions. *Journal of Business Venturing*, *27*(1), 143–165.

De Martino, M., & Magnotti, F. (2018). The Innovation Capacity of Small Food Firms in Italy. *European Journal of Innovation Management*, *21*(3), 362–383.

de Vries, E. J. (2006). Innovation in Services in Networks of Organizations and in the Distribution of Services. *Research Policy*, *35*(7), 1037–1051.

den Hertog, P. (2000). Knowledge-Intensive Business Services as Co-Producers of Innovation. *International Journal of Innovation Management*, *4*(4), 491–528.

den Hertog, P., van der Aa, W., & de Jong, M. W. (2010). Capabilities for Managing Service Innovation: Towards a Conceptual Framework. *Journal of Service Management*, *21*(4), 490–514.

Deprey, B., Lloyd-Reason, L., & Ibeh, K. I. N. (2012). The Internationalisation of Small- and Medium-Sized Management Consultancies: An Exploratory Study of Key Facilitating Factors. *Service Industries Journal*, *32*(10), 1609–1621.

Dhanaraj, C., & Beamish, P. W. (2003). A Resource-Based Approach to the Study of Export Performance. *Journal of Small Business Management*, *41*(3), 242–261.

Di Maria, E., Bettiol, M., De Marchi, V., & Grandinetti, R. (2012). Developing and Managing Distant Markets: The Case of KIBS. *Economia Politica*, *29*(3), 361–379.

Dierickx, I., & Cool, K. (1989). Asset Stock Accumulation and Sustainability of Competitive Advantage. *Management Science*, *35*(12), 1504–1511.

Djellal, F., & Gallouj, F. (2001). Patterns of Innovation Organisation in Service Firms: Postal Survey Results and Theoretical Models. *Science and Public Policy*, *28*(1), 57–67.

Doloreux, D., & Shearmur, R. (2010). Exploring and Comparing Innovation Patterns across Different Knowledge Intensive Business Services. *Economics of Innovation and New Technology*, *19*(7), 605–

625.

Doloreux, D., & Shearmur, R. (2012). Collaboration, Information and the Geography of Innovation in Knowledge Intensive Business Services. *Journal of Economic Geography*, *12*(1), 79–105.

Doloreux, D., & Shearmur, R. (2013). Innovation Strategies: Are Knowledge-Intensive Business Services Just Another Source of Information? *Industry and Innovation*, Vol. 20, pp. 719–738.

Doloreux, D., Shearmur, R., & Rodriguez, M. (2016). Determinants of R&D in Knowledge-Intensive Business Services Firms. *Economics of Innovation and New Technology*, *25*(4), 391–405.

Doloreux, D., Shearmur, R., & Van Assche, A. (2019). Combined Innovation and Export Strategies of KIBS in Different Regional Settings. *Industry and Innovation*, *26*(6), 715–740.

Drejer, I. (2004). Identifying Innovation in Surveys of Services: A Schumpeterian Perspective. *Research Policy*, *33*(3), 551–562.

Drucker, P. (2015). *Innovation and Entrepreneurship*. New York: Routledge.

Dul, J. (2016). Necessary Condition Analysis (NCA): Logic and Methodology of "Necessary but Not Sufficient" Causality. *Organizational Research Methods*, *19*(1), 10–52.

Dutta, D. K., & Crossan, M. M. (2005). The Nature of Entrepreneurial Opportunities: Understanding the Process Using the 4I Organizational Learning Framework. *Entrepreneurship Theory and Practice*, *29*(4), 425–449.

Dyer, J. H., & Singh, H. (1998). The Relational View: Cooperative Strategy and Sources of Interorganizational Competitive. *Academy of Management Review*, *23*(4), 660–679.

Eisenhardt, K. M., & Martin, J. A. (2000). Dynamic Capabilities: What Are They? *Strategic Management Journal*, *21*(10–11), 1105–1121.

Eisenhardt, K. M., & Santos, F. M. (2002). Knowledge-Based View: A New Theory of Strategy? In A. Pettigrew, H. Thomas, & R. Whittington (Eds.), *Handbook of Strategy and Management*. Sage Publications.

Ellis, P. D. (2011). Social Ties and International Entrepreneurship: Opportunities and Constraints Affecting Firm Internationalization. *Journal of International Business Studies*, *42*(1), 99–127.

Fagerberg, J. (2009). A Guide to Schumpeter. In W. Østreng (Ed.), *Confluence. Interdisciplinary Communications 2007/2008* (pp. 20–22).

Fagerberg, Jan. (2004). Innovation: A Guide to the Literature. In Jan Fagerberg, D. Mowery, & R. Nelson (Eds.), *The Oxford Handbook of Innovation*.

Fan, D., Cui, L., Li, Y., & Zhu, C. J. (2016). Localized Learning by Emerging Multinational Enterprises in Developed Host Countries: A Fuzzy-Set Analysis of Chinese Foreign Direct Investment in Australia. *International Business Review*, *25*(1PartA), 187–203.

Felício, J. A., Duarte, M., & Rodrigues, R. (2016). Global Mindset and SME Internationalization: A

Fuzzy-Set QCA Approach. *Journal of Business Research*, *69*(4), 1372–1378.

Filatotchev, I., & Piesse, J. (2009). RD, Internationalization and Growth of Newly Listed Firms: European Evidence. *Journal of International Business Studies*, *40*(8), 1260–1276.

Filipescu, D. A., Prashantham, S., Rialp, A., & Rialp, J. (2013). Technological Innovation and Exports: Unpacking Their Reciprocal Causality. *Journal of International Marketing*, *21*(1), 23–38.

Filipescu, D. A., Rialp, A., & Rialp, J. (2009). Internationalisation and Technological Innovation: Empirical Evidence on their Mutual Relationship. In *Advances in International Marketing* (Vol. 20).

Filippetti, A. (2011). Innovation Modes and Design as a Source of Innovation: A Firm-Level Analysis. *European Journal of Innovation Management*, *14*(1), 5–26.

Fiss, P. C. (2007). A Set-Theoretic Approach to Organizational Configurations. *Academy of Management Review*, *32*(4), 1180–1198.

Fiss, P. C. (2011). Building Better Causal Theories: A Fuzzy Set Approach to Typologies in Organization Research. *Academy of Management Journal*, *54*(2), 393–420.

Fiss, P. C., Marx, A., & Cambré, B. (2013). Configurational Theory and Methods in Organizational Research: Introduction. In *Research in the Sociology of Organizations* (Vol. 38, pp. 1–22).

Fitjar, R. D., & Rodríguez-Pose, A. (2013). Firm Collaboration and Modes of Innovation in Norway. *Research Policy*, *42*(1), 128–138.

Fletcher, M., & Harris, S. (2012). Knowledge Acquisition for the Internationalization of the Smaller Firm: Content and Sources. *International Business Review*, *21*(4), 631–647.

Fletcher, M., Harris, S., & Richey, R. G. (2013). Internationalization Knowledge: What, Why, Where, and When? *Journal of International Marketing*, *21*(3), 47–71.

Forsgren, M. (2002). The Concept of Learning in the Uppsala Internationalization Process Model: A Critical Review. *International Business Review*, *11*(3), 257–277.

Fowler, F. J. (2013). *Survey Research Methods* (5th ed.). Thousand Oaks: Sage Publications.

Freel, M. (2006). Patterns of Technological Innovation in Knowledge-Intensive Business Services. *Industry & Innovation*, *13*(3), 335–358.

Freeman, S., Edwards, R., & Schroder, B. (2006). How Smaller Born-Global Firms Use Networks and Alliances to Overcome Constraints to Rapid Internationalization. *Journal of International Marketing*, *14*(3), 33–63.

Freeman, S., & Sandwell, M. (2008). Professional Service Firms Entering Emerging Markets: The Role of Network Relationships. *Journal of Services Marketing*, *22*(3), 198–212.

Frenz, M., & Lambert, R. (2009). Exploring Non-technological and Mixed Modes of Innovation Across Countries. In *Innovation in Firms* (pp. 69–110).

Gallouj, F. (2002). Innovation in Services and the Attendant Old and New Myths. *Journal of Socio-Economics*, *31*(2), 137–154.

Gallouj, F., & Savona, M. (2009). Innovation in Services: A Review of the Debate and a Research Agenda. *Journal of Evolutionary Economics*, *19*(2), 149–172.

Gallouj, F., & Weinstein, O. (1997). Innovation in Services. *Research Policy*, *26*(4–5), 537–556.

Gallouj, F., & Windrum, P. (2009). Services and Services Innovation. *Journal of Evolutionary Economics*, *19*(2), 141–148.

Ganter, A., & Hecker, A. (2014). Configurational Paths to Organizational Innovation: Qualitative Comparative Analyses of Antecedents and Contingencies. *Journal of Business Research*, *67*(6), 1285–1292.

Gourlay, A., Seaton, J., & Suppakitjarak, J. (2005). The Determinants of Export Behaviour in UK Service Firms. *Service Industries Journal*, *25*(7), 879–889.

Granovetter, M. (1985). Economic Action and Social Structure: The Problem of Embeddedness. *American Journal of Sociology*, *91*(3), 481–510.

Grant, R. M. (1991). The Resource-Based Theory of Competitive Advantage: Implications for Strategy Formulation. *California Management Review*, pp. 114–135.

Grant, R. M. (1996a). Prospering in Dynamically-Competitive Environments: Organizational Capability as Knowledge Integration. *Organization Science*, *7*(4), 375–387.

Grant, R. M. (1996b). Toward a Knowledge-Based Theory of the Firm. *Strategic Management Journal*, *17*(S2), 109–122.

Greckhamer, T. (2015). Qualitative Comparative Analysis: Fuzzy Set Applications for Strategic Management Research. *Research Methods for Strategic Management*, 229–252.

Greckhamer, T., Misangyi, V. F., Elms, H., & Lacey, R. (2007). Using Qualitative Comparative Analysis in Strategic Management Research. *Organizational Research Methods*, *11*(4), 695–726.

Greckhamer, T., Misangyi, V. F., & Fiss, P. C. (2013). The Two QCAs: From a Small-N to a Large-N Set Theoretic Approach. In *Research in the Sociology of Organizations* (Vol. 38, pp. 49–75).

Greenwood, R., & Empson, L. (2003). The Professional Partnership: Relic or Exemplary Form of Governance? *Organization Studies*, *24*(6), 909–933.

Guan, J., & Ma, N. (2003). Innovative Capability and Export Performance of Chinese Firms. *Technovation*, *23*(9), 737–747.

Gulati, R. (1995). Social Structure and Alliance Formation Patterns: A Longitudinal Analysis. *Administrative Science Quarterly*, *40*(4), 619.

Gulati, R., & Gargiulo, M. (1999). Where Do Interorganizational Networks Come From? *American Journal of Sociology*, *104*(5), 1439–1493.

Gupta, S., Malhotra, N. K., Czinkota, M., & Foroudi, P. (2016). Marketing Innovation: A Consequence of Competitiveness. *Journal of Business Research*, *69*(12), 5671–5681.

Hagedoorn, J., & Wang, N. (2012). Is there Complementarity or Substitutability between Internal and External R&D Strategies? *Research Policy*, *41*(6), 1072–1083.

Hair Jr., J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2014). *Multivariate Data Analysis* (7th ed.). Essex: Pearson.

Hak, T., Jaspers, F., & Dul, J. (2013). The Analysis of Temporally Ordered Configurations: Challenges and Solutions. In *Research in the Sociology of Organizations* (Vol. 38, pp. 107–127).

Hallbäck, J., & Gabrielsson, P. (2013). Entrepreneurial Marketing Strategies During the Growth of International New Ventures Originating in Small and Open economies. *International Business Review*, *22*(6), 1008–1020.

Haneda, S., & Ito, K. (2014). Modes of International Activities and the Innovativeness of Firms: an Empirical Analysis Based on the Japanese National Innovation Survey for 2009. *Economics of Innovation and New Technology*, *23*(8), 758–779.

Hardin, J. W., & Hilbe, J. M. (2018). *Generalized Linear Models and Extensions* (4th ed.). Stata Press.

Harman, H. H. (1976). *Modern Factor Analysis* (3rd ed.). Chicago: University of Chicago Press.

Harris, R., & Li, Q. C. (2009). Exporting, R&D, and Absorptive Capacity in UK Establishments. *Oxford Economic Papers*, *61*(1), 74–103.

Helfat, C. E., & Peteraf, M. A. (2003). The Dynamic Resource-Based View: Capability Lifecycles. *Strategic Management Journal*, *24*(10), 997–1010.

Helfat, C. E., & Peteraf, M. A. (2015). Managerial Cognitive Capabilities and the Microfoundations of Dynamic Capabilities. *Strategic Management Journal*, *36*(6), 831–850.

Hervas-Oliver, J.-L., Sempere-Ripoll, F., Boronat-Moll, C., & Rojas-Alvarado, R. (2018). On the Joint Effect of Technological and Management Innovations on Performance: Increasing or Diminishing Returns? *Technology Analysis & Strategic Management*, *30*(5), 569–581.

Higón, D. A., & Driffield, N. (2011). Exporting and Innovation Performance: Analysis of the Annual Small Business Survey in the UK. *International Small Business Journal: Researching Entrepreneurship*, *29*(1), 4–24.

Hilbe, J. M. (2009). *Logistic Regression Models*.

Hipp, C., Gallego, J., & Rubalcaba, L. (2015). Shaping Innovation in European Knowledge-Intensive Business Services. *Service Business*, *9*(1), 41–55.

Hipp, C., & Grupp, H. (2005). Innovation in the Service Sector: The Demand for Service-Specific Innovation Measurement Concepts and Typologies. *Research Policy*, *34*(4), 517–535.

Hirsch, S., & Bijaoui, I. (1985). R&D Intensity and Export Performance: A Micro View.

Weltwirtschaftliches Archiv, *121*(2), 238–251.

Hitt, M. A., Bierman, L., Uhlenbruck, K., & Shimizu, K. (2006). The Importance of Resources in the Internationalization of Professional Service Firms: The Good, the Bad, and The Ugly. *Academy of Management Journal*, *49*(6), 1137–1157.

Hogan, S. J., Soutar, G. N., McColl-Kennedy, J. R., & Sweeney, J. C. (2011). Reconceptualizing Professional Service Firm Innovation Capability: Scale Development. *Industrial Marketing Management*, *40*(8), 1264–1273.

Hollender, L., Zapkau, F. B., & Schwens, C. (2017). SME Foreign Market Entry Mode Choice and Foreign Venture Performance: The Moderating Effect of International Experience and Product Adaptation. *International Business Review*, *26*(2), 250–263.

Hollenstein, H. (2003). Innovation Modes in the Swiss Service Sector: a Cluster Analysis Based on Firm-Level Data. *Research Policy*, *32*(5), 845–863.

Hollenstein, H. (2005). Determinants of International Activities: Are SMEs Different? *Small Business Economics*, *24*(5), 431–450.

Hortinha, P., Lages, C., & Lages, L. F. (2011). The Trade-off between Customer and Technology Orientations: Impact on Innovation Capabilities and Export Performance. *Journal of International Marketing*, *19*(3), 36–58.

Hosmer Jr., D. W., Lemeshow, S., & Sturdivant, R. X. (2013). *Applied Logistic Regression*.

Huber, G. P. (1991). Organizational Learning: The Contributing Processes and the Literatures. *Organization Science*, *2*(1), 88–115.

Huizingh, E. K. R. E. (2011). Open innovation: State of the art and future perspectives. *Technovation*, *31*(1), 2–9.

Idrissia, M. O., Amara, N., & Landry, R. (2012). SMEs' Degree of Openness: The Case of Manufacturing Industries. *Journal of Technology Management & Innovation*, *7*(1), 186–210.

Industry Canada. (2011). *Canadian Small Business Exporters*. Ottawa.

Innovation Science and Economic Development Canada. (2019). *Key Small Business Statistics January 2019*.

Jansen, J. J. P., Van Den Bosch, F. A. J., & Volberda, H. W. (2006). Exploratory Innovation, Exploitative Innovation, and Performance: Effects of Organizational Antecedents and Environmental Moderators. *Management Science*, *52*(11), 1661–1674.

Janssen, M. J., Castaldi, C., & Alexiev, A. (2016). Dynamic Capabilities for Service Innovation: Conceptualization and Measurement. *R&D Management*, *46*(4), 797–811.

Janssen, M. J., Castaldi, C., & Alexiev, A. (2018). In the Vanguard of Openness: Which Dynamic Capabilities Are Essential for Innovative KIBS Firms to Develop? *Industry and Innovation*, *25*(4),

432–457.

Javalgi, R. G., & Martin, C. L. (2007). Internationalization of Services: Identifying the Building-Blocks for Future Research. *Journal of Services Marketing*, *21*(6), 391–397.

Jean, R.-J. "Bryan," Deng, Z., Kim, D., & Yuan, X. (2016). Assessing Endogeneity Issues in International Marketing Research. *International Marketing Review*, *33*(3), 483–512.

Jensen, M. B., Johnson, B., Lorenz, E., & Lundvall, B.-Å. (2007). Forms of Knowledge and Modes of Innovation. *Research Policy*, *36*(5), 680–693.

Jimenez, B., Angelov, B., & Rao, B. (2012). Service Absorptive Capacity: Its Evolution and Implications for Innovation. *Journal of the Knowledge Economy*, *3*(2), 142–163.

Johanson, J., & Mattsson, L.-G. (1987). Interorganizational Relations in Industrial Systems: A Network Approach Compared with the Transaction-Cost Approach. *International Studies of Management & Organization*, *17*(1), 34–48.

Johanson, J., & Mattsson, L.-G. (1994). The Markets-As-Networks Tradition in Sweden. In *Research Traditions in Marketing* (pp. 321–346).

Johanson, J., & Vahlne, J.-E. (1977). The Internationalization Process of the Firm-A Model of Knowledge Development and Increasing Foreign Market Commitments. *Journal of International Business Studies*, *8*(1), 23–32.

Johanson, J., & Vahlne, J.-E. (1990). The Mechanism of Internationalisation. *International Marketing Review*, *7*(4), 02651339010137414.

Johanson, J., & Vahlne, J.-E. (2003). Business Relationship Learning and Commitment in the Internationalization Process. *Journal of International Entrepreneurship*, *1*(1), 83–101.

Johanson, J., & Vahlne, J.-E. (2009). The Uppsala Internationalization Process Model Revisited: From Liability of Foreignness to Liability of Outsidership. *Journal of International Business Studies*, *40*(9), 1411–1431.

Jones, M. V., & Coviello, N. E. (2005). Internationalisation: Conceptualising an Entrepreneurial Process of Behaviour in Time. *Journal of International Business Studies*, *36*(3), 284–303.

Jones, M. V., Coviello, N. E., & Tang, Y. K. (2011). International Entrepreneurship Research (1989–2009): A Domain Ontology and Thematic Analysis. *Journal of Business Venturing*, *26*(6), 632–659.

Jordan, E., Gross, M. E., Javernick-Will, A. N., & Garvin, M. J. (2011). Use and Misuse of Qualitative Comparative Analysis. *Construction Management and Economics*, *29*(11), 1159–1173.

Kafouros, M., Buckley, P. J., Sharp, J. A., & Wang, C. (2008). The Role of Internationalization in Explaining Innovation Performance. *Technovation*, *28*(1–2), 63–74.

Kaleka, A. (2012). Studying Resource and Capability Effects on Export Venture Performance. *Journal of World Business*, *47*(1), 93–105.

Kang, K. H., & Kang, J. (2009). How Do Firms Source External Knowledge for Innovation? Analysing Effects of Different Knowledge Sourcing Methods. *International Journal of Innovation Management*, *13*(01), 1–17.

Kang, K. H., & Kang, J. (2014). Do External Knowledge Sourcing Modes Matter for Service Innovation? Empirical Evidence from South Korean Service Firms. *Journal of Product Innovation Management*, *31*(1), 176–191.

Karra, N., Phillips, N., & Tracey, P. (2008). Building the Born Global Firm. *Long Range Planning*, *41*(4), 440–458.

Katila, R., & Ahuja, G. (2002). Something Old, Something New: A Longitudinal Study of Search Behavior and New Product Introduction. *Academy of Management Journal*, *45*(6), 1183–1194.

Ketchen Jr., D. J., & Shook, C. L. (1996). The Application of Cluster Analysis in Strategic Management Research: An Analysis and Critique. *Strategic Management Journal*, *17*(6), 441–458.

Keupp, M. M., & Gassmann, O. (2009). Determinants and Archetype Users of Open Innovation. *R&D Management*, *39*(4), 331–341.

Kilduff, M., & Brass, D. J. (2010). Organizational Social Network Research: Core Ideas and Key Debates. *The Academy of Management Annals*, *4*(1), 317–357.

Kirbach, M., & Schmiedeberg, C. (2008). Innovation and Export Performance: Adjustments and Remaining Differences in East and West German Manufacturing. *Economics of Innovation and New Technology*, *17*(5), 435–457.

Knight, G. (2015). Born Global Firms: Evolution of a Contemporary Phenomenon. In S. Zou, H. Xu, & L. H. Shi (Eds.), *Entrepreneurship in International Marketing* (pp. 3–19).

Knight, G., & Cavusgil, S. T. (2004). Innovation, Organizational Capabilities, and the Born-Global Firm. *Journal of International Business Studies*, *35*(2), 124–141.

Koch, A., & Strotmann, H. (2008). Absorptive Capacity and Innovation in the Knowledge Intensive Business Service Sector. *Economics of Innovation and New Technology*, *17*(6), 511–531.

Kogut, B. (2000). The Network as Knowledge: Generative Rules and the Emergence of Structure. *Strategic Management Journal*, *21*(3), 405–425.

Kogut, B., & Zander, U. (1992). Knowledge of the Firm, Combinative Capabilities, and the Replication of Technology. *Organization Science*, *3*(3), 383–397.

Kogut, B., & Zander, U. (1996). What Firms Do? Coordination, Identity, and Learning. *Organization Science*, *7*(5), 502–518.

Kostopoulos, K., Papalexandris, A., Papachroni, M., & Ioannou, G. (2011). Absorptive Capacity, Innovation, and Financial Performance. *Journal of Business Research*, *64*(12), 1335–1343.

Krull, E., Smith, P., & Ge, G. L. (2012). The Internationalization of Engineering Consulting from a

Strategy Tripod Perspective. *The Service Industries Journal*, *32*(7), 1097–1119.

Kuivalainen, O., Saarenketo, S., & Puumalainen, K. (2012). Start-Up Patterns of Internationalization: A Framework and its Application in the Context of Knowledge-Intensive SMEs. *European Management Journal*, *30*(4), 372–385.

Lachenmaier, S., & Woessmann, L. W. (2004). *Does Innovation Cause Exports? Evidence from Exogenous Innovation Impulses and Obstacles* (No. CESifo Working Paper, No. 1178). Munich.

Lages, L. F., Silva, G., & Styles, C. (2009). Relationship Capabilities, Quality, and Innovation as Determinants of Export Performance. *Journal of International Marketing*, *17*(4), 47–70.

Lam, A. (2005). Organizational Innovation. In Jan Fagerberg & D. C. Mowery (Eds.), *The Oxford Handbook of Innovation*.

Lamb, P. W., & Liesch, P. W. (2002). The Internationalization Process of the Smaller Firm: Re-Framing the Relationships between Market Commitment, Knowledge and Involvement. *Management International Review*, *42*(1), 7–26.

Landry, R., Amara, N., & Doloreux, D. (2012). Knowledge-Exchange Strategies Between KIBS Firms and their Clients. *Service Industries Journal*, *32*(2), 291–320.

Langseth, H., O'Dwyer, M., & Arpa, C. (2016). Forces Influencing the Speed of Internationalisation. *Journal of Small Business and Enterprise Development*, *23*(1), 122–148.

Laursen, K., & Salter, A. (2006). Open for Innovation: the Role of Openness in Explaining Innovation Performance Among U.K. Manufacturing Firms. *Strategic Management Journal*, *27*(2), 131–150.

Lavie, D. (2006). Capability Reconfiguration: An Analysis Of Incumbent Responses To Technological Change. *Academy of Management Review*, *31*(1), 153–174.

Lawson, B., & Samson, D. (2001). Developing Innovation Capability in Organisations: A Dynamic Capabilities Approach. *International Journal of Innovation Management*, *5*(3), 377–400.

Lefebvre, É., Lefebvre, L. A., & Bourgault, M. (1998). R&D Related Capabilities as Determinants of Export Performance. *Small Business Economics*, *10*(4), 365–377.

Leiponen, A. (2005). Skills and Innovation. *International Journal of Industrial Organization*, *23*(5–6), 303–323.

Leiponen, A. (2006). Managing Knowledge for Innovation: The Case of Business-to-Business Services*. *Journal of Product Innovation Management*, *23*(3), 238–258.

Leiponen, A. (2012). The Benefits of R&D and Breadth in Innovation Strategies: a Comparison of Finnish Service and Manufacturing Firms. *Industrial and Corporate Change*, *21*(5), 1255–1281.

Leiponen, A., & Drejer, I. (2007). What Exactly are Technological Regimes? *Research Policy*, *36*(8), 1221–1238.

Leiponen, A., & Helfat, C. E. (2010). Innovation Objectives, Knowledge Sources, and the Benefits of

Breadth. *Strategic Management Journal*, *31*(2), 224–236.

Lejpras, A. (2015). Knowledge, Location, and Internationalization: Empirical Evidence for Manufacturing SMEs. *Economics of Innovation and New Technology*, *24*(8), 734–754.

Leonidou, L. C., Katsikeas, C. S., Palihawadana, D., & Spyropoulou, S. (2007). An Analytical Review of the Factors Stimulating Smaller Firms to Export. *International Marketing Review*, *24*(6), 735–770.

Lewandowska, M. S., Szymura-Tyc, M., & Gołębiowski, T. (2016). Innovation Complementarity, Cooperation Partners, and New Product Export: Evidence from Poland. *Journal of Business Research*, *69*(9), 3673–3681.

Lichtenthaler, U. (2011). Open Innovation: Past Research, Current Debates, and Future Directions. *Academy of Management Perspectives*, *25*(1), 75–93.

Lichtenthaler, U., & Lichtenthaler, E. (2009). A Capability-Based Framework for Open Innovation: Complementing Absorptive Capacity. *Journal of Management Studies*, *46*(8), 1315–1338.

Lin, C., Wu, Y.-J., Chang, C., Wang, W., & Lee, C.-Y. (2012). The Alliance Innovation Performance of R&D Alliances—the Absorptive Capacity Perspective. *Technovation*, *32*(5), 282–292.

Long, J. S. (1997). *Regression Models for Categorical and Limited Dependent Variables*. Thousand Oaks: Sage Publications.

Longest, K. C., & Vaisey, S. (2008). Fuzzy: A Program for Performing Qualitative Comparative Analyses (QCA) in Stata. *Stata Journal*, *8*(1), 79–104.

López Rodríguez, J., & García Rodríguez, R. M. (2005). Technology and Export Behaviour: A Resource-Based View Approach. *International Business Review*, *14*(5), 539–557.

Love, J. H., & Mansury, M. A. (2009). Exporting and Productivity in Business Services: Evidence from the United States. *International Business Review*, *18*(6), 630–642.

Love, J. H., & Roper, S. (2015). SME Innovation, Exporting and Growth: A Review of Existing Evidence. *International Small Business Journal: Researching Entrepreneurship*, *33*(1), 28–48.

Love, J. H., Roper, S., & Bryson, J. R. (2011). Openness, Knowledge, Innovation and Growth in UK Business Services. *Research Policy*, *40*(10), 1438–1452.

Love, J. H., Roper, S., & Hewitt-Dundas, N. (2010). Service Innovation, Embeddedness and Business Performance: Evidence from Northern Ireland. *Regional Studies*, *44*(8), 983–1004.

Love, J. H., Roper, S., & Vahter, P. (2014). Learning from Openness: The Dynamics of Breadth in External Innovation Linkages. *Strategic Management Journal*, *35*(11), 1703–1716.

Love, J. H., Roper, S., & Zhou, Y. (2016). Experience, Age and Exporting Performance in UK SMEs. *International Business Review*, *25*(4), 806–819.

Lu, J. W., & Beamish, P. W. (2006). SME Internationalization and Performance: Growth vs. Profitability. *Journal of International Entrepreneurship*, *4*(1), 27–48.

Lundvall, B.-Å. (1992). *National Innovation Systems: Towards a Theory of Innovation and Interactive Learning*. London: Pinter.

Lundvall, B.-Å. (2007). National Innovation Systems—Analytical Concept and Development Tool. *Industry & Innovation*, *14*(1), 95–119.

Maggetti, M., & Levi-Faur, D. (2013). Dealing with Errors in QCA. *Political Research Quarterly*, *66*(1), 198–204.

Mahoney, J., & Goertz, G. (2006). A Tale of Two Cultures: Contrasting Quantitative and Qualitative Research. *Political Analysis*, *14*(3), 227–249.

Malerba, F. (2005). Sectoral Systems of Innovation: a Framework for Linking Innovation to the Knowledge Base, Structure and Dynamics of Sectors. *Economics of Innovation and New Technology*, *14*(1–2), 63–82.

Mansury, M. A., & Love, J. H. (2008). Innovation, Productivity and Growth in US Business Services: A Firm-Level Analysis. *Technovation*, *28*(1–2), 52–62.

Maritan, C. A., & Peteraf, M. A. (2011). Invited Editorial: Building a Bridge Between Resource Acquisition and Resource Accumulation. *Journal of Management*, *37*(5), 1374–1389.

Martinez-Gomez, V., Baviera-Puig, A., & Mas-Verdú, F. (2010). Innovation Policy, Services and Internationalisation: the Role of Technology Centres. *The Service Industries Journal*, *30*(1), 43–54.

Marx, A. (2010). Crisp-Set Qualitative Comparative Analysis (csQCA) and Model Specification: Benchmarks for Future csQCA Applications. *International Journal of Multiple Research Approaches*, *4*(2), 138–158.

McDougall, P. P., & Oviatt, B. M. (2000). International Entrepreneurship: The Intersection of Two Research Paths. *Academy of Management Journal*, *43*(5), 902–906.

McDougall, P. P., Oviatt, B. M., & Shrader, R. C. (2003). A Comparison of International and Domestic New Ventures. *Journal of International Entrepreneurship*, *1*(1), 59–82.

Meliá, M. R., Pérez, A. B., & Dobón, S. R. (2010). The Influence of Innovation Orientation on the Internationalisation of SMEs in the Service Sector. *The Service Industries Journal*, *30*(5), 777–791.

Miles, I. (2005). Knowledge Intensive Business Services: Prospects and Policies. *Foresight*, *7*(6), 39–63.

Miles, I. (2008). Patterns of Innovation in Service Industries. *IBM Systems Journal*, *47*(1), 115–128.

Miles, I., Belousova, V., & Chichkanov, N. (2017). Innovation Configurations in Knowledge-Intensive Business Services. *Foresight and STI Governance*, *11*(3), 94–102.

Miles, I., Belousova, V., & Chichkanov, N. (2018). Knowledge Intensive Business Services: Ambiguities and Continuities. *Foresight*, *20*(1), 1–26.

Miles, I., Kastrinos, N., Bilderbeek, R., den Hertog, P., Huntink, W., & Bouman, M. (1995). Knowledge-Intensive Business Services: Users, Carriers and Sources of Innovation. In *DG13 SPRINT-EIMS*.

Miles, I., & Miozzo, M. (2015). The Globalization of Knowledge-Intensive Services. In *The Handbook of Global Science, Technology, and Innovation* (pp. 171–190).

Mina, A., Bascavusoglu-Moreau, E., & Hughes, A. (2014). Open Service Innovation and the Firm's Search for External Knowledge. *Research Policy*, *43*(5), 853–866.

Miozzo, M., & Miles, I. (2002). The Relation Between the Internationalisation of Services and the Process of Innovation: a Research Agenda. In M. Miozzo & I. Miles (Eds.), *Internationalisation, Technology and Services*. Cheltenham: Edward Elgar Publishing.

Miozzo, M., & Soete, L. (2001). Internationalization of Services. *Technological Forecasting and Social Change*, *67*(2–3), 159–185.

Monreal-Pérez, J., Aragón-Sánchez, A., & Sánchez-Marín, G. (2012). A Longitudinal Study of the Relationship Between Export Activity and Innovation in the Spanish Firm: The Moderating Role of Productivity. *International Business Review*, *21*(5), 862–877.

Morris, T., Smets, M., & Greenwood, R. (2015). In Pursuit of Creative Compliance: Innovation in Professional Service Firms. In J. Bryson & P. Daniels (Eds.), *Handbook of Service Business* (pp. 301–315).

Mothe, C., & Uyen Nguyen Thi, T. (2010). The Link between Non-Technological Innovations and Technological Innovation. *European Journal of Innovation Management*, *13*(3), 313–332.

Muller, E., & Doloreux, D. (2009). What We Should Know about Knowledge-Intensive Business Services. *Technology in Society*, *31*(1), 64–72.

Muller, E., & Zenker, A. (2001). Business Services as Actors of Knowledge Transformation: the Role of KIBS in Regional and National Innovation Systems. *Research Policy*, *30*(9), 1501–1516.

Najafi-Tavani, Z., Giroud, A., & Sinkovics, R. R. (2012). Knowledge-Intensive Business Services: Does Dual Embeddedness Matter? *The Service Industries Journal*, *32*(10), 1691–1705.

Nassimbeni, G. (2001). Technology, Innovation Capacity, and the Export Attitude of Small Manufacturing Firms: a Logit/Tobit model. *Research Policy*, *30*(2), 245–262.

Nieto, M. J., & Santamaría, L. (2007). The Importance of Diverse Collaborative Networks for the Bovelty of Product Innovation. *Technovation*, *27*(6–7), 367–377.

Nonaka, I., & Takeuchi, H. (1995). *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation*. New York: Oxford University Press.

Nonaka, I., & von Krogh, G. (2009). Perspective—Tacit Knowledge and Knowledge Conversion: Controversy and Advancement in Organizational Knowledge Creation Theory. *Organization Science*, *20*(3), 635–652.

Norušis, M. (2012). Cluster Analysis. In *BM SPSS Statistics 19 Statistical Procedures Companion* (pp. 375–404).

Nunes, S., & Lopes, R. (2015). Firm Performance, Innovation Modes and Territorial Embeddedness. *European Planning Studies*, *23*(9), 1796–1826.

Nunnally, J. C. (1978). *Psychometric Theory* (2nd ed.). New York: McGraw-Hill.

O'Cass, A., & Weerawardena, J. (2009). Examining the Role of International Entrepreneurship, Innovation and International Market Performance in SME Internationalisation. *European Journal of Marketing*, *43*(11/12), 1325–1348.

OECD. (2005). *Working Party on Innovation and Technology Policy: Promoting Innovation in Services*.

OECD. (2010). *Measuring Innovation: A New Perspective*.

Ordanini, A., & Parasuraman, A. (2011). Service Innovation Viewed Through a Service-Dominant Logic Lens: A Conceptual Framework and Empirical Analysis. *Journal of Service Research*, *14*(1), 3–23.

Ordanini, A., Parasuraman, A., & Rubera, G. (2014). When the Recipe Is More Important Than the Ingredients. *Journal of Service Research*, *17*(2), 134–149.

Ott, U. F., & Kimura, Y. (2016). A Set-Theoretic Analysis of Negotiations in Japanese MNEs: Opening up the Black Box. *Journal of Business Research*, *69*(4), 1294–1300.

Oura, M. M., Zilber, S. N., & Lopes, E. L. (2016). Innovation Capacity, International Experience and Export Performance of SMEs in Brazil. *International Business Review*, *25*(4), 921–932.

Oviatt, B. M., & Mcdougall, P. P. (1997). Challenges for Internationalization Process Theory: The Case of International New Ventures. *MIR: Management International Review*, *37*, 85–99.

Oviatt, B. M., & McDougall, P. P. (1994). Toward a Theory of International New ventures. *Journal of International Business Studies*, *25*(1), 45–64.

Oviatt, B. M., & McDougall, P. P. (1995). Global Start-Ups: Entrepreneurs on a Worldwide Stage. *Academy of Management Perspectives*, *9*(2), 30–43.

Oviatt, B. M., & McDougall, P. P. (2005a). Defining International Entrepreneurship and Modeling the Speed of Internationalization. *Entrepreneurship Theory and Practice*, *29*(5), 537–554.

Oviatt, B. M., & McDougall, P. P. (2005b). The Internationalization of Entrepreneurship. *Journal of International Business Studies*, *36*(1), 2–8.

Papke, L. E., & Wooldridge, J. M. (1996). Econometric Methods for Fractional Response Variables with an Application to 401(k) Plan Participation Rates. *Journal of Applied Econometrics*, *11*(6), 619–632.

Papke, L. E., & Wooldridge, J. M. (2008). Panel Data Methods for Fractional Response Variables with an Application to Test Pass Rates. *Journal of Econometrics*, *145*(1–2), 121–133.

Parrilli, M. D., & Alcalde-Heras, H. (2016). STI and DUI innovation modes: Scientific-technological and context-specific nuances. *Research Policy*, *45*(4), 747–756.

Parrilli, M. D., & Elola, A. (2012). The Strength of Science and Technology Drivers for SME Innovation. *Small Business Economics*, *39*(4), 897–907.

Patel, P. C., Fernhaber, S. A., McDougall-Covin, P. P., & van der Have, R. P. (2014). Beating Competitors to International Markets: The Value of Geographically Balanced Networks for Innovation. *Strategic Management Journal*, *35*(5), 691–711.

Pavitt, K. (1984). Sectoral Patterns of Technical Change: Towards a Taxonomy and a Theory. *Research Policy*, *13*(6), 343–373.

Pedhazur, E. J., & Schmelkin, L. P. (1991). *Measurement, Design, and Analysis: An Integrated Approach* (L. Erlbaum, Ed.). Hillsdale, NJ.

Peneder, M. (2010). Technological Regimes and the Variety of Innovation Behaviour: Creating Integrated Taxonomies of Firms and Sectors. *Research Policy*, *39*(3), 323–334.

Peng, M. (2001). The Resource-Based View and International Business. *Journal of Management*, *27*(6), 803–829.

Penrose, E. (1959). *The Theory of the Growth of the Firm*. Oxford: B. Blackwell.

Peteraf, M. A. (1993). The Cornerstones of Competitive Advantage: A Resource-Based View. *Strategic Management Journal*, *14*(3), 179–191.

Petersen, B., Pedersen, T., & Sharma, D. (2002). The Role of Knowledge in Firms' Internationalization Process : Wherefrom and Whereto? In A. Blomstermo & D. Sharma (Eds.), *Learning in the internationalization process of firms*. Edward Elgar Publishing.

Pina, K., & Tether, B. S. (2016). Towards Understanding Variety in Knowledge Intensive Business Services by Distinguishing their Knowledge Bases. *Research Policy*, *45*(2), 401–413.

Pitelis, C. N., & Teece, D. J. (2010). Cross-Border Market Co-Creation, Dynamic Capabilities and the Entrepreneurial Theory of the Multinational Enterprise. *Industrial and Corporate Change*, *19*(4), 1247–1270.

Pla-Barber, J., & Alegre, J. (2007). Analysing the Link between Export Intensity, Innovation and Firm Size in a Science-Based Industry. *International Business Review*, *16*(3), 275–293.

Podmetina, D., Smirnova, M., Väätänen, J., & Torkelli, M. (2009). Innovativeness and International Operations: Case of Russian R&D Companies. *International Journal of Innovation Management*, *13*(2), 295–317.

Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common Method Biases in Behavioral Research: A Critical Review of the Literature and Recommended Remedies. *Journal of Applied Psychology*, *88*(5), 879–903.

Podsakoff, P. M., MacKenzie, S. B., & Podsakoff, N. P. (2012). Sources of Method Bias in Social Science Research and Recommendations on How to Control It. *Annual Review of Psychology*, *63*(1), 539–569.

Poorkavoos, M., Duan, Y., Edwards, J. S., & Ramanathan, R. (2016). Identifying the Configurational Paths to Innovation in SMEs: A Fuzzy-Set Qualitative Comparative Analysis. *Journal of Business Research*, *69*(12), 5843–5854.

Powell, W. W., Koput, K. W., & Smith-Doerr, L. (1996). Interorganizational Collaboration and the Locus of Innovation: Networks of Learning in Biotechnology. *Administrative Science Quarterly*, *41*(1), 116.

Prashantham, S. (2008). New venture internationalization as strategic renewal. *European Management Journal*, *26*(6), 378–387.

Protogerou, A., Kontolaimou, A., & Caloghirou, Y. (2017). Innovation in the European Creative Industries: a Firm-Level Empirical Approach. *Industry and Innovation*, *24*(6), 587–612.

Ragin, C. C. (2000). *Fuzzy-Set Social Science*. Chicago: The University of Chicago Press.

Ragin, C. C. (2006). Set Relations in Social Research: Evaluating their Consistency and Coverage. *Political Analysis*, *14*(3), 291–310.

Ragin, C. C. (2008). *Redesigning Social Inquiry: Fuzzy Sets and Beyond*. Chicago: The University of Chicago Press.

Ragin, C. C. (2009). Qualitative Comparative Analysis Using Fuzzy Sets (FSQCA). In B. Rihoux & C. C. Ragin (Eds.), *Configurational Comparative Methods: Qualitative Comparative Analysis (QCA) and Related Techniques2 Qualitative Comparative Analysis (QCA) and Related Techniques*. Thousand Oaks: SAGE Publications, Inc.

Ragin, C. C., & Davey, S. (2016). *Fuzzy-Set/Qualitative Comparative Analysis 3.0*. Irvine, California: Department of Sociology, University of California.

Ragin, C. C., & Fiss, P. C. (2008). Net Effects Analysis Versus Configurational Analysis: An Empirical Demonstration. In C. C. Ragin (Ed.), *Redesigning Social Inquiry: Set Relations in Social Research*. Chicago: University of Chicago Press.

Ramalho, E. A., Ramalho, J. J. S., & Murteira, J. M. R. (2011). Alternative Estimating and Testing Empirical Strategies for Fractional Regression Models. *Journal of Economic Surveys*, *25*(1), 19–68.

Raymond, L., & St-Pierre, J. (2013). Strategic Capability Configurations for the Internationalization of SMEs: A Study in Equifinality. *International Small Business Journal: Researching Entrepreneurship*, *31*(1), 82–102.

Raymond, L., St-Pierre, J., Uwizeyemungu, S., & Le Dinh, T. (2014). Internationalization Capabilities of SMEs: A Comparative Study of the Manufacturing and Industrial Service Sectors. *Journal of International Entrepreneurship*, *12*(3), 230–253.

Reeb, D., Sakakibara, M., & Mahmood, I. P. (2012). From the Editors: Endogeneity in International Business Research. *Journal of International Business Studies*, *43*(3), 211–218.

Reuber, A. R., Dimitratos, P., & Kuivalainen, O. (2017). Beyond Categorization: New Directions for

Theory Development About Entrepreneurial Internationalization. *Journal of International Business Studies*, *48*(4), 411–422.

Rihoux, B., & Ragin, C. C. (2009). *Configurational Comparative Methods: Qualitative Comparative Analysis (QCA) and Related Techniques*. SAGE Publications, Inc.

Roberts, P. W., & Amit, R. (2003). The Dynamics of Innovative Activity and Competitive Advantage: The Case of Australian Retail Banking, 1981 to 1995. *Organization Science*, *14*(2), 107–122.

Robertson, P. L., Casali, G. L., & Jacobson, D. (2012). Managing Open Incremental Process Innovation: Absorptive Capacity and Distributed Learning. *Research Policy*, *41*(5), 822–832.

Rodríguez, A., & Nieto, M. J. (2010). Cooperation and Innovation in the Internationalisation of Knowledge-Intensive Business Services. In J. Pla-Barber & J. Alegre (Eds.), *Reshaping the Boundaries of the Firm in an Era of Global Interdependence* (pp. 247–270). Emerald Group Publishing Limited.

Rodríguez, A., & Nieto, M. J. (2012). The Internationalization of Knowledge-Intensive Business Services: the Effect of Collaboration and the Mediating Role of Innovation. *The Service Industries Journal*, *32*(7), 1057–1075.

Rodriguez, M., Doloreux, D., & Shearmur, R. (2016). Innovation Strategies, Innovator Types and Openness: a Study of KIBS Firms in Spain. *Service Business*, *10*(3), 629–649.

Rodriguez, M., Doloreux, D., & Shearmur, R. (2017). Variety in External Knowledge Sourcing and Innovation Novelty: Evidence from the KIBS Sector in Spain. *Technovation*, *68*(June), 35–43.

Roper, S., & Love, J. H. (2002). Innovation and Export Performance: Evidence from the UK and German Manufacturing Plants. *Research Policy*, *31*(7), 1087–1102.

Rubinson, C. (2013). Contradictions in fsQCA. *Quality & Quantity*, *47*(5), 2847–2867.

Ruzzier, M., Hisrich, R. D., & Antoncic, B. (2006). SME Internationalization Research: Past, Present, and Future. *Journal of Small Business and Enterprise Development*, *13*(4), 476–497.

Sahaym, A., Treviño, L. J., & Steensma, H. K. (2012). The Influence of Managerial Discretion, Innovation and Uncertainty on Export Intensity: A Real Options Perspective. *International Business Review*, *21*(6), 1131–1147.

Sammarra, A., & Biggiero, L. (2008). Heterogeneity and Specificity of Inter-Firm Knowledge Flows in Innovation Networks. *Journal of Management Studies*, *45*(4), 800–829.

Santamaría, L., Nieto, M. J., & Miles, I. (2012). Service Innovation in Manufacturing Firms: Evidence from Spain. *Technovation*, *32*(2), 144–155.

Santos-Vijande, M. L., González-Mieres, C., & López-Sánchez, J. Á. (2013). An Assessment of Innovativeness in KIBS: Implications on KIBS' Co-Creation Culture, Innovation Capability, and Performance. *Journal of Business & Industrial Marketing*, *28*(2), 86–102.

Schilling, M. A., & Phelps, C. C. (2007). Interfirm Collaboration Networks: The Impact of Large-Scale Network Structure on Firm Innovation. *Management Science*, *53*(7), 1113–1126.

Schlegelmilch, B. B., & Crook, J. N. (1988). Firm-Level Determinants of Export Intensity. *Managerial and Decision Economics*, *9*(4), 291–300.

Schneider, C. Q., & Wagemann, C. (2010a). Qualitative Comparative Analysis (QCA) and Fuzzy-Sets: Agenda for a Research Approach and a Data Analysis Technique. *Comparative Sociology*, *9*(3), 376–396.

Schneider, C. Q., & Wagemann, C. (2010b). Standards of Good Practice in Qualitative Comparative Analysis (QCA) and Fuzzy-Sets. *Comparative Sociology*, *9*(3), 397–418.

Schneider, C. Q., & Wagemann, C. (2012). *Set-Theoretic Methods for the Social Sciences*.

Schumpeter, J. A. (1934). *The Theory of Economic Development: An Inquiry into Profits, Capital, Credits, Interests, and the Business Cycle*. Cambridge, MA: Harvard Publishing.

Schwab, D. P. (2005). *Research Methods for Organizational Studies* (2nd ed.). Mahwah, NJ: Lawrence Erlbaum.

Schweizer, R., Vahlne, J. E., & Johanson, J. (2010). Internationalization as an Entrepreneurial Process. *Journal of International Entrepreneurship*, *8*(4), 343–370.

Scott-Kennel, J., & von Batenburg, Z. (2012). The Role of Knowledge and Learning in the Internationalisation of Professional Service Firms. *The Service Industries Journal*, *32*(10), 1667–1690.

Seens, D. (2015). *SME Profile: Canadian Exporters*.

Sharma, D., & Blomstermo, A. (2003). The Internationalization Process of Born Globals: a Network View. *International Business Review*, *12*(6), 739–753.

Shearmur, R. (2015). Far from the Madding Crowd: Slow Innovators, Information Value, and the Geography of Innovation. *Growth and Change*, *46*(3), 424–442.

Shearmur, R., & Doloreux, D. (2013). Innovation and Knowledge-Intensive Business Service: the Contribution of Knowledge-Intensive Business Service to Innovation in Manufacturing Establishments. *Economics of Innovation and New Technology*, *22*(8), 751–774.

Shearmur, R., Doloreux, D., & Laperrière, A. (2015). Is the Degree of Internationalization Associated with the Use of Knowledge Intensive Services or with Innovation? *International Business Review*, *24*(3), 457–465.

Skarmeas, D., Lisboa, A., & Saridakis, C. (2016). Export Performance as a Function of Market Learning Capabilities and Intrapreneurship: SEM and FsQCA Findings. *Journal of Business Research*, *69*(11), 5342–5347.

Srholec, M., & Verspagen, B. (2009). The Voyage of the Beagle in Innovation Systems Land.

Explorations on Sectors, Innovation, Heterogeneity and Selection. In *UNU-MERIT Working Papers*.

Stanko, M. A., & Olleros, X. (2013). Industry Growth and the Knowledge Spillover Regime: Does Outsourcing Harm Innovativeness but Help Profit? *Journal of Business Research*, *66*(10), 2007–2016.

Starbuck, W. H. (1992). Learning by knowledge-intensive firms. *Journal of Management Studies*, *29*(6), 713–740.

Steen, J. T., & Liesch, P. W. (2007). A Note on Penrosean Growth, Resource Bundles and the Uppsala Model of Internationalisation. *Management International Review*, *47*(2), 193–206.

Sterlacchini, A. (1999). Do Innovative Activities Matter to Small Firms in Non-R&D-Intensive Industries? An Application to Export Performance. *Research Policy*, *28*(8), 819–832.

Sterlacchini, A. (2001). The Determinants of Export Performance: A Firm-Level Study of Italian Manufacturing. *Review of World Economics*, *137*(3), 450–472.

Stieglitz, N., Knudsen, T., & Becker, M. C. (2016). Adaptation and Inertia in Dynamic Environments. *Strategic Management Journal*, *37*(9), 1854–1864.

Suh, Y., & Kim, M.-S. (2014). Internationally Leading SMEs vs. Internationalized SMEs: Evidence of Success Factors from South Korea. *International Business Review*, *23*(1), 115–129.

Sui, S., & Baum, M. (2014). Internationalization Strategy, Firm Resources and the Survival of SMEs in the Export Market. *Journal of International Business Studies*, *45*(7), 821–841.

Sullivan, D. (1994). Measuring the Degree of Internationalization of a Firm. *Journal of International Business Studies*, *25*(2), 325–342.

Szczygielski, K., Grabowski, W., & Woodward, R. (2017). Innovation and the Growth of Service Companies: The Variety of Firm Activities and Industry Effects. *Industry and Innovation*, *24*(3), 249–262.

Teece, D. J. (2007). Explicating Dynamic Capabilities: the Nature and Microfoundations of (Sustainable) Enterprise Performance. *Strategic Management Journal*, *28*(13), 1319–1350.

Teece, D. J. (2015). Managing Experts and Creative Talent. In J. Bryson & P. Daniels (Eds.), *Handbook of Service Business* (pp. 242–256).

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic Capabilities and Strategic Management. *Strategic Management Journal*, *18*(7), 509–533.

Teirlinck, P., & Spithoven, A. (2013). Formal R&D Management and Strategic Decision Making in Small Firms in Knowledge-Intensive Business Services. *R and D Management*, *43*(1), 37–51.

Teixeira, A. A. C., & dos Santos, L. C. B. (2016). Innovation Performance in Service Companies and KIBS vis-à-vis Manufacturing: the Relevance of Absorptive Capacity and Openness. *Review Business Management*, *18*(59), 43–66.

Tether, B. S. (2005). Do Services Innovate (Differently)? Insights from the European Innobarometer Survey. *Industry & Innovation*, *12*(2), 153–184.

Tether, B. S., & Hipp, C. (2002). Knowledge Intensive, Technical and Other Services: Patterns of Competitiveness and Innovation Compared. *Technology Analysis & Strategic Management*, *14*(2), 163–182.

Tether, B. S., Li, Q. C., & Mina, A. (2012). Knowledge-Bases, Places, Spatial Configurations and the Performance of Knowledge-Intensive Professional Service Firms. *Journal of Economic Geography*, *12*(5), 969–1001.

Tether, B. S., & Tajar, A. (2008). Beyond industry-university links: Sourcing knowledge for innovation from consultants, private research organisations and the public science-base. *Research Policy*, *37*(6–7), 1079–1095.

Thiem, A., & Duşa, A. (2013). QCA: A Package for Qualitative Comparative Analysis. *The R Journal*, *5*(1), 87.

Toivonen, M., & Tuominen, T. (2009). Emergence of Innovations in Services. *The Service Industries Journal*, *29*(7), 887–902.

Tomiura, E. (2007). Effects of R&D and Networking on the Export Decision of Japanese Firms. *Research Policy*, *36*(5), 758–767.

Torre, A., & Rallet, A. (2005). Proximity and Localization. *Regional Studies*, *39*(1), 47–59.

Tripsas, M., & Gavetti, G. (2000). Capabilities, Cognition, and Inertia: Evidence from Digital Imaging. *Strategic Management Journal*, *21*(1011), 1147–1161.

Uzzi, B. (1996). The Sources and Consequences of Embeddedness for the Economic Performance of Organizations: The Network Effect. *American Sociological Review*, *61*(4), 674.

Vahlne, J.-E., Ivarsson, I., & Johanson, J. (2011). The Tortuous Road to Globalization for Volvo's Heavy Truck Business: Extending the Scope of the Uppsala Model. *International Business Review*, *20*(1), 1–14.

Vahlne, J.-E., & Johanson, J. (2013). The Uppsala Model on Evolution of the Multinational Business Enterprise – from Internalization to Coordination of Networks. *International Marketing Review*, *30*(3), 189–210.

Valaei, N., Rezaei, S., & Ismail, W. K. W. (2017). Examining Learning Strategies, Creativity, and Innovation at SMEs Using Fuzzy Set Qualitative Comparative Analysis and PLS Path Modeling. *Journal of Business Research*, *70*, 224–233.

Van Beveren, I., & Vandenbussche, H. (2010). Product and Process Innovation and Firms' Decision to Export. *Journal of Economic Policy Reform*, *13*(1), 3–24.

van de Vrande, V., de Jong, J. P. J., Vanhaverbeke, W., & de Rochemont, M. (2009). Open Innovation in SMEs: Trends, Motives and Management Challenges. *Technovation*, *29*(6–7), 423–437.

Veglio, V., & Zucchella, A. (2015). Entrepreneurial Firms in Traditional Industries. Does Innovation Matter for International Growth? *Journal of International Entrepreneurship*, *13*(2), 138–152.

Vence, X., & Trigo, A. (2009). Diversity of Innovation Patterns in Services. *The Service Industries Journal*, *29*(12), 1635–1657.

Villadsen, A. R., & Wulff, J. (2018). Fractional Regression Models in Strategic Management Research. *Academy of Management Proceedings*, *2018*(1), 11217.

Villar, C., Alegre, J., & Pla-Barber, J. (2014). Exploring the Role of Knowledge Management Practices on Exports: A Dynamic Capabilities View. *International Business Review*, *23*(1), 38–44.

Vis, B. (2012). The Comparative Advantages of fsQCA and Regression Analysis for Moderately Large-N Analyses. *Sociological Methods & Research*, *41*(1), 168–198.

von Nordenflycht, A. (2010). What Is a Professional Service Firm? Toward a Theory and Taxonomy of Knowledge-Intensive Firms. *Academy of Management Review*, *35*(1), 155–174.

Wagner, J. (2001). A Note on the Firm Size – Export Relationship. *Small Business Economics*, *17*(4), 229–237.

Wakelin, K. (1998). Innovation and Export Behaviour at the Firm Level. *Research Policy*, *26*(7–8), 829–841.

Wang, K.-J., & Lestari, Y. D. (2013). Firm Competencies on Market Entry Success: Evidence from a High-Tech Industry in an Emerging Market. *Journal of Business Research*, *66*(12), 2444–2450.

Weerawardena, J., Mort, G. S., Liesch, P. W., & Knight, G. (2007). Conceptualizing Accelerated Internationalization in the Born Global Firm: A Dynamic Capabilities Perspective. *Journal of World Business*, *42*(3), 294–306.

Weerawardena, J., Mort, G. S., Salunke, S., Knight, G., & Liesch, P. W. (2015). The Role of the Market Sub-System and the Socio-Technical Sub-System in Innovation and Firm Performance: a Dynamic Capabilities Approach. *Journal of the Academy of Marketing Science*, *43*(2), 221–239.

Weerawardena, J., O'Cass, A., & Julian, C. (2006). Does Industry Matter? Examining the Role of Industry Structure and Organizational Learning in Innovation and Brand Performance. *Journal of Business Research*, *59*(1), 37–45.

West, J., Salter, A., Vanhaverbeke, W., & Chesbrough, H. (2014). Open Innovation: The Next Decade. *Research Policy*, *43*(5), 805–811.

Westhead, P., Ucbasaran, D., & Binks, M. (2004). Internationalization Strategies Selected by Established Rural and Urban SMEs. *Journal of Small Business and Enterprise Development*, *11*(1), 8–22.

Wong, P. K., & He, Z.-L. (2005). A Comparative Study of Innovation Behaviour in Singapore's KIBS and Manufacturing Firms. *The Service Industries Journal*, *25*(1), 23–42.

Woodside, A. G. (2013). Moving Beyond Multiple Regression Analysis to Algorithms: Calling for

Adoption of a Paradigm Shift from Symmetric to Asymmetric Thinking in Data Analysis and Crafting Theory. *Journal of Business Research*, *66*(4), 463–472.

Woodside, A. G. (2014). Embrace•perform•model: Complexity Theory, Contrarian Case Analysis, and Multiple Realities. *Journal of Business Research*, *67*(12), 2495–2503.

Woodside, A. G. (2016). The Good Practices Manifesto: Overcoming Bad Practices Pervasive in Current Research in Business. *Journal of Business Research*, *69*(2), 365–381.

Wright, M., Westhead, P., & Ucbasaran, D. (2007). Internationalization of Small and Medium-sized Enterprises (SMEs) and International Entrepreneurship: A Critique and Policy Implications. *Regional Studies*, *41*(7), 1013–1030.

Yi, J., Wang, C., & Kafouros, M. (2013). The Effects of Innovative Capabilities on Exporting: Do Institutional Forces Matter? *International Business Review*, *22*(2), 392–406.

Yli-Renko, H., Autio, E., & Tontti, V. (2002). Social Capital, Knowledge, and the International Growth of Technology-Based New Firms. *International Business Review*, *11*(3), 279–304.

Zahra, S. A. (2005). A Theory of International New Ventures: A Decade of Research. *Journal of International Business Studies*, *36*(1), 20–28.

Zahra, S. A., Ireland, R. D., & Hitt, M. A. (2000). International Expansion by New Venture Firms: International Diversity, Mode of Market Entry, Technological Learning, and Performance. *Academy of Management Journal*, *43*(5), 925–950.

Zucchella, A., & Siano, A. (2014). Internationalization and Innovation as Resources for SME Growth in Foreign Markets. *International Studies of Management & Organization*, *44*(1), 21–41.