CHAPTER 1

INTRODUCTION

Organizations which enjoy long-term success are becoming a rarity, and the average company life is shortening at an accelerating pace (Goodburn, 2015). There are many reasons for this trend. However, the common denominator is that with companies focusing on short-term goals, it is becoming harder to maintain a competitive advantage in today's dynamic environment. Firms focusing on the tactical use of competitive advantages (i.e., exploiting) while at the same time looking to acquire the next set of competitive advantages (i.e., exploring) are more likely to survive and prosper in the long run than firms focusing on only one or the other. Several examples support this capability, 3M with its teams of scouts, entrepreneurs and implementers transits from exploration to exploitation seamlessly and with significant value creation; another case is Ely Lilly, the pharmaceutical firm, with a research, development and innovation collaboration program where the firm teams up with entrepreneurs and small firms in creating new molecules, products and business cases. The IT sector has also evolved to include ambidexterity, with Cisco's entrepreneurs in residence program, the firm has reached out (absorptive capacity) to include entrepreneurs in the development of new products, processes or business models (ambidexterity). Finally, IBM's Watson open innovation business model, whereby the firm allows third parties to develop innovations using Watson and partnering with the latter if the new product or service is promising.

In academia, a firm's ability to exploit and explore has been studied extensively. Researchers advocate that the two activities should be undertaken sequentially (Duncan,

1976), cyclically (Boumgarden, Nickerson, & Zenger, 2012; Mudambi & Swift, 2011, 2014; Swift, 2016), or simultaneously (O'Reilly & Tushman, 2013; Ren & Guo, 2011), the latter is known as organizational ambidexterity.

Studies have identified and explored many antecedents to organizational ambidexterity, but there is still a gap in the literature on the impact of external knowledge on this construct. The relevance of what Cohen and Levinthal (1989, 1990: 129) defined as "absorptive capacity," or the "ability of a firm to recognize, assimilate, and apply new knowledge," is paramount since new competitive advantages will very likely come from this source. The direct relationship between absorptive capacity and organizational ambidexterity remains mostly unexplored, except for studies by Datta (2012), and Yan, Yu, and Dong (2016). Additionally, studies of absorptive capacity have been conducted by researchers independently in the innovation and operations fields, without exploring the impact of the simultaneous effect in both fields.

In Chapter 2, I borrow from organizational learning and operational theories to introduce a multileveled absorptive capacity construct. This construct includes a strategic element defined as the ability of top management to recognize and interpret the opportunity of disruptive innovations, based on Cohen and Levinthal (1990) and Yan et al. (2016), and an operational element defined as "the ability of a firm's operational unit to acquire, assimilate, transform and exploit knowledge from the operations environment" (Patel, Terjesen, & Li, 2012, p. 202). I theorize that strategic and operational absorptive capacities independently exert a positive influence in the exploration and repetitive exploitation dimensions of ambidexterity. Further, strategic and operational absorptive capacities concurrently positively influence the ability of the

firm to perform incremental innovation, defined by Piao and Zajac (2016) as incremental exploitation.

Innovation and ambidexterity are considered critical dynamic capabilities because they represent a driver for change within the organization (O'Reilly & Tushman, 2008; Wang & Ahmed, 2007). The model I explore in Chapter 2 on how strategic and operational absorptive capacity affect organizational ambidexterity shows a significant positive relationship between both constructs, but it remains a static representation of a more complex and dynamic problem. Studies conducted on panel data from New Zealand and the UK demonstrate that the impact of absorptive capacity on a firm's ability to explore changes over time (Harris & Moffat, 2011; Harris & Moffat, 2013; Harris & Le, 2018). Also, a large amount of literature has touched upon the variation of ambidexterity over time and its impact on firm performance and innovation capacity (Ahuja & Morris Lampert, 2001; Benner & Tushman, 2003; Phelps, 2010; Uotila, Maula, Keil, & Zahra, 2009).

Comprehensive surveys conducted by the World Economic Forum (i.e. the Global Competitiveness Index) and INSEAD with Cornell University (i.e. the Global Innovation Index) conclude that, government-sponsored private investments in R&D and joint ventures or strategic alliance deals are among the more influential factors in the innovation and competitive capabilities of companies (Dutta, Lanvin, & Wunsch-Vincent, 2016; Schwab & Sala-i-Martin, 2018). Furthermore, there is a discrepancy in the literature regarding the use of absorptive capacity and its effect on ambidexterity by companies in the manufacturing versus service sectors (Álvarez, Bravo-Ortega, & Zahler, 2015; Arbussa & Coenders, 2007; Mina, Bascavusoglu-Moreau, & Hughes, 2014).

In Chapter 3, I explore the relationship between both constructs over time and focus on the moderating effects of industry sector (i.e., service vs. manufacturing), collaboration activities, and innovation-promoting legislation. I begin with a literature review describing all longitudinal studies about absorptive capacity and ambidexterity, the relevance of absorptive capacity on national-level innovation efforts, and the variation in relevant variables over the period under study in Chile. I then describe the panel data set and my statistical approach, followed by a results section. I conclude by discussing the theoretical and managerial contributions as well as directions for future research.

Chapter 4 includes the overall conclusions of this dissertation along with proposed avenues of future research.

CHAPTER 2

THE ROLE OF STRATEGIC AND OPERATIONAL ABSORPTIVE CAPACITY IN ORGANIZATIONAL AMBIDEXTERITY

Abstract

Scholars have identified and examined a number of antecedents of organizational ambidexterity, but extant studies have not yet fully explored the role of a firm's absorptive capacity in developing its organizational ambidexterity. Absorptive capacity is supremely relevant to any discussion of firm organization ambidexterity since new sources of competitive advantage likely come from outside the organizations. In this study, I examine this relationship by focusing on two levels of absorptive capacity and three dimensions of organizational ambidexterity. Using a survey of 5,600 companies performed by the Government of Chile in 2015, I find that both strategic and operational absorptive capacity contribute to the incremental exploitation dimension of organizational ambidexterity. My study contributes to our understanding of the absorptive capacity construct and illuminates how it affects organizational ambidexterity. The study also provides managerial implications as to what kind of external knowledge to procure and how to leverage it based on the firm's ambidexterity goals.

Introduction

Long-term successful organizations are becoming a rarity, while average company life is shortening at an increasing pace (Goodburn, 2015). There are many reasons for this trend, but the common denominator is that it is becoming harder to maintain competitive advantages in today's dynamic environment, with companies

focusing on short-term goals. Firms focusing on the tactical use of competitive advantages (i.e., exploiting) and, at the same time, looking to acquire the next set of competitive advantages (i.e., exploring) are more likely to survive in the long run. In academia, the ability of a firm to exploit and explore has already been studied extensively. Researchers claim that the two activities should be undertaken sequentially (Duncan, 1976), cyclically (Boumgarden et al., 2012; Mudambi & Swift, 2011, 2014; Swift, 2016), and simultaneously, the latter known as organizational ambidexterity (O'Reilly & Tushman, 2013).

Studies have identified and explored many antecedents to the construct, but there is still a gap in the literature on the impact of external knowledge on organizational ambidexterity. The relevance of what Cohen and Levinthal (1989, 1990) defined as "absorptive capacity," or the ability of a firm to recognize, assimilate, and apply new knowledge, is paramount since new competitive advantages will very likely come from this source. The direct relationship between absorptive capacity and ambidexterity, the primary focus of this study, remains mostly unexplored except for the studies by Datta (2012), and Yan et al. (2016). Additionally, studies of absorptive capacity have been conducted by researchers in the innovation and operations fields independently without exploring the impact of their simultaneous effect.

In the present study, borrowing from organizational learning and operational theories, a multileveled absorptive capacity construct is introduced. It includes a strategic element defined as the ability of top management to recognize and interpret the opportunity of disruptive innovations, based on Cohen and Levinthal (1990), Yan et al. (2016), and an operational element defined as "the ability of a firm's operational

unit to acquire, assimilate, transform, and exploit knowledge from the operations environment" (Patel et al., 2012, p. 202). It is theorized that strategic and operational absorptive capacity independently exert a positive influence in the exploration and repetitive exploitation dimensions of ambidexterity respectively. Concurrently, strategic and operational absorptive capacity also influence positively the ability of the firm to perform incremental innovation, defined by Piao and Zajac as incremental exploitation (2016).

The rest of this chapter is organized as follows: I start with a literature review and develop hypotheses on the relationships between absorptive capacity and organizational ambidexterity. Next, I describe the data, methods, and results of the data analysis. I then discuss the study's contributions to theory and practice, its limitations, and future research areas.

Literature Review and Hypotheses

Organizational Ambidexterity: Exploration and Exploitation

The concepts of exploration and exploitation adopted from the field of adaptive processes were first formulated by March (1991). He recognized that exploration and exploitation are both essential for organizations, and must compete for the firm's limited resources available. Exploration is here defined as the pursuit of new knowledge, whereas exploitation was the use and development of things already known. From a learning perspective, these definitions are focused on the type and amount of learning, and on whether learning exploitation followed the same trajectory as old knowledge, while learning exploration followed a different path (Gupta, Smith, & Shalley, 2006). In this context, exploitation's advantage stems from its proximity to

the action, clearer ties with its consequences, and therefore less uncertainty. Exploitation seems to have an advantage in this competition because of its proximity to the action, clearer ties with its consequences, and therefore less uncertainty. In contrast, March found that exploration involved more uncertainty, longer terms, and less clarity in its implications. However, March also noted that a lack of equilibrium between exploitation and exploration, with adaptive processes more inclined to exploitation, could become self-destructive; thus, an organization should reach such equilibrium using the process of adaptation.

Different scholars have proposed different tactics aimed at resolving the organizational tension between exploratory and exploitative activities. Some authors suggest externalizing exploitative or exploratory activity by establishing alliances or by outsourcing (Holmqvist, 2004; Rothaermel & Deeds, 2004). Other authors suggest that firms should cycle between states of exploitation and exploration, defined as a punctuated equilibrium model (Mudambi & Swift, 2011, 2014; Swift, 2016). Another view is that successful organizations are efficient in their day-to-day activities and in satisfying their actual business demands while at the same time preparing for future challenges and adapting to changing environments (Raisch & Birkinshaw, 2008; Ren & Guo, 2011; Tushman & O'Reilly, 1996). This last view is often referred to as organizational ambidexterity—the ability to "ambidextrously" balance the needs of both exploitation and exploration at the same time.

Organizations that pursue exploitation and exploration, whether simultaneously or sequentially, are more likely to achieve superior performance than organizations prioritizing one over the other (Raisch & Birkinshaw, 2008). For example, when firms concentrate only on the exploitation of existing competencies,

they fall into organizational inertia (Anand, Mulotte, & Ren, 2016). This inertia prevents them from adapting to changing conditions, ultimately leading them to mediocre performance (i.e., the "success trap") in the long run (Levinthal & March, 1993; Raisch & Birkinshaw, 2008; Smith & Tushman, 2005; Tushman & O'Reilly, 1996). In contrast, if a firm leans too much on exploration, it runs the risk of having too many underdeveloped innovative ideas that fail to generate value (Junni, Sarala, Taras, & Tarba, 2013).

The prospect of potential success if the tension is balanced has caught the attention of a vast number of researchers from various perspectives. Contributions from organizational learning, strategic management, innovation, organizational design, and adaptation have enriched the discussion on ambidexterity, but have also brought with them a lack of clarity as to the central meaning of organizational ambidexterity (Birkinshaw & Gupta, 2013). Although, as Birkinshaw and Gupta proposed, "the study of ambidexterity is the study of firms, or indeed organizations more generally" (p. 290), that generalization could deprive the construct of its potential to contribute to the understanding of an actual and complex challenge for businesses. In a meta-analysis of organizational ambidexterity and performance, Junni and colleagues (2013) concluded that "combined" exploration and exploitation, or the independent, orthogonal combination of high levels of exploration and exploitation pursued concurrently within a firm, explain the ambidexterity phenomenon better than "balanced" exploration and exploitation, or equilibrium between both elements of ambidexterity.

Following Junni and colleagues' argument, Piao and Zajac (2016) recognize that the relationship between exploration and exploitation is not a zero-sum game and

that components of exploitation could impel exploration. The authors introduce the concept of "*incremental exploitation*," defined as "the creation of new designs for existing products," and "*repetitive exploitation*" defined as "the repetition of existing designs for existing products" that could potentially impede exploration (p. 1432). Piao and Zajac maintained the well-accepted definition of exploration as "the development of new products aimed at entering new product-market domains" (p. 1432). In this study, I adopt the "combined" view of ambidexterity proposed by Junni et al. and its expansion introduced by Piao and Zajac. Services and processes are also included in the definition.

Absorptive Capacity at the Strategic and Operational Level of the Organization

The fast pace of change inherent in technology-enabled business models, products, and services requires firms to expand into new resources and capabilities. Rather than developing them internally, companies often look to acquire them from outside. Therefore, the ability to seek and acquire critical resources and capabilities from outside the organization—otherwise known as "absorptive capacity"—has become an essential capability for technologically-minded firms.

The term "absorptive capacity" was introduced by Kedia and Bhagat (1988) in the context of technology transfer between nations, but Cohen and Levinthal's work (1989, 1990) is considered the origin of the absorptive capacity construct. Based on the stock of collected knowledge from R&D activities, Cohen and Levinthal (1990) define absorptive capacity as, "an ability to recognize the value of new information, assimilate it, and apply it to commercial ends" (p. 129). Researchers have since extended the concept from R&D to other areas. Zahra and George (2002) expand and

modify the concept by adding the ability to "acquire" new knowledge and dropping the ability to "recognize the value" of knowledge as suggested by Cohen and Levinthal (1990: 129). The first two resulting capabilities, acquisition, and assimilation are grouped and labeled "potential absorptive capacity." Zahra and George (2002: 186) add the ability to transform the assimilated knowledge, grouping transformation and exploitation, under the label "realized absorptive capacity." They also establish that the higher the exposure to diversified and complementary external knowledge, the greater the ability to develop potential absorptive capacity.

Todorova and Durisin's (2007) proposed construct dismiss the categorization by Zahra and George in potential and realized absorptive capacity as unnecessary. However, they retain the addition of acquisition and transformation as key capabilities of the construct and incorporate the dynamic dimension in their model. They also include the ability to "recognize value" originally proposed by Cohen and Levinthal (1990), and suggest that "assimilation" and "transformation" are events that occur in parallel, not sequentially, and that there is an association between them.

Since its inception, absorptive capacity has been associated with new knowledge coming from R&D, either internal (Cohen & Levinthal, 1990; Grant, 1996) or external (Lin, Zeng, Liu, & Li, 2016) and with an almost exclusive emphasis on radical or incremental innovation. From an organizational learning perspective, absorptive capacity is related to strategic learning when dealing with disruptive innovation and with business learning at the operational level (Yan et al., 2016). As the construct became more mature, its application widened, and it was applied to areas such us marketing, finance (Huizingh, 2011), and operations (Fayard, Lee, Leitch, & Kettinger, 2012; Malhotra, Gosain, & Sawy, 2005; Patel et al., 2012; Tu,

Vonderembse, Ragu-Nathan, & Sharkey, 2006). From the latter, Patel et al. (2012) define operational absorptive capacity as "the ability of a firm's operational unit to acquire, assimilate, transform, and exploit knowledge from the operations environment" (p. 202). Thus, utilizing organizational learning and operational perspective, the construct expanded beyond its innovation focus on efficiency and productivity. This development is natural since the contribution of external knowledge is not restricted just to innovation from R&D but to all functional areas of the firm.

The expansion of absorptive capacity beyond R&D and innovation to include other operational areas of the organization, and its impact on the exploratory and exploitative abilities of the firm, is the focus of this study. Addressed toward the ambiguity in the literature, the following research question is posed: *How do strategic and operational absorptive capacity affect organizational ambidexterity?*

Strategic Absorptive Capacity, Exploration, and Incremental Exploitation

The relationship between absorptive capacity and exploration has been identified in the study of R&D and innovation in understanding different issues at the firm level. Some examples include studies of external R&D sources by Lin et al. (2016), "knowledge spillover" as a criterion for locating R&D facilities by Feinberg and Gupta (2004), and by Ritala & Hurmmelina-Laukkanen (2013) in the context of coopetition. While studying the flow of knowledge between units of a firm and its impact on radical innovation, van Wijk, Jansen, Van Den Bosch, and Volberda (2012) find that excessive investment in in-depth knowledge beyond a moderate level limits absorptive capacity and subsequently impedes the firm's exploratory capability.

Starting from recognizing the type of knowledge that exists in an organization (i.e., breadth and depth), Zhou and Li (2012) conclude that companies with a breadth of knowledge across many disciplines and fields find it convenient to concentrate on the dissemination of such knowledge internally to achieve radical innovation. In the case of companies with knowledge depth only in particular fields, the conclusion is to reach out for new knowledge in order to achieve radical innovation.

Inherent to open innovation is the notion of reaching outside the organization for new knowledge. Many studies have recognized absorptive capacity as an open innovation key capability, going as far as stating that absorptive capacity is a pre-condition to the implementation of open innovation (Spithoven, Clarysse, & Knockaert, 2010).

The building mechanisms of absorptive capacity have been explained successfully by the organizational learning perspective at different hierarchical levels within the firm (Kim, 1998). Using Hyundai Motor Company as a case study, Kim identifies the company's shift in learning orientation from imitation to innovation and the emphasis on absorptive capacity for the transition. Yan et al. (2016) expand upon this notion by introducing the strategic-business learning typology, which acknowledges different learning outcomes due to efforts at different levels. At the firm-level, strategic learning "leads to a significant impact on the whole organization and causes long-term revolutionary changes, such as new basic assumptions" (p. 653). The authors related strategic learning directly to the explorative capability of organizational ambidexterity and they recognize the beneficial effect of exploration due to the ability of top management to recognize and interpret the opportunity of disruptive innovations. Analyzing the history of Huawei in a longitudinal case study,

Levinthal (1990) and Lichtenthaler (2009). According to Lichtenthaler, existing knowledge can be put into one of two categories: technological knowledge and market knowledge. Borrowing from Cohen and Levinthal (1990), the author defines "technological knowledge" as knowledge that the firm explores, transforms, and exploits in its absorptive capacity processes, whereas "market knowledge" refers to application and commercialization opportunities for technological knowledge, for example, identifying new applications of technology in new markets. Likewise, Lichtenthaler links exploitative learning with the matching of knowledge and markets (Lichtenthaler, 2009: 823).

An excellent example of Lichtenthaler's postulate is 3M's external knowledge absorption mechanism. Through its R&D and radical innovation initiatives, 3M developed new imaging technology for its medical unit (i.e., exploration) (3M, 2003). Furthermore, the company kept gathering external strategic knowledge, mainly from other industries with similar needs. This knowledge was used to enhance the product or to find other uses for it. In this case, the company applied the technology successfully to mining and construction industries, to locate and identify subsurface formations or buried infrastructure. One could argue that this was a joint effort to gather strategic and operational knowledge from outside the organization to find a different use for the technology, or what could be defined as incremental innovation. Chance did not play any part in this finding since the company has an established process to work permanently on incremental innovation based on their new strategic and operational knowledge. 3M has defined roles to facilitate this task, breaking up their staff into "scouts," people searching for new opportunities, knowledge, and needs outside the organization (i.e., strategic absorptive capacity); "entrepreneurs,"

individuals focused on converting the opportunities identified into new products, services or processes; and "implementers," employees in charge of taking these new products to market.

At 3M, scouts and entrepreneurs represent the interaction between strategic absorptive capacity and incremental exploitation, viewed as finding new uses for already developed products. This phenomenon is not exclusive to 3M; many other companies have implemented a version of this mechanism, but academia has lagged in studying this phenomenon in detail. Therefore, I engage with this interaction by proposing the following hypothesis:

> *H2. Strategic absorptive capacity increases the incremental exploitative component of organizational ambidexterity.*

Operational Absorptive Capacity, Incremental Exploitation, and Repetitive Exploitation

From an operational viewpoint, Patel et al. (2002) defined operational absorptive capacity as "the ability of a firm's operational units to acquire, assimilate, transform, and exploit knowledge from the operations environment" (p. 202). The authors argue that operational absorptive capacity allows firms to rapidly analyze and act on changes to the operational environment, like changes in demand, to quickly increase the range and mobility of machines, labor, and material. Operational absorptive capacity also allows firms to respond to changes in the competitive landscape by changing the product mix. Finally, the authors state that operational absorptive capacity could influence the company's ability to achieve a competitive advantage through manufacturing flexibility.

Table 3.13 SACAP and OACAP Interaction for IEXPLOITE

Random-effects GLS regression		Number of obs =	720
Group variable: ID_Company		Number of groups =	334
R-sq:		Obs per group	
	within = 0.2655	min =	1
	between = 0.2329	avg =	2.2
	overall = 0.2169	max =	6
corr(u_i, X) = 0 (assumed)		Wald chi2(14) =	.
		Prob > chi2 =	.

IEXPLOITE	Coef.	Std. Err.	t	P>| t |	[95% Coef. Interval]	
SACAP	.0923279	.0199878	4.62	0.000	.0531526	.1315033
1.OACAP					.082667	.1768791
OACAP#SACAP						
1	.047043	.0263225	1.79	0.074	-.0045482	.0986342
Control Variables						
Total exp innov active log	-.0028679	0.0074195	-0.39	0.699	-0.017447	0.0117113
Info sources internal rev	-.0061413	0.0152331	-0.40	0.687	-.0360738	0.0237912
Company age log	-.0128117	0.0265755	-0.48	0.630	-.0650317	0.0394083
Sales log	0.0012927	0.0103749	0.12	0.901	-.0190937	0.0216791
Ed up to high school log	0.0053433	0.0131307	0.41	0.684	-.0204582	0.0311449
Year						
2012	0.0069333	0.0395014	0.18	0.861	-.0706858	0.0845524
2013	-.1006663	0.0456842	-2.20	0.028	-.1904345	-.0108981
2014	-.0993659	0.043643	-2.28	0.023	-.1851231	-.0136087
Cooperation	-0.051538	0.0375689	-1.37	0.171	-.1253598	0.0222837

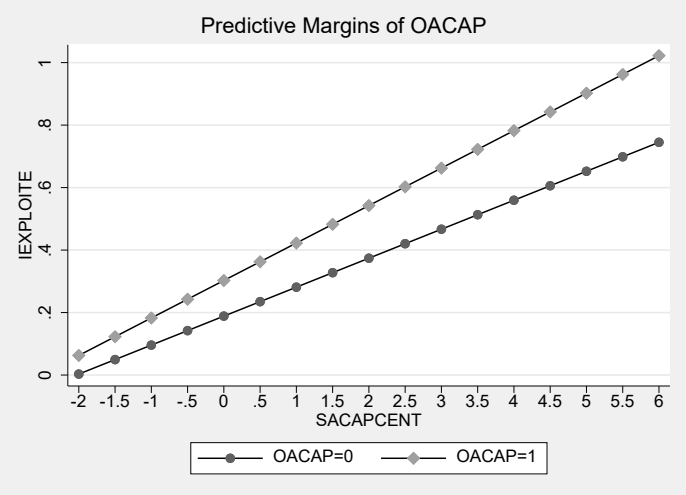

Figure 3.10 SACAP and OACAP Interaction for IEXPLOITE

Discussion and Conclusions

Absorptive capacity and ambidexterity have been extensively studied separately as key capabilities for value generation and sustainability of competitive advantages (Cohen and Levinthal, 1990; O'Reilly and Tushman, 2008). However, limited research has been conducted in the interaction between these two constructs. This relationship is explored in Chapter 2 of this dissertation, contributing to the theoretical understanding of both constructs by introducing two types of absorptive capacities (i.e., strategic and operational absorptive capacities), and classifying ambidexterity as exploration, incremental exploitation, and repetitive exploitation, following Patel et al. (2012). The panel data analysis conducted in Chapter 3 allows for a more accurate representation of the interacting phenomena between these two constructs by refining the variable representing exploration, and moreover, replacing the operational absorptive capacity variable with a better proxy (i.e., support processes). This model refinement allows for the exploration of the interaction between the strategic and operational absorptive capacity constructs. The analysis indicates that for a firm with average *SACAP*, simultaneous engagement of strategic and operational absorptive capacity increases the exploratory ability of the firm (Table 3.12 and Figure 3.9). The same effect is observed for incremental exploration, but with a lesser intensity (Table 3.13 and Figure 3.10).

This research also contributes to clarifying the apparent contradiction regarding the intensity of absorptive capacity exercised by the service and manufacturing sectors. My findings are in agreement with the conclusions reached by Arbussa and Coenders (2007) and Harris & Le (2018) that service-sector firms have higher levels of exploration capabilities for increasing levels of absorptive capacity

than manufacturing firms. Moreover, Figure 3.3 shows that for service companies, the larger the strategic absorptive capacity, the larger the effect on exploration.

Strategic absorptive capacity plays a significant role in both the exploratory ability and incremental exploitation of service companies, as shown in Figures 3.5 and 3.6. Quite a different behavior is shown for manufacturing companies; while for incremental exploitation *SACAP* has a similar influence for both industry sectors, it shows a diminishing return's behavior in its influence on exploration. Therefore, companies in the manufacturing sector with high levels of absorptive capacity might end up with disappointing exploratory findings (i.e., radical innovation or significant new knowledge) but strong incremental innovation results.

Similar behavior is observed between *SACAP* and exploration and incremental exploitation in the presence of collaboration. Firms already engaged in collaboration with other entities do not need to develop high levels of *SACAP*; actually, there are diminishing returns when it refers to the exploratory ability of the firm, as shown in Figure 3.5. On the contrary, collaboration slightly modifies the impact of *SACAP* on incremental exploitation, as shown in Figure 3.6. Interestingly, despite a firm's engagement in collaboration with other entities, it should develop significant *SACAP* to increase its ability to perform incremental exploitation.

Additionally, ambidexterity and absorptive capacity are affected over time by exogenous conditions like innovation tax incentives that significantly increase companies' spending in exploratory activities (Intelis, 2018).

Due to an unsuccessful attempt to implement innovation-incentive legislation in 2009, Chile introduced modifications to the law in 2012 to incentivize innovation

within the firm, without any association requirement. This modification brought a significant increase in tax incentives applications, as shown in Figure 3.6. The release of the association requirement in the legislation brought an unwanted effect in the market, i.e., a substantial reduction of efforts to incorporate external new knowledge or technologies by the companies.

Therefore, the negative results observed validates the actual behavior of Chilean firms, i.e., the relationship between *SACAP* and *EXPLORE* weakens in the presence of the new incentive legislation. This behavior is corroborated in Figure 3.7, where the existence of new legislation disincentivized high levels of strategic absorptive capacities. The same phenomenon but to a lesser extent is observed for incremental exploitation; prior to the regulatory change, strategic absorptive capacity had a higher impact on incremental exploitation. After the legislative change, strategic absorptive capacity lost importance in terms of improving incremental exploitation. This is consistent with companies shifting to inward innovation efforts, rather than reaching outside for sources of innovation, either radical or incremental.

This research makes three contributions to the theory supporting ambidexterity and absorptive capacity. First, it provides a different view of the absorptive capacity construct. Prior research shows ACAP as a linear process (Cohen & Levinthal, 1990; Todorova & Durisin, 2007; Volberda, Foss, & Lyles, 2010), while this study considers two levels: a strategic, related to value generation in the long run, and an operational, related to short-term goals. Also, reflecting on Patel et al. (2012), ambidexterity is considered as exploration, incremental exploitation, and repetitive exploitation, to better represent innovative and operational activities within the firm. Findings on the

interaction of both constructs is a novel contribution to the theoretical understanding of the dynamics between external sources of knowledge and innovation and the ambidexterity capability of the firm. Second, this study contributes to the understanding of the moderating effects of two relevant variables, industry type (i.e., service vs. manufacturing), and collaboration practices. The longitudinal study also sheds light onto innovation-incentive legislation impact on the dynamics between the constructs. Third, the research shows a substantially different interacting behavior of exploration and incremental exploitation with ACAP; absorptive efforts show diminishing returns on exploration while showing an always positive trend for incremental exploitation.

From a practical perspective, managers tend to treat innovation knowledge separately from operational best practices. This study shows that the simultaneous application of both types of knowledge are complementary and contributes positively to the incremental innovation within the firm. This research contributes to the robustness of the guidance the ACAP/OA model could provide managers to develop criteria to reach outside their organizations for new knowledge and innovative sources. Insights are provided for service and manufacturing companies and on criteria for developing collaboration policies. Finally, it provides policy makers with some insights on the impacts of innovation-promotion legislation.

Despite the positive results, several limitations of the study should be addressed in future research. Single-source bias is present in the study since the data was collected from one secondary source. Since the original survey is based on the OECD innovation questionnaire, further research, including data from other countries using the same standard, would be promising to overcome this bias. The proxy

utilized to represent the operational absorptive capacity variable, though significant and representative, comes from an innovation questionnaire and it is not fully operationally oriented. Future research should consider improving the operationalization of this variable.

Further, although the panel data allowed for a more detailed analysis of the relationship between absorptive capacity and ambidexterity, it was not powerful enough to allow for lagged effects. As more periods are incorporated in the future, lagged effects of the relevant variables should be considered and studied.

CHAPTER 4

CONCLUSIONS

I began this study by introducing a gap in the literature regarding the direct relationship between absorptive capacity and organizational ambidexterity. The current business environment requires companies to reach out for new ideas, technologies, and best practices in order to maintain their competitive advantages. Several companies are living examples of sustained and adapted competitive advantages. 3M for example, with its teams of scouts, entrepreneurs and implementers transits from exploration to exploitation seamlessly and with significant value creation; another case is Ely Lilly, the pharmaceutical firm, with a research, development, and innovation collaboration program where the firm teams up with entrepreneurs and small firms in creating new molecules, products, and business cases. The IT sector has also evolved to include ambidexterity, with Cisco's entrepreneurs in residence program, the firm has reached out (absorptive capacity) to include entrepreneurs in the development of new products, processes or business models (ambidexterity). Finally, IBM's Watson open innovation business model, whereby the firm allows third parties to develop innovations using Watson is a good example of absorptive capacity and ambidexterity. IBM, finding the new application attractive, usually invests in the venture. This phenomenon is not only occurring at the firm level; entire industries are changing, like the electrical utility industry where new digital technology is transforming the operating area as well as the strategic level, including the business model, the utility-client and the utility-employee relationships.

The necessary knowledge to deal with this significant change can not be found inside the utilities. They have to reach out for the proper knowledge, new practices, and technologies.

The original definition of ambidexterity proposed a dichotomy between exploration and exploitation, assimilating the former with R&D and radical innovation, and the latter with operational efficiency (March, 1991). There is a significant spectrum between both positions that was not fully captured by extant studies. Building upon an early study by Piao and Zajac (2016), I further categorize exploitation as incremental exploitation, which is associated with incremental innovation, and repetitive exploitation, which is associated with operational efficiency.

Absorptive capacity has become increasingly relevant since the construct was introduced by Cohen & Levinthal (1990), but has been focused mostly on innovation and strategic change. However, organizations have always reached out for new knowledge or best practices, regardless of whether they were related to operations or new competitive advantages. Instead of treating absorptive capacity as a phenomenon exclusively in the realm of innovation or operations as the extant literature suggests, this study combines the observation of both research streams into a construct with two elements, strategic absorptive capacity that is related to innovation, and operational absorptive capacity related to innovation as well as operational efficiency.

Focusing on organizational units, the objective of this study is to understand how absorptive capacity at the strategic and operational levels affects organizational ambidexterity. Piao and Zajac (2016) have explored this relationship, but only at the strategic level of absorptive capacity. Moreover, they focus only on one case study,

which limits the generalizability of the findings. In Chapter 2, I used cross-sectional data and found a positive relationship between strategic absorptive capacity and exploration. More relevantly, Chapter 2 shows the positive effect of both strategic absorptive capacity and operational absorptive capacity on incremental exploitation. These findings indicate that the effort of improving existing products, services and processes is better served with contributions from innovative and operational external knowledge. Also, as expected from the extant operational literature, operational absorptive capacity has a positive impact on repetitive exploitation.

The proposed model of absorptive capacity in Chapter 2, which includes an innovative and operational dimension simultaneously, is novel and contributes to the knowledge of this construct. Moreover, since absorptive capacity as an antecedent of ambidexterity has not been studied extensively before, this study contributes to theory by validating the hypothesis of the influence of innovative and operational absorptive capacity on incremental exploitation.

Chapter 3 focuses on how the relationship between both constructs varies over a six-year period and is moderated by firm-, sector-, and policy-level factors. From a sector point of view, the results indicate that the impact of strategic absorptive capacity for exploration is stronger for service firms than for manufacturing firms. Figure 3.2 shows that for service companies the larger the strategic absorptive capacity, the larger the effect on exploration. Figure 3.2 also shows that for services and manufacturing firms with an average level of strategic absorptive capacity, absorptive capacity has a higher impact on exploration. One could conclude from this pattern that service firms have to try to maximize their absorptive capabilities in order to obtain a significant level of exploration.

For non-collaborating and collaborating firms with other companies or institutions with the same level of strategic absorptive capacity and no interaction term, collaborating companies have a larger positive impact on exploration (10.9% at the 0.05 level). The moderating effect amplifies the impact more than double, to 22%, i.e., those that collaborate have 22% more influence on exploration than non-collaborative firms. Figure 3.4 shows that the incremental effort on strategic absorptive capacity has diminishing returns, so a company with absorptive capacity and collaboration should moderate the use of such capacity because the effect on exploration diminishes.

Original innovation-incentive legislation was passed in Chile in 2009. The mechanism required collaboration with an external research institution, either a university or other institution duly accredited by the Innovation Agency. The effect of the legislation was not significant since, according to some reports, the process was cumbersome, and relationships between industry and academia were almost nonexistent. Due to the lack of success, the legislation was modified in 2012 to incentivize innovation within the firm, without the previous requirement. This modification brought a significant increase in the application for tax incentives, as shown in Figure 3.6. However, this increase disincentivized those firms that reach outside to look for innovation sources. The results I have found validates the actual behavior of Chilean firms. That is, the relationship between strategic absorptive capacity and exploration is weaker due to the new incentive legislation since Chilean firms did not use absorptive capacity for their exploratory efforts. This pattern is

corroborated in Figure 3.7, where the existence of new legislation disincentivized high levels of strategic absorptive capacity.

The study also explores the effect of strategic absorptive capacity on incremental exploitation, defined as incremental modifications of existing products or services. The impact of strategic absorptive capacity on incremental exploitation is substantially different for those moderators previously analyzed. Companies from the manufacturing and service sectors with average strategic absorptive capacity have roughly the same impact on incremental exploitation. However, for larger efforts on absorptive capacity, service companies do have a better impact on incremental exploitation than manufacturing firms. From the exploratory and incremental exploitation analysis, one could conclude that service companies should seek higher levels of absorptive capacity than manufacturing firms.

A similar pattern is observed for collaborative and non-collaborative firms. At the average level of strategic absorptive capacity for both types of companies, the exploration impact is higher for the latter, but for higher levels of strategic absorptive capacity, collaborative firms show a higher impact on exploration than non-collaborative firms.

In the case of the impact of new innovation legislation, recalling that the modification of the legislation incentivized in-house innovation, prior to the regulatory change strategic absorptive capacity had a higher impact on incremental exploitation. After the legislative change, strategic absorptive capacity lost importance in terms of improving incremental exploitation. This is consistent with companies

shifting to inward innovation efforts, rather than reaching outside for sources of innovation, either radical or incremental.

Managers tend to treat innovation knowledge separately from operational or efficiency best practices. This study shows that the simultaneous application of both types of knowledge contributes positively to the incremental innovation within the firm. This research contributes to the robustness of the guidance the absorptive capacity-organizational ambidexterity model could provide for managers to develop criteria to reach outside their organizations for new sources of knowledge and innovative. It also provides managers with important insights into the length of time it will take for their organizations to develop absorptive capacity and how this affects ambidexterity over time.

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