Effects of Strategy, Context, and Antecedents and Capabilities on Outcomes of Ambidexterity – A Multiple Country Case Study of the US, China and Taiwan

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SUMMARY

In this thesis, we examined the factors (i.e., strategies, contextual factors, antecedents and capabilities) that were assumed to influence *the extent to which* innovation and ambidexterity occur; and *how* innovation and ambidexterity are likely to be undertaken and executed to generate greater innovation and ambidexterity that resulted in higher business performance and sustainable competitive advantage. We conducted case studies and administered surveys to collect data from American and Chinese companies, and administered survey questionnaires to collect data from Taiwanese companies to answer our main research question "*how do strategies, contextual factors, antecedents and capabilities foster innovation and ambidexterity?*" Our results provide some intriguing insights into how firms may be able to foster innovation by managing their contextual facilitators and antecedents to enable the effective execution of innovation, knowledge strategies, and multiple types of innovation simultaneously. They also suggest how firms may use the outcome of ambidexterity (i.e., innovation ambidexterity) to generate higher firm performance.

Firstly, based on our research with over 50 organizations, we argue if organizations devise strategy by thinking only about the positioning of their company's product or service, they are missing a

huge opportunity. To this point, we introduce the notion of competing based not only on what an organization makes or the service it provides, but also on what it knows and how it innovates. Each aspect represents a competitive position that must be evaluated relative to the organization's capabilities and to others in the marketplace battling for the same space. It suggests the need to compete based on the alignment of product, knowledge, and innovation positions and provide. We also suggest several implications of this research for strategic managers.

Secondly, we looked at how China and Chinese companies balance an innovation and low cost manufacturing orientation. While many western managers think that innovation can never succeed in a situation of command, control, hierarchy and authority, these conditions, however, turn out to play important roles in fostering innovation best practices in Chinese companies. We found that three aspects of China's cultural heritage, senior leadership and the Confucian orientation, and the Chinese mindset, and several best practices are particularly important to fostering innovation. Together they are a powerful force that works as a counterbalance against Chinese leaders' inclination toward command, control.

Thirdly, using quantitative data derived from a research study of 125 firms in Taiwan, we applied multiple regression analyses to test our hypotheses that a knowledge sharing organizational culture is directly associated with innovation ambidexterity, and strategic leadership is directly associated with knowledge sharing culture. The Sobel test and bootstrapping approach were used to test the mediating

effect of organizational culture on the strategic leadership and innovation ambidexterity relationship. We found a significantly positive relationship between a higher the level of knowledge sharing organizational culture and greater innovation ambidexterity, and between strategic leadership and the development of a knowledge sharing organizational culture, and that a knowledge sharing culture mediated the relationship between strategic leadership and innovation ambidexterity.

Lastly, we gathered primary data from 214 Taiwanese owned SBUs drawn from several industries to examine the impact of three resource-based capabilities – organizational culture, intraorganizational collaboration, and interorganizational collaboration, on a firm's innovation ambidexterity, i.e., the attainment of both incremental and radical innovation simultaneously, as well as innovation ambidexterity's subsequent impact on business performance. Our results suggest that entrepreneurial organizational culture and a combination of interorganizational and intraorganizational collaboration facilitate innovation ambidexterity. We also found that innovation ambidexterity mediates the relationship between bundled capabilities and firm performance.

In sum, our findings contribute insights to the innovation, strategy, capability and ambidexterity literatures, and provide several implications for strategic managers regarding ways of fostering innovation in US, Chinese, and Taiwanese companies. We also discuss the limitations of the research and provide some suggestions for future research. Overall, future researchers are encouraged to

include other factors to examine their effects on strategies, infrastructures, capabilities and contextual elements in fostering innovation in the international context.

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LIST OF ABBREVIATIONS

BL	Buckman Lab
IA	Innovation Ambidexterity
OA	Organizational Ambidexterity
TMT	Top Management Team
SBU	Strategic Business Unit
R	Correlation Coefficient
γ_{wg}	Inter-rater Agreement Score
ICC	Intraclass Correlation Coefficients
VIF	Variance Inflation Factor
RBV	Resource Based View of the firm

Chapter 1

Introduction

1.1. Background

There is growing recognition of the importance of innovation and ambidexterity as sources of competitive advantage for firms' success (Porter, 1980; Haapaniemi, 2002; McDonough, Zack, Lin, & Berdrow, 2008; Tushman & O'Raily, 1996; Gibson & Bikinshaw, 2004). Innovation and ambidexterity represent critical means of not only competing against other companies in one's own country, but, perhaps even more importantly, also competing against companies in other countries. Innovation refers to "the successful exploitation of new ideas" of a company or strategic business unit while ambidexterity refers to the firm's ability to do two things at the same time. According to Raisch and Birkinshaw's (2008) conceptual model on ambidexterity and innovation, innovation and ambidexterity can be impacted by a broad range of factors. Some of the most salient factors can be grouped into four dimensions including 1) strategies designed to achieve innovation, 2) context that may facilitate or inhibit the firm's ability to innovate (i.e., cultural heritage, and tradition), 3) antecedents that underpin the effectiveness of the innovating process (i.e., leadership and organizational culture), and 4) resources and capabilities that create ambidextrous innovation and secure high

business performance (i.e., organizational culture, inter and intraorganizational collaboration). These factors are likely to predict *the extent to which* innovation and ambidexterity occur, *how* innovation and ambidexterity are likely to be undertaken and executed, and the impact of greater innovation and ambidexterity on higher business performance and sustainable competitive advantage.

But, while innovation is potentially an important driver of competitive advantage in all countries, the level of innovativeness of companies may differ from country to country. As well, the critical factors that impact on innovation and the ability of firms to innovate may not be the same for all countries. Unfortunately, there is little prior research that investigates whether the same factors foster innovation in different countries, especially non-Western countries. Similarly, research on ambidexterity has also indicated the need for further exploring the notion of ambidexterity in the international context and how ambidexterity can be achieved (cf., Raisch & Birkinshaw, 2008; Simsek et al., 2009).

Given the above gaps, we propose our main research question: "*how do strategies, contextual factors, antecedents and capabilities foster innovation?*" Specifically, we focus on answering the questions, "*how do strategies and context influence a firm's capabilities in fostering innovation?* "and "*how do antecedents and capabilities foster innovation ambidexterity and business performance?*" In order to address these two issues, this thesis investigates each of these factors separately regarding how they impact on innovation in firms

in emerging economies (e.g., China) and developed economies (e.g., USA). As well, we also investigate the antecedents of ambidexterity and their effects on business performance in Taiwanese companies. By doing so, this thesis contributes to our knowledge of innovation and competitive advantage by providing a holistic assessment of the effect of each factor (i.e., strategies, contextual factors, antecedents, and capabilities) in fostering innovation and ambidexterity. It also contributes to our understanding of how innovation and ambidexterity lead to high business performance and competitive advantage. Figure 1-1 shows the research framework guiding this thesis

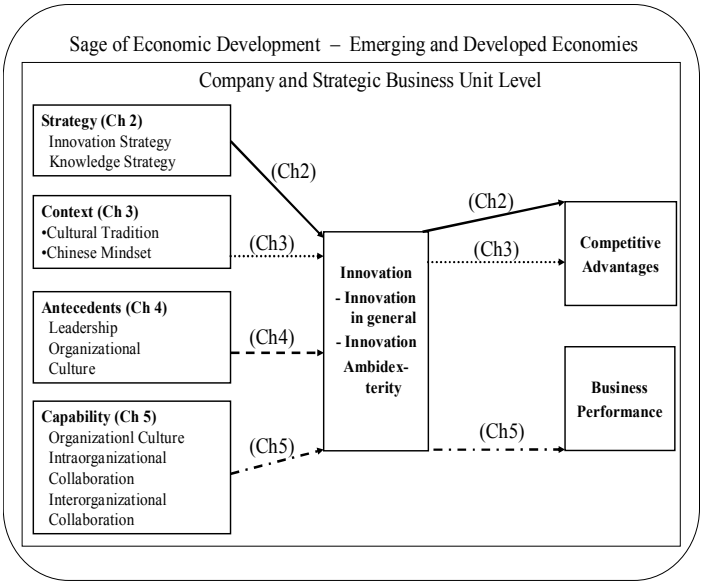

Figure 1-1. The research framework of this thesis

1.2. Problem Statement and Research Objectives

1.2.1. Innovation

Before we proceed, it is important to define what we mean by innovation. Garcia and Calantone (2002) and Grant (2002) suggested that innovation can be generally described as the quest for finding new ways of doing things. Tidd, Bessant and Pavitt (2001), e.g., define innovation as "change" and include the creation and commercialization of new knowledge in terms of a firm's generic innovation strategies (Porter, 1980). These definitions make clear that innovation is not limited to technological change or new products even though it is frequently described in this way.

In our study, we follow Porter and Ketels (2003) in defining innovation as "the successful exploitation of new ideas" of a company or strategic business unit, i.e., an innovation has to put to use ideas in the form of a process, product or service. Innovation, as such, is an overall concept that can include internal (e.g., internal process innovation) and external innovations (e.g., product innovations) and reaches far beyond the current emphasis on innovation within an organization.

1.2.2 Major Streams of Innovation Research

Given the importance of innovation to competitive advantage, it is not surprising that there have been numerous studies investigating the relationship between innovation and a variety of variables thought to foster innovation across different research domains as diverse as economics, marketing, strategy, entrepreneurship, organizational

behavior and new product development (e.g., Freeman, 1997; Tushman,Anderson & O'Reilly, 1997; McDonough & Griffin, 2000; Elenkov, Judge & Wright, 2005; Van Looy, Martens, & Debackere, 2005; Feldman & Kelley, 2006; McDonough et al., 2008).

In the field of innovation research, two dominant streams of research have arguably been major contributors to the discussion, an Innovation stream of research and a Knowledge stream of research (Berdrow & Lane, 2003; Van Krogh, Ichijo, & Nonaka, 2000; McDonough, Spital, & Athanassiou, 2004; Majchrzak, Lynne, Cooper, & Neece, 2004; Zack, 1999; 2005; Atuahene-Gima, 2005; Cooper & Kleinschmidt, 2000; McDonough et al., 2008).

Innovation stream researchers have focused much of their efforts on the diffusion of innovations across nations, industries, and organizations (e.g., Rogers, 1962; Shane, 1993; Shane, Venkataran, & MacMillan, 1995; Freeman & Soete, 1997; O'neill, Pouder, & Buchholtz, 1998; Chang & Shih, 2004), and on examining the influence of organizational structures, characteristics, processes, and people on the development and marketing of new products (e.g., Zirger & Maidique, 1990; McDonough & Griffin,2000).

Knowledge stream researchers, on the other hand, have focused much of their efforts on studying the transfer, flow and creation of knowledge (McDonough et al., 2008). Some have also focused on the relationship between knowledge and competitive advantage and a few have focused on the relationship between knowledge and innovation. Those researchers who have included innovation as a dependent variable have tended to use measures of innovation that are cursory at

best. Thus, our understanding of the relationship between knowledge and innovation remains at a relatively rudimentary level. And, while some Innovation stream researchers have included knowledge in their studies, once again measures of this variable are cursory.

Thus, while both streams of research have provided important insights in their respective fields, and each acknowledge the importance of the other, our understanding of the linkages among innovation and knowledge, and their impact on innovation remains largely unexplored.

1.2.3. Strategies

Most recently the focus of these streams has been on the strategic aspects of innovation and knowledge and the need to integrate the two into a coherent whole (see Figure 1-2). It is argued that an effective strategy is comprised of three key components including product/market, knowledge and innovation positions that must be aligned in order to compete effectively (e.g., McDonough et al., 2008). And further, that competing effectively is based not only on what an organization makes or the service it provides, but also on what it knows, and how it innovates. When we examine the link between knowledge and innovation, we see that an organization can choose to innovate based on what it already knows, or if existing knowledge alone is not sufficient to enable the level of innovation required, can attempt to obtain or develop new knowledge.

And when we look closer, we see how the positions are

inter-related. On the one hand, the focus of an organization's innovation activity needs to be guided by the knowledge they currently have and the knowledge they need. On the other hand, the focus of their innovation activity influences the knowledge they have and the knowledge they need in order to compete in the particular arena that they have chosen.

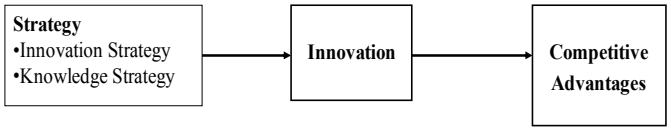

Figure 1-2. Innovation, knowledge strategy and innovation:

The US Case

1.2.4. Context

In addition, research has noted that our understanding of facilitators/inhibitors, including the contextual impacts of country tradition and mindset within which an organization is situated and

how they influence a firm's ability to innovate is very underdeveloped. Yet, developing an understanding of these issues is especially important in China, a country that is growing amazingly quickly and rapidly heading toward being the number one economy in the world (see Figure 1-3).

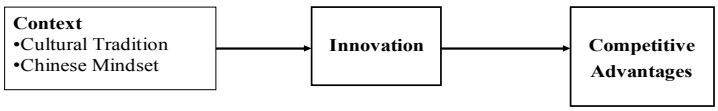

Figure 1-3. The impact of contextual factors on innovation and competitive advantage: The China Case

Emerging economies, including China, face the critical problem of sustaining growth in the long run. While many emerging economies have had success in generating growth, typically this growth has come from low value added manufacturing activities in the value chain (Audretsch, 2007; Thurik, 2009). In order for sustained growth to occur, countries with emerging economies need to move their economies up the value chain, where they can produce

goods and services with much greater added value. And to do this, requires that they employ both a managed economy, with its low-cost, low value added manufacturing orientation, as well as an entrepreneurial economy with its innovation, high value added orientation. To successfully employ both types of economies, companies in these countries will need to adopt an ambidextrous orientation, policies, and capabilities that will lead to ambidextrous capabilities that will, in turn, lead to ambidextrous outcomes (Audretsch, 2007; Thurik, 2009).

While there has been a great deal of research on China's manufacturing economy and the impact it has had on their economic growth (Acs & Szerb, 2007), much less has been written about the innovative capability of companies, particularly smaller and medium sized ones. Yet, as Thurik (2009) proposes, for a country to continue to grow and develop economically requires that their companies develop an entrepreneurial, innovative orientation. Thus, the focus of this study is on the relationship between organizational capabilities and innovation outcomes. Specifically, we investigate the innovativeness of Chinese companies by examining two issues. First, "What capabilities do Chinese companies possess that facilitate their ability to develop innovations?" Second, "What factors influence these companies' ability to innovate?"

1.2.5. Ambidexterity Research

Researchers have focused on the notion of ambidexterity, i.e., the ability to simultaneously engage in exploratory activities on the

one hand and exploitative activities on the other, to help resolve the paradox of fostering incremental and radical innovation simultaneously, and generate high business performance (Tushman & O'Reilly, 1996; Benner & Tushman, 2003; Jansen et al., 2006). Thus, creating, preserving and exploiting ambidexterity has emerged as an important topic in the field of strategic management. Research on how to create and preserve ambidexterity, however, is still underdeveloped. One specific area that is lacking in research is the impact of behavioral antecedents and resource-based capability on ambidexterity (Raisch & Birkinshaw, 2008; Simsk et al., 2009). In the following subsections, we provide a brief discussion of how ambidexterity can be achieved and its effects on business performance.

1.2.6. Antecedents

While correctly positioning one's innovation and knowledge strategies is an important step, positioning alone is not sufficient to achieve effective organizational functioning or competitive advantage. Achieving long run, sustainable competitive advantage requires that the organization execute these strategies. While many factors are important to effectively executing a knowledge/innovation strategy and generating multiple types of innovation, prior research suggests that an organization's innovation infrastructure and antecedents, and in particular its leadership and its culture are especially key (see Figure 1-4).

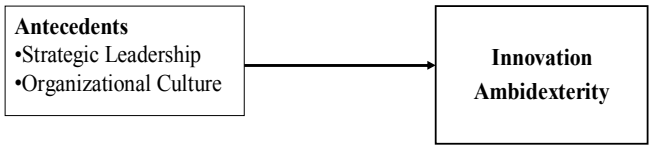

Figure 1-4. The impact of antecedents on innovation ambidexterity: The first Taiwan Case

Research also indicated that leadership and organizational culture may not only play important roles in generating innovation but also in fostering innovation ambidexterity, i.e., the attainment of multiple types of innovation simultaneously (Vera & Crossan, 2004; O'Reilly & Tushman, 2004; Gibson & Birkinshaw, 2004; Raisch & Birkinshaw, 2008). It has been proposed, e.g., that different leadership styles are needed in order to facilitate different types of innovation (Vera & Crossan, 2004; O'Reilly & Tushman, 2004). These researchers have suggested that a participative form of leadership may

be most helpful in fostering radical and discontinuous types of innovation, while an authoritative, top down style of leadership may be most helpful in fostering incremental innovation (Vera & Crossan, 2004; O'Reilly & Tushman, 2004). Similarly, the type of organizational culture represents a complex pattern of beliefs, expectations, ideas, values, attitudes, and behaviors shared by the members of an organization (Trice & Beyer, 1984). It may influence an individual's attitude, behavior and motivation in achieving innovation goals. Interestingly, despite the importance ascribed to leadership and its culture (Vera & Crossan, 2004; O'Reilly & Tushman, 2004; Gibson & Birkinshaw, 2004; Raisch & Birkinshaw, 2008), we are unaware of any empirical research that has specifically focused on the role of senior leadership style and organizational culture and their impact on fostering innovative activities leading to different types of innovation.

To date, the tendency for research on leadership and culture has been conducted in Western countries such as North America or Western Europe (Jackson & Schuler, 1995; Porter, 1985; Schuler, 1992; Wright & McMahan, 1992; Huselid, 1995; Elenkov et al., 2005). Specifically, it has been pointed out recently that there has been virtually no research that has examined the international context impacting on ambidexterity research (Raisch & Birkinshaw, 2008). Yet, given the evidence of the impact of societal culture in other management areas of research (Hofstede, 1983; House, Hanges, Javidan, Dorfman, & Gupta, 2004; Sirmon & Lane, 2004; Elenkov et al., 2005), it is important to investigate whether the international

context plays a role.

While there are some indications that these factors play an important role in promoting innovation in Western firms, their importance has rarely been tested in firms in other parts of the world that have vastly different cultures. Thus, we know little about the role that leadership and organizational culture play in executing a knowledge/innovation strategy and promoting innovation in different contexts. One exception is the recent research of Jung and his colleagues (e.g., Jung, Chow, & Wu, 2003; Elenkov et al., 2005) who investigated the relationship between organizational innovation and transformational leadership, as well as other organizational factors in firms in Taiwan. Two shortcomings of this study, however, were that 1) they measured only product innovation, ignoring internal process innovation and 2) they used proxies for measuring innovation instead of measures of actual innovation.

Below we review prior research, albeit mostly from Western countries, on leadership, culture, and innovation.

1.2.6.1. Leadership

There is no agreement on the definition of leadership. In line with our research purpose, we follow Kouzes and Posner's (1987) definition that "Leadership is ultimately about creating a way for people to contribute to making something extraordinary happen." The type of leadership will likely lead to different outcomes. While a great deal of research has been conducted on leadership and its influence on organizational processes, outcomes, and employee behavior (Bass &

Avolio, 1993; Mumford, Scott, Gaddis & Stranges, 2002; House et al., 2004), much less research has been conducted on the influence of leadership behaviors on innovation, and even less still on the leadership styles of senior leaders and their impact on innovation.

Prior research suggests that leadership influences an organization's strategy, its processes, and its outcomes, as well as employee behavior, which in turn, helps to foster greater innovation (Jung et al., 2003; Mumford & Licuanan, 2004; Hunt, Stelluto & Hooijberg, 2004; Elenkov et al., 2005; Jung, Wu & Chow, 2008). Seen from this perspective, the role of leadership is to integrate strategy, processes, resources and people to work effectively toward innovation.

1.2.6.2. Organizational Culture

Since the seminal work of Peters & Waterman (1982), Deal & Kennedy (1982) and Kotter & Heskett (1992) organizational culture has been recognized as being a major factor for organizational success. Organizational culture represents a complex pattern of beliefs, expectations, ideas, values, attitudes, and behaviors shared by the members of an organization that evolve over time. The prevailing culture has a major influence on current strategies and future changes, and any decision to make major strategic changes may require a change in the culture. Thus, organizational culture is a vital element in both strategy creation and strategy implementation (Thompson, 1993). It is suggested that an innovation enhancing organizational culture is one in which continuous improvement through the generation and

implementation of ideas in all parts of the organization is the norm (Smith, 2004). In organizations with an innovation enhancing organization culture, innovation is not something that a small minority is responsible for (e.g. the R&D department in an organization) with the results appearing at a fixed time. Rather, an innovation enhancing culture is created by the collectivity, i.e., employees who are motivated and confident enough to try out new ideas on a continual basis. Specifically, organization cultures that foster a customer orientation and knowledge and information sharing, provide employees with opportunities to explore, investigate and experiment, thus fostering innovation (Amabile, Conti, Coon, Lazenby & Herron, 1996; Woodman, Sawyer & Griffin, 1993; Sackmann, 2003, 2006; Ulwick, 2002; Anand, Gardner & Morris, 2007). Researchers have also looked at the relationships among organization culture, leadership, and innovation. They have found that leaders play an important role in creating an organizational culture that can lead to innovation success (Kanter, 1983, 2001; Cameron & Quinn, 1990).

1.2.7. Capability

On the other hand, a firm's capabilities have been suggested as the core to distinguish and secure its strategic success while fostering innovation requires infrastructures underpinning its effectiveness. Further, research on ambidexterity also proposes that firms' specific capabilities allow organizations to facilitate both exploitative and exploratory activities simultaneously that achieves high levels of

incremental and radical innovation is an important vehicle for organizations to generate greater business performance (Gibson & Birkinshaw, 2004; Benner & Tushman, 2003). Seeking to understand the effects of capabilities on innovation and further achieving ambidexterity, we examine the impact of several resource-based capabilities (i.e., entrepreneurial organizational culture, inter and intraorganizational collaboration) that are thought to enable firms to generate both incremental and radical innovation. It also investigates the relationship between innovation and business performance (see Figure 1-5).

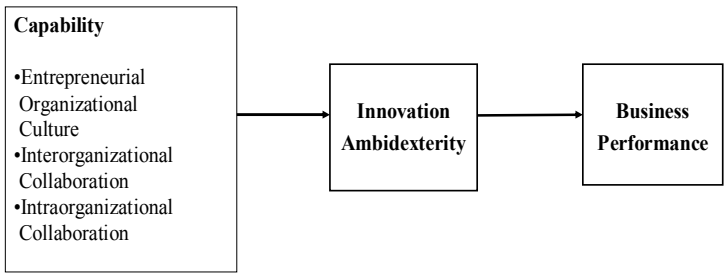

Figure 1-5. The impact of capabilities on innovation ambidexterity and business performance: The second Taiwan Case

While the importance of exploitation and exploration to the attainment of ambidexterity has been recognized, exploitation and exploration inherently compete for resources of a firm (March, 1991). As organizations learn from experience how to divide resources between exploitation and exploration, this distribution of consequences across time and space affects the lessons learned. As a result, it created an imbalance/trade-off situation between exploitation and exploration. To balance the pursuit of exploitation and exploration, Gibson and Birkinshaw (2004) draw on organizational context to enable behavioral capacities for fostering exploitation and exploration simultaneously. They propose that greater ambidexterity will result from a behavioral context is characterized by the interaction of stretch, discipline, support, and trust. But while such a context may have a positive affect ambidexterity, they leave unanswered the question of what resources and capabilities are needed to enable the activities of exploitation and exploration simultaneously. Thus, beyond the importance of fostering a behavioural context as Gibson & Birkinshaw (2004) proposed, we have little understanding of the specific capabilities that are required to achieve ambidexterity. To address this issue, research suggests that the resources of a firm might be the foundation for achieving ambidexterity in independent units or organizations (Kang & Snell, 2009; Simsek, Heavey, Veiga, & Souder, 2009).

Considering the lack of slack resources of a firm, we explore a set of resource-based capabilities that may enable exploitation and exploration leading to the attainment of ambidexterity, thus generate

greater business performance. Traditionally, strategy literature views the firm as a bundle of resources and capabilities. According to Amit and Schoemaker (1993), a firm's resources are defined as stocks of available factors that are owned or controlled by the firm. Capabilities, in contrast, refer to a firm's capacity to deploy resources. They usually combine and use organizational processes to affect a desired end. In this sense, resource-based capabilities derive from organizational resources that comprise both tangible and intangible processes that are firm-specific and are developed over time through complex interactions among the firm's resources toward a desired direction. Consequently, resource-based capabilities may not only fundamentally avoid the usual need of allocating resources for exploitation and exploration but also sustainable capabilities for an effective learning context over long term. As noted there has been very little detailed investigation of how organizations actually enable exploitation and exploration and achieve ambidexterity (Adler, Goldoftas & Levine, 1999; Simsek et al., 2009). Further, while there is a wealth of research on capability and business performance, study looking at the relationship of capability, ambidexterity and business performance is still underexplored. Thus, the purpose of this paper was to empirically investigate how resource-based capabilities enable exploitation and exploration and achieve ambidexterity. We also examine the relationships among resource-based capabilities, ambidexterity and business performance. By doing so, our study contributes to our understanding of ambidexterity by identifying the effects of resource-based capabilities on ambidexterity and business

performance.

1.3. Research Design and Methodology

Prior studies, on innovation and/or ambidexterity, have typically either adopted a qualitative methodology, or a quantitative methodology. As researchers have note, both approaches have their limitations (Gibson & Birkinshaw, 2004). Our research approach, in contrast, uses a mixed methodology including both a qualitative approach and a quantitative approach to achieve our stated research objectives and to answer the research questions. A qualitative cased study approach allows us to gather an in-depth understanding of actors' (e.g., leaders, mangers and employees) perspectives in terms of *why* and *how* innovation is fostered within a particular context (Yin, 1994). A quantitative approach, on the other hand, allows us to test hypotheses in a larger and broader sample.

Innovation, knowledge and contextual factors are complex, interwoven and generate difficulty in measuring their effects. Thus, a qualitative case study is appropriate for us to understand the interactions among these factors and how they may impact the process and development of innovation. A case study is also an important means of obtaining data from multiple sources, levels and sections within the focal organization and outside of the focal organization. Thus, we apply qualitative case study with semi-structured interview questions to guide our interviews for our first two chapters - chapter 2 and chapter 3. By doing so, the two chapters provide in-depth insights and concept for us to explore the

linkage between innovation and ambidexterity in depth and detail.

Subsequently, in chapters 4 and 5, we employ a quantitative methodology to test several hypotheses using survey data. This quantitative methodology was used to test hypotheses that were derived from the insights derived from our case studies. In this sense, the core of this thesis is chapter 4 and chapter 5 that rely on a quantitative research design.

Chapters 4 and 5 use the quantitative approach for two main reasons: 1) the variables in the two studies can be identified and measured; and 2) we are able to use prior research and existing theories to develop hypotheses. In this instance quantitative survey data enables us test hypotheses and to explain causality deductively. Further, such an approach was selected because the core concerns of deductive quantitative research matched the requirements for achieving the purpose of this research to understand the factors that influence innovation ambidexterity and business performance. Previously published instruments and prior research are used to develop survey questionnaires that were administered in Taiwanese SBUs/companies. Using this methodology, we were able to gather primary survey data from SBUs/companies.

A number of researchers (Podsakoff, et al, 2003; Elenkov et al. 2005) suggest that respondents for independent and dependent variables should be different in order to avoid self report and self evaluation that can result in common method bias. Thus, separate questionnaires for measuring independent and dependent variables were developed and these questionnaires were administered to

different set of respondents. Appendix 1-1 and Appendix 1-2 contain the entire set of questionnaires used for the thesis (Appendix 1-3 and Appendix 1-4 are the Chinese version). Specifically, in each participating company, a senior level manager was asked to fill out a questionnaire asking about the performance/outcomes of the company/SBU, and middle level managers or staff members were asked to fill out questionnaires asking about leadership behaviors, contextual factors and capabilities.

To analyze the data, we conducted factor analyses, reliability tests, correlation tests, multiple regression analysis using SPSS[1], and a syntax for Sobel and Bootstrapping tests.

1.4. Expected Contributions

This thesis is devoted to addressing the main question, "How do strategies, contextual factors, antecedents and capabilities foster innovation and ambidexterity?" We expect to contribute to our knowledge in the following respects. Firstly, this thesis links innovation and the notion of ambidexterity to investigate how a firm achieves innovation ambidexterity and greater business performance. We add to our understanding of the innovation and ambidexterity literatures.

Secondly, the use of mixed qualitative case study and quantitative survey methodologies contributes a holistic understanding of the interaction effects between innovation and

[1] Kindly note that SPSS, is a statistical package of SPSS. Inc.

knowledge strategies and between contextual factors on the process of innovation development. It also enables the verification of the hypotheses derived from the insight and concepts derived from this understanding. For the thesis we conducted in-depth interviews with executives and mangers in US and China, and collected primary survey data on a firm's leadership behaviors, capabilities and direct measures of innovation and business performance. The insights of managers and executives on innovation and management practices in US companies were important in understanding the strategies and practices leading to greater innovativeness, that in turn leads to economic development. The insights of Chinese managers and executives, on the other hand, were important to understand how they foster innovation that has enabled them to quickly catch up with the developed economies. Taiwan presents an important context for our empirical testing with its relatively complex economic and cultural background in terms of adopting Western capitalism mixed with a Chinese cultural heritage. Our empirical findings may thus contribute to our understanding of the process of innovation in other economies in the region such as South Korea, Singapore and Japan.

1.5. Thesis Structure

The remaining chapters in this thesis include two case studies, two survey-based studies and a discussion and conclusions chapter (see Figure 1-6 for the framework of the thesis).

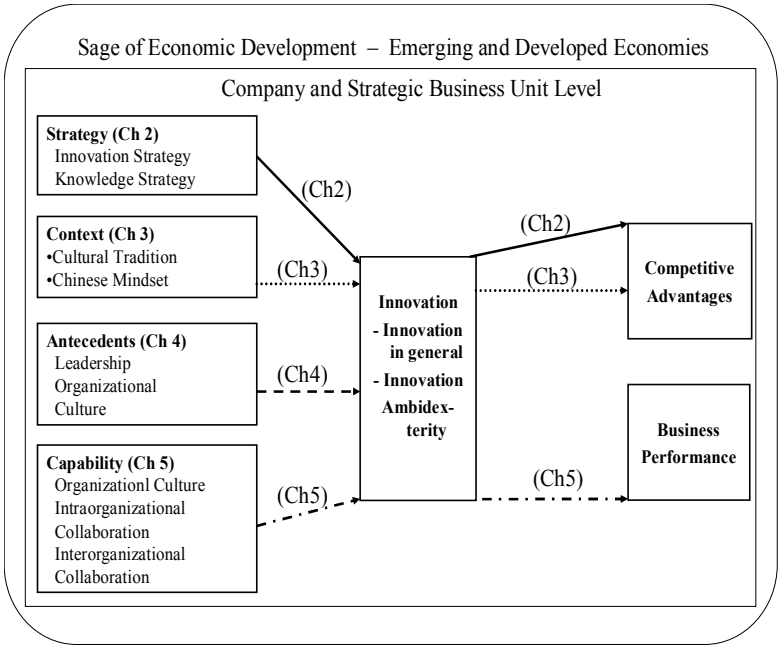

Figure 1-6. The research framework of this thesis

In the next Chapter, we discuss innovation and knowledge. Our findings are based on our research with over 50 organizations in United States, Taiwan and China. We propose that both innovation and knowledge strategy are not independent entities, but rather are inter-related strategic positions that impact on the product/market strategy of a firm. We describe what it means to compete based on product, knowledge and innovation and to align, and if necessary realign, all three positions to secure competitive advantage when the competitive landscape changes. We then conclude this Chapter with several implications for strategic managers.

In Chapter 3, we present insights into what constitutes effective

innovation facilitators as they relate to facilitating a firm's ability to innovate in Chinese companies. This framework is derived from data collected in face-to-face interviews with Chinese executives and managers over a period of four years. In this study, we looked at small and medium sized companies, privately owned and state owned companies, joint ventures, and companies in a variety of industries including, automotive, leisure, and information technology. We also reviewed secondary data sources, including company documents and information from each organization's web site. In addition, we talked with government officials, academics, and employees about the role and importance of innovation. In addition to these sources, we added the work of prior studies on innovation, and other Chinese companies' experiences in trying to innovate.

In Chapter 4, we seek to increase our understanding of how two key antecedents of ambidexterity (i.e., leadership and organizational culture) facilitate innovation ambidexterity. Our results are based on original data collected from 125 Taiwanese companies. We address the relationships between leadership and organizational culture and their effects on innovation ambidexterity in terms of fostering multiple dimensions of innovation including internal process, incremental product, and radical product innovation. Conducting research in Taiwanese companies enables us to identify whether the factors important to innovation ambidexterity in Western firms also apply to firms in different contexts, and non-Western countries in particular. The theoretical and managerial implications are discussed.

In Chapter 5, we examine the impact of the bundled capabilities –

organizational culture, intraorganizational collaboration, and interorganizational collaboration, on a firm's innovation ambidexterity, i.e., the attainment of both incremental and radical innovation simultaneously, and business performance. We gathered survey data from 214 Taiwanese owned SBUs drawn from several industries to test several specific hypotheses including the relationship between innovation ambidexterity and business performance and how the bundled capabilities enable the attainment of innovation ambidexterity. We also examine the mediating effect of innovation ambidexterity on the bundled capabilities and business performance relationship.

The final chapter summarizes the important findings reached by this series of research studies. These findings identify the significance and contributions of our studies to the existing literature on ambidexterity, strategy, leadership and organizational culture, and capabilities as they relate to innovation. Our findings also identify the contextual factors – cultural tradition, senior leadership and mindset in particular, that are critical to foster capabilities and best practices in achieving innovation that may contribute to the attainment of innovation ambidexterity. Last, we conclude by pointing out the limitations of the studies and by providing suggestions for future research.

Chapter 2

Strategy - Knowledge & Innovation Strategies : The US Case

(Based upon paper published in MIT Sloan Managemnt Review 2008 Fall Issue, Vol.50 (1)).

2.1. Introduction

The way we think about strategy is woefully incomplete.

Traditionally, our conversation focuses on the positioning of products (or services.) Porsche, for example, sells expensive sports cars to wealthy individuals who covet status and a thrilling ride, while Kia sells more utilitarian vehicles to frugal consumers who are merely looking to get from point A to B in a cost-effective manner. So, defined this way strategy is about staking out and defending a unique competitive position (Porter, 1996). While useful, this approach to strategy underplays much of what most would agree makes a company truly competitive. Not only does it give short-shrift to what a company knows, it ignores completely the fact that in today's dynamic economy, organizations have to continually reinvent who they are and what they do in large and small ways. And, one important means of doing so it through innovation.

An effective strategy, then, is comprised of three key components: product/market, knowledge, and innovation positions

that must be aligned. And as the competitive landscape changes, organizations need to continually revisit the alignment among these positions.

In this article we introduce the notion of competing based not only on what an organization makes or the service it provides, but on what it knows, and how it innovates.

Each aspect represents a competitive position that must be evaluated relative to the capabilities of the organization and to others in the marketplace battling for the same space.

Based on our research with 50 organizations, we describe what it means to compete based on product, knowledge and innovation and to align, and if necessary realign, all three positions. We conclude with several implications for strategic managers.

2.2. Knowledge Positioning

Products and services are like the tip of an iceberg, when it comes to positioning. They are the visible, tangible realization of an organization's product/market position.

But like an iceberg, most of what is important lies below the surface. What remains out of sight (and too frequently out of mind even though it is critical to the business) is the knowledge that the organization has that enables it to deliver those products and services.

Knowledge, once taken for granted, is now being explicitly regarded as a having value and thus, a resource that must be managed, e.g., companies have created the position of chief knowledge officer and instituted a host of knowledge management initiatives.

The problem, however, is that managing knowledge has been viewed as an operational issue not a strategic one. The link between knowledge and strategy has rarely been made explicit (Zack, 1999). And that is a mistake.

The set of strategies an organization can execute successfully is limited by what it knows. And what it needs to know and the knowledge it needs to create and share depends on the strategy it would like to execute. The difference between what an organization knows and what it needs to know to successfully compete creates a strategic knowledge gap that organizations must try to eliminate or reduce. This can be done either by changing product/market position to be more in line with organizational knowledge, or changing what the organization knows to better support its product/market position.

Either approach can work. What won't work is not addressing the problem. Ignoring this knowledge gap can put a company at risk. For example, Polaroid's attempt to execute a digital strategy without having sufficient knowledge about digital imaging ended in bankruptcy (for detail see reference 3). What it did know was based on designing, costing, marketing, manufacturing and distributing physical film and analog cameras. It attempted to move from chemistry to computer systems without changing what it knew. Its strategy, based on product/market positioning, failed to a large extent because it ignored its knowledge gap.

Knowledge provides a radically different way to describe and map the competitive landscape and an organization's strategic

position within it. Mapping an organization and its competitors based on knowledge, that is mapping *knowledge positions*, can produce very different results than using a product/market map. Companies not on your competition "radar screen" because they do not make the same products as your company or sell to the same markets may in fact be direct head-to-head *knowledge* competitors. Until food companies began selling cholesterol lowering spreads, pharmaceutical companies did not envision them as competitors. Yet they might have had they realized the large overlap in knowledge held by both industries (Patel & Pavitt, 2000).

Knowledge competitors are especially dangerous and stealthy because they *could* potentially produce your products or serve your markets. Could Polaroid have known that consumer electronics and computer systems company such Sony or HP would produce the next wave of imaging equipment – digital cameras? Perhaps, if they had regarded competition and strategy from a knowledge perspective.

An organization's knowledge positioning is as important as its product/market positioning when evaluating the success or failure of its competitive strategy. And the two cannot be treated independently, but rather need to be seen as parts of a strategic whole. Yet, what an organization knows is but a static snapshot of its learning trajectory. In today's dynamic economy, organizations have to continually reinvent who they are and what they do in large and small ways or risk being made obsolete. And, one important means of doing so it through innovation—a concept that has been all but ignored when it comes to your discussion of strategy.

2.3. Innovation Positioning

The business world has begun to take innovation seriously. For example, the number of articles published in the Sloan Management Review with innovation in the title since 2000 now outnumbers the total number of articles containing the word in the headline from the 1970s, 1980s, and 1990s combined. But although innovation is critical to success, most attention is paid to the innovation process and not to an organization's competitive *innovation position* and how it aligns with their product/market position.

Innovation typically suggests new product development (Sawhney, Wolcott & Arroniz, 2006). But organizations may also compete based on innovation in a variety of areas reflecting its key strategic drivers including leading-edge technologies, new and better services, lower prices, better operational execution, and better understanding of customers and markets.

An organization's innovation position specifies how much it will focus on developing external innovations that are experienced directly by customers, e.g., via products and services, or internal innovations that are intended to be used by the organization itself, e.g., new processes and procedures. The organization's innovation position also reflects the extent of innovation, ranging from incremental refinements to radical change and the degree of newness to the customer or market that it wishes to incorporate into its external innovations.

No matter what course it takes, it is critically important that the

organization align its innovation position with its product/market position. For a company that competes on low cost operations or best-in-class execution, for example, product innovation may make little strategic sense. For a company that competes by better understanding it customers, marketing innovation may be more strategic. For a company that competes on having the latest high-end products, innovating around operational cost saving may be a low priority.

Another way to carve up the innovation landscape is by the order of entry into a new market: first mover, early follower or late entrant. First movers focus on offering new products to early adopter markets, and in those cases a commitment to product- or technology-oriented innovation may make sense. Early followers, learning about markets and customer needs from early entrants, typically focus on marketing and in these cases an innovation position focused on services and connection to customers may be the right course of action. Finally, late entrants typically compete on volume and low cost, and therefore an innovation position may best be focused on operational process efficiency.

While an organization's innovation capability defines and constrains where it is currently capable of competing based on innovation, its product/market position sets guidelines and requirements for that innovation.

As with knowledge position, an organization must strive to align its innovation position with its strategic product/market position. Polaroid, for example, attempted to stay viable with incremental

chemistry-oriented innovation, when it needed to be radically innovative in digital imaging technology. The result as we saw was bankruptcy.

2.4. Linking Knowledge and Innovation

We have described the link between knowledge and product/market positions as well as between innovation and product/market positions. The remaining relationship between knowledge and innovation positions is often given the least attention in the process of formulating strategy. Specifically, this link addresses the questions: 1) what does the organization need to know in order to innovate in a way that supports the product/market position? And, 2) how does the organization's knowledge limit the kinds of innovation it can successfully execute?

In examining this link we see that an organization can choose to innovate based on what it already knows, or if existing knowledge alone is not sufficient to enable the level of innovation required, can attempt to obtain or develop new knowledge.

And when we look closer, we see how the positions are inter-related. On the one hand, the focus of an organization's innovation activity needs to be guided by the knowledge they currently have and the knowledge they need. On the other hand, the focus of their innovation activity influences the knowledge they have and the knowledge they need in order to compete in the particular arena that they have chosen.

2.5. Overall Strategic Alignment

Even if a company masters the three strategic positions of product/market, knowledge, and innovation independently they are still at risk. Only when all three positions are aligned and mutually reinforcing can a strategy succeed.

In adopting the notion of alignment, organizations need to view each position – product/market, knowledge and innovation – as aspects of an organization's overall strategy. Creating an integrated strategy thus requires focusing not on each position separately, but rather on all the positions simultaneously.

Figure 2-1 illustrates the links between these three positions and raises the questions that must be raised to make that all three elements work together.

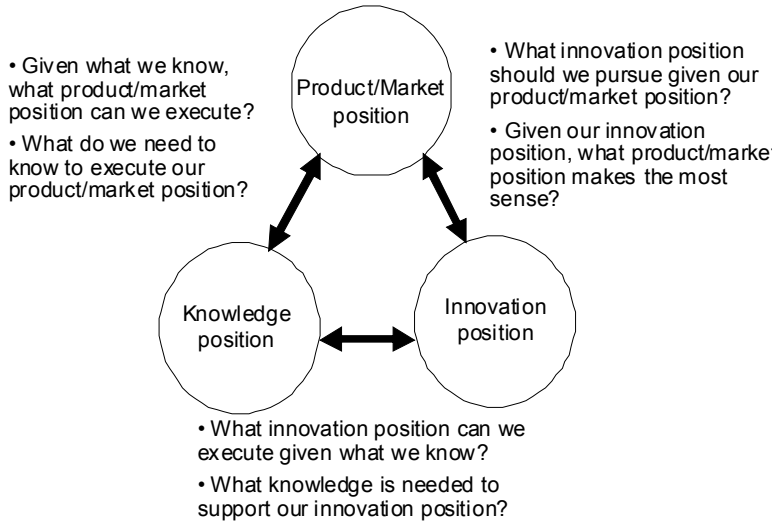

Figure 2-1. Strategic Alignment

Acer, Inc., the largest manufacturer of laptop computers in Taiwan, is an example of how to do strategic alignment well. Beginning in 2000 their top priority was delivering the newest, most affordable technology for the benefit of consumers worldwide. Thus, for nearly a decade now, their product/market position has been to offer computers with user-friendly technologies that make life easier for home & commercial users. Everything the company does when it comes to the three parts of strategy supports that overarching goal. For example, the company gains knowledge about industrial and fashion trends, so that it can make its products as appealing as possible.

2.6. Strategic Transitions: Buckman Labs [6]

As important as alignment among the three positions is, maintaining that alignment as the competitive landscape changes provides an even greater challenge. Buckman Laboratories (BL), a $500 million manufacturer of specialty chemicals operating in over 90 countries, provides an example of a company that was able to do it successfully.

Figure 2-2 depicts the major strategic transitions that BL went through since its founding in 1945. While the process was continuous, for ease of discussion, we divide the transition into three phases. As you see, in each a specific strategic position dominated. In each phase, however, the key to BL's success was their ability to explicitly bring into alignment all three positions.

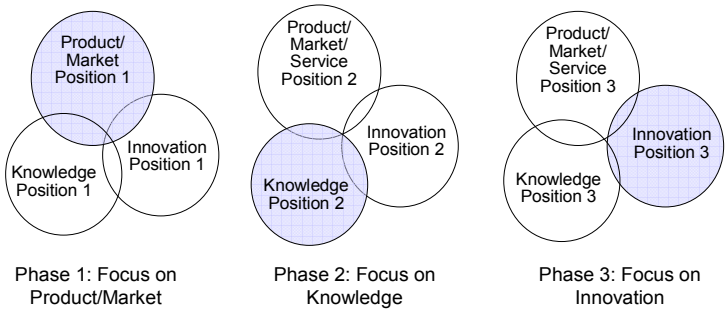

Figure 2. Buckman Labs' Strategic Transitions

Phase 1: A focus on product/market

BL originally competed on product leadership. Their product/market position was to manufacture the most effective microbicides (i.e., chemicals that control the growth of mold and bacteria) and sell them at a competitive price, thereby offering greater value than the competition. They did not focus on specific market segments at this point. Their knowledge position was focused broadly on acquiring chemistry and chemical engineering knowledge associated with microbicides, and they typically hired people with advanced degrees in these areas for all functions within the company, including sales, customer support, and even information systems. According to Bob Buckman, Chairman, Bulab Holding, Inc. (BL's parent company).

> Our critical knowledge lies in the experiences of our people in the field. And that knowledge is continually evolving and changing. The best knowledge is whatever the last person learned. BL hired 1240 people, 85% of which are spread around 90 countries.

While they did not ignore customer needs, because they were not focusing on specific market segments, innovation tended to be internally driven, incremental, and focused on advancing the chemical properties of their products. New products were developed based on their existing chemistry knowledge, augmented via relationships with

research universities.

In this way, BL established an effective alignment among their product/market, knowledge, and innovation positions. Because Buckman's products were generally superior to the competition, and its markets were relatively unsaturated, they were successful with this strategy.

Phase 2: A focus on knowledge

Over time as the industry became more competitive, many of BL's key products became commoditized, prices were forced downward, and margins began to shrink. BL's product leadership position was becoming less effective.

BL's response was to shift strategic focus from a product-oriented position to a knowledge-based position. They decided to focus on developing a specific and unique body of knowledge from which they could derive leading-edge products. Additionally they began to shift from selling products alone to selling value-added services based on showing customers how to make the most effective use of BL products. Finally they began to narrow their market focus, identifying pulp and paper, water treatment, and leather manufacturing as their three primary segments. This afforded them the ability to focus the knowledge and innovation required to support their new product/service/market position.

The knowledge they now required shifted from product-oriented chemistry to chemical "application" knowledge. BL was no longer selling a chemical to get rid of slime on paper rolling mills. Rather,

they were now offering the best (most effective, yet least costly) methods for treating a slime that built up on a particular type of paper mill running at a particular speed in a particular climate with water of certain acidity. This knowledge and the means to capture and share it were more complex than before, yet provided a more proprietary and difficult to copy – thus more strategic – way to compete.

Buckman's innovation position shifted from internal, chemistry-driven product innovation to external, customer-driven service innovation. This required BL to develop innovative communication and knowledge sharing processes that tapped into the experience and expertise developed by their field technicians. Once again, BL had aligned the three dimensions of strategy, but to a significantly different set of positions.

The shift to this new strategy, while eventually successful involved a complex transition on many levels. While the move from selling products to knowledge-based services was relatively easy, the transition to change their product/market position proved much more difficult. Not only did they change their product/market position, but BL also had to change the fundamental domain of strategic knowledge upon which the organization competed, as well as its approach to innovation. If it sounds extremely difficult, it was.

In fact, BL experienced a temporary misalignment while making the transition. At first, BL did not shift their knowledge position – the knowledge basis on which they compete – to support their new service position. They continued to focus on the creation of product-oriented knowledge even as they were implementing their

new service/market position. For example they created online repositories of product information and training programs for new sales and support employees to teach them the chemistry behind the BL product line. At this point BL was not yet capturing and had no efficient mechanism for sharing the field-based application knowledge and experience of their front-line employees from around the world. As you will see, in a moment, it was a problem they were able to solve.

BL's innovation position likewise required a complex shift that was temporarily out of alignment. Innovation was no longer to be centered in an R&D laboratory and driven out to customers, but rather to be driven from the customer into BL. It was no longer to be focused on product chemistry alone, but also based on services driven by the particular chemical application problems customers were facing in their operations. The key to the new innovation position was to recognize the need to shift the focus from chemical manufacturing processes to knowledge-sharing processes and from products to solutions, and to dominate these new positions relative to competitors. This they did successfully.

Phase 3: A focus on innovation

While the second phase of BL's strategic journey was reactive, the third and current phase, which began about five years ago, represented a proactive strategic move to claim and control a unique and highly defensible competitive position based on what BL called

"continuous innovation."

The company's continuous innovation initiative is aimed at providing measurable, cost-effective improvements in output and quality for customers by delivering new customer-specific services and products. This shift in BL's product/service/market position once again required a commensurate shift in knowledge and innovation positions.

BL's new knowledge position builds on, but significantly expands, the knowledge previously required to compete on application services. They still focus on problems solving skills and applications expertise, but to that they have added customer relations and communications skills, the ability to learn and innovate *with* the customer, and a deep understanding of customers' strategy, operations, economics, and manufacturing processes and systems.

BL's new innovation position is based on continuous, collaborative, customer-specific, problem-focused innovation. By establishing such a close relationship, BL can maintain and defend its unique access to the customer-specific learning that is fueling the next round of innovation for that customer.

So you can see that BL's new knowledge position and innovation position are tightly aligned in support of their new service/market position. To support their innovation position, BL again had to innovate not only with regard to its products and services, but also internally with its organizational structure and processes. This may have been the most important aspect of innovation, especially as it aligned with and enhanced the other two strategic positions.

One of the outcomes of continuous innovation is that it enables BL to make adjustments in various areas of the customer relationship to improve performance outcomes. Thus the continuous innovation process addressed both service innovation and process innovation. The mutual learning between BL and its customers that occurs within this process and the equity built into the relationship creates a significant disincentive for customers to switch suppliers.

One of the keys to executing BL's successful new strategy was the ability to support communication and knowledge sharing across their global operations. BL created two structural and process innovations: Global Workgroups and Global Account teams.

The cross-functional global teams were created to were created to build trust, improve communication, and enhance the exchange of information companywide—not only from the bottom up, but horizontally as well.

They were responsible for implementing BL's three-fold strategy by directing activities and managing the business globally in each of the major market segments.

To support customer-specific innovation, BL created Global Key Corporate Account Teams to directly apply BL's knowledge and application expertise to effect improvements in customers' operations and to obtain feedback from these customers. These teams are responsible for gathering information, developing strategies, and coordinating global innovation and service delivery activities with specific customers.

BL's relationship with Voith AG provides an excellent example of how its three-fold strategic alignment supported BL's strategy of joint, customer-focused continuous innovation.

Based on expertise BL had accumulated in tissue manufacturing, Voith Tissue approached BL to collaborate on the development of products for a revolutionary new tissue machine that would produce high quality tissue at a significant cost savings. BL developed a new line of chemicals specifically for use on this machine.

BL and Voith then created a formal partnership agreement designating BL as the preferred supplier of this chemistry. As a result of this collaboration: BL has been able to innovate and expand its new line of chemicals; increase its expertise in tissue manufacture; and been able to extend its new expertise to the water treatment market.

2.7. Implications

The product/market position is only one part of an organization's competitive strategy. Organizations also need to explicitly regard and evaluate their knowledge position and innovation position as well, and do so in three ways.

1) Are all three positions aligned and mutually reinforcing?

2) Is each position unique or superior to competitors' positions?

3) Does that position align with the organization's capabilities?

Mapping competitors based on knowledge and innovation positions can provide results that differ significantly from traditional product/market mapping. Organizations that may not appear to be competitors because they make different things or sell to different

markets may in fact be knowledge competitors because they know what your organization knows, or innovation competitors because they innovate and learn in a manner similar to yours. These “stealth competitors” might be the ones to put you out of business. Strategic change is not merely a matter of changing the organization’s product/market position, but may require changing the organization’s knowledge and innovation positions as well, to maintain strategic alignment. Polaroid did not, and went bankrupt. Buckman Labs and Acer, Inc. did and have been successful.

Organizations that merely change their product/market position set themselves up for failure by ignoring the hidden complexity involved in changing their organization’s knowledge and innovation positions. In our experience, knowledge and innovation positions are in fact more difficult to change successfully than is the organization’s product/market position.

Although it is not impossible to change all three positions simultaneously, having one position act as a focus makes strategic transition easier, reduces the degree of misalignment during the transition period, and thus provides a greater chance of success.

Alignment of the three strategies occurs in their execution. For example, Buckman Labs integrated its service, knowledge and innovation positions via its global key account teams. What made these teams different from traditional global account teams who merely provide one face to the customer, is that their mission was directly tied to integrating and executing the three strategic positions?

Competitive advantage increasingly is coming from an

organization's knowledge and its ability to innovate based on that knowledge. But, successfully leveraging an organization's knowledge and innovative capability requires that it explicitly recognize the role of knowledge and innovation in developing the organization's strategy. Organizations need to consciously design and develop their strategy in a way that ensures the integration of its three key strategic positions – product/markets, knowledge and innovation. Success and competitive advantage also depend on the organization's ability to not only align these positions initially, but realign them as market externalities dictate. This will require constant monitoring of the competitive landscape and altering the organization's current alignment in light of changes in their environment.

2. 8. About the Research

Methods

We used a multiple case study research design. The case study design was particularly useful because our focus was on "how" and "why" questions (Yin, 1994). It was also useful to help us understand the interaction among the factors that were the focus of this study. Lastly, it was an important means of obtaining data from multiple sources, levels, and sections within the focal organization. This approach also allowed us to incorporate multiple sources of data from organizations and individuals outside of the focal organization.

We obtained our data through the use of a semi-structured interview instrument. This approach allowed us to be flexible in our questioning of respondents, to explain questions that were unclear,

and most importantly, to allow us to probe into new areas and issues that arose during the interviews (Brown & Eisenhardt, 1997; McDonough & Leifer, 1986). Due to the exploratory nature of our research, and the inherent complexity of the innovation processes, we believe that a semi-structured interview was the best data collection procedure for our research. Moreover, studies suggest that senior managers are more likely to agree to be interviewed, rather than complete a questionnaire, especially where the interview topic is seen to be interesting and relevant to their own current work (Lawrence, 2000). An interview provides them with an opportunity to reflect on events without their needing to write down responses.

To develop insight into the broader process of innovation, we employed a grounded theory approach. Such an approach is ideal for searching for underlying patterns and consistencies (Stake, 1995). This search process and the subsequent data interpretation are at the heart of qualitative research (Erickson, 1986). Thus, instead of simply reporting on what was found, the researcher's role is to interpret events and draw inferences from the data. A grounded theory approach is particularly well suited to aid in the understanding of the impact of contextual elements and the effect of key actors on this innovation process over time.

Data

We conducted semi-structured face-to-face interviews with 68 managers in 50 different organizations. Each interview took an average between 1 to 2 hours. Interview questions asked about the

background of the participating companies, roles of individuals, relationships, capabilities in terms of knowledge, competitive advantages, methods of learning and sharing information and knowledge, and the importance of innovation and knowledge to the company. Exhibit 2-1 contains our interview questions for our interviewees (see Exhibit 2-1). Zack (1999b) identified a key set of questions regarding the knowledge strategy relationship that formed the basis for our interviews. As the interviews proceeded, follow-on questions were asked to pursue other relevant issues that arose during the course of each interview. During the data collection process each interview was recorded with the permission of the informant and subsequently transcribed. In addition, extensive notes were taken during the interviewing process.

Exhibit 2-1 – Interview Questions for US Interviewees

1.	What is your company's primary business? Who are you major customers?
2.	What are the different ways companies compete in your industry?
3.	Who are you major competitors? What is their key competitive advantage?
4.	What is your company's competitive advantage? I.e., why do customers buy from you?
5.	How does <u>your</u> company compete? What do you <u>know</u> that sustains that advantage?
6.	How have you used your knowledge to produce product, process, and/or service innovations?
7.	How do you learn what you need to know to innovate?
8.	How fast does knowledge become obsolete? How do you learn more than your competitors?
9.	How important is innovation to provide competitive advantage? Why do you say that? How innovative are you? What is the thrust of your innovation activity?

In addition to the interviews, we reviewed secondary data sources, company documents, as well as public documents. The reviewed data included organization charts, documents relating to each organization's new product development efforts and process, and information from the internet including each organization's web site.

Measure

The contribution of knowledge and innovation was assessed by asking about the importance of knowledge and innovation to the company as it pertained to providing competitive advantages, whether it allowed the company to develop innovations and products that

adapted to market changes and demands.

Data Analysis

Interview transcripts were content analyzed to identify general patterns in the data using an iterative process consisting of multiple readings of the interviews by the researchers. The goal of this process is to achieve convergence around a set of themes that emerge from the data. Not all aspects of the interviews and the data which result from the interviews will be given equal emphasis in this process (Stake 1995). Each member of the research team read the interviews and took notes regarding themes and patterns in the data, followed by meetings as a whole team to discuss each other's views. This led the research team to go back to the transcripts to reread them. From this analysis, we were able to refine our thinking about the key patterns emerging from the data as they pertain to our proposed framework.

During this period we followed-up with discussions on key issues with some managers of our participating companies several times to clarify points raised in the interviews. Following our preliminary analysis and sense-making, we provided on-site feedback to managers within the Buckman Lab. through dialogue sessions that involved many of the individuals interviewed at that location, as well as other company personnel. These feedback sessions were interactive and allowed us to reach a deeper understanding of the process of knowledge and innovation and to obtain additional feedback.

Announcement

In next chapter, we use a set of interview questions derived from the interview questions used in this chapter. As the US study focused on three aspects of strategies – innovation, knowledge, and product and market strategy, we had questions asking about knowledge and how do they learn about the required knowledge (see Exhibit 2-1, p.48). In contrast, in next chapter for studying the China case, we will focus on gaining in-depth insights on capabilities for innovation. Therefore, we will use more in-depth questions for our interviewees.

Chapter 3

Context –Cultural Tradition & Chinese Mindset : The China Case

(This chapter is based upon an article under reviewing at Research Technology Management)

ABSTRACT

The aim of this study was to investigate the capabilities that Chinese companies possess that might facilitate their ability to develop innovations. We employed a qualitative research approach to obtain insights into this question. We found that senior leadership, the Confucian orientation, and the Chinese mindset, and several best practices all contributed to facilitating innovation. The ability of Chinese companies to innovate, although still in a formative state, suggests that they are becoming increasingly ambidextrous. As noted, it is this ambidextrous orientation that is important to their ability to sustain growth in the long term.

3.1. Introduction

Emerging economies face the critical problem of sustaining growth in the long run. While many emerging economies have had success in generating growth, typically this growth has come from low value added manufacturing activities in the value chain (Audretsch, 2007; Thurik, 2009). In order for sustained growth to occur, countries with emerging economies need to move their economies up the value chain, where they can produce goods and services with much greater added value. And to do this, requires that they employ both a managed economy, with its low-cost, low value added manufacturing orientation, as well as an entrepreneurial economy with its innovation, high value added orientation. To successfully employ both types of economies, companies in these countries will need to adopt an ambidextrous orientation, policies, and capabilities that will lead to ambidextrous capabilities that will, in turn, lead to ambidextrous outcomes (Audretsch, 2007; Thurik, 2009). Figure 3-1 presents a framework that suggests how these elements are related.

In the following sections we present a framework based on prior research (cf., Thurik, 2009; Audretsch, 2007; Lin & McDonough, 2009) and present the research questions guiding the study discussed in this chapter.

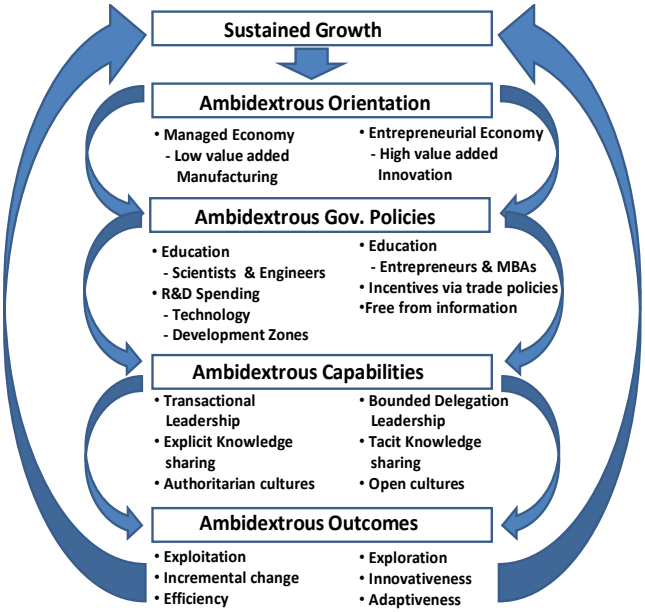

Figure 3-1. A Framework for Creating Ambidextrous Countries in Emerging Economies: The China Case

An Ambidextrous Framework

An Ambidextrous Orientation

According to Thurik (2009), a *managed economy* reflects the predominance of the production factors of capital and mostly unskilled labor as the sources of competitive advantage, while an *entrepreneurial economy* is dominated by knowledge as the essential production factor, as well as a complementary factor that has often been overlooked, which is the capacity to generate entrepreneurial activity. Managed economies are important to stimulate growth and to generate revenues that provide sources of funding for entrepreneurial

activity, but operate at the low end of the value chain. Entrepreneurial economies, on the other hand, are important for generating innovations and innovative activity at the high value added end of the value chain.

Unfortunately, too often governments in emerging economies adopt policies that exacerbate an emerging economy's tendency to emphasize a managed economy when what is needed are polices that facilitate entrepreneurialism. But, an economy based upon managing production requires totally different policies than ones where entrepreneurship needs to be stimulated (Audretsch, 2007). Indeed, policies and institutions which make a managed economy successful are often counterproductive in an entrepreneurial economy and may act as a deterrent to entrepreneurialism, rather than a stimulus. Thus, what is needed are a very different set of policies that will foster an entrepreneurial orientation that will allow countries to sustain their growth over the long run.

Ambidextrous Government Policies

Among emerging countries, none have had nearly the success that China has enjoyed in recent decades. China's governmental policies have played a critically important role in promoting double digit growth for more than a decade. One of the primary foci of China's governmental policies has been to promote FDI. And one of the primary means that they have used to do so is through the creation of 49 economic development zones. Government policy has also focused on spending for education, specifically for educating

scientists and engineers, as well as for buying technology. But, while these policies have worked quite effectively to facilitate low value added activities, they will not be effective to facilitate the high value added activities associated with entrepreneurialism (Baliamoune-Lutz, 2009).

Ironically, it has been suggested that the Chinese are among the most entrepreneurial people in the world (Perkowski, 2008). In line with this view, the emphasis of these policies does not need to be on directly fostering entrepreneurialism, but rather on creating a context within which entrepreneurialism can thrive. One important means of creating this context is to strike a balance in the focus of education that moves away its current emphasis on developing scientists and engineers and more toward developing entrepreneurial thinking by emphasizing international business programs, liberal arts training, MBA programs, and the like that will serve to provide a broad-based educational perspective that enables creative thinking – the core ingredient of entrepreneurial activity. An over-emphasis on formal R&D activity in large corporations is not conducive to the type of entrepreneurial orientation that we are suggesting is necessary for sustained growth (Thurik, 2009). Consider for example the Apples, HPs, and Googles of the entrepreneurial world, all of which started not as the result of R&D spending or projects in large corporations, but rather as entrepreneurial activity in garages.

Trade policies are the other way to create an entrepreneurial context. As Acs and Szerb (2007) point out, entrepreneurial firms must be able to move quickly and secure the highest

price/performance inputs wherever they are to be found, and they need to be able to sell their outputs to markets, regardless of where they are located. This means that governments cannot maintain artificial barriers to impede the movement of goods, services, capital and ideas across national borders (Brainard et al., 2005) and equally importantly, across internal boundaries.

A third ingredient in creating an entrepreneurial context is the free flow of information, and even more importantly, knowledge. There is little argument that the flow of information in China has become much more open and free. Nonetheless, creativity, ideation, and innovation are dependent on the ability of individuals to share, obtain, and create new knowledge in an arena unfettered by constraints and restrictions. This will require loosening of policies regarding the flow of information and knowledge. Included in this loosening needs to be the ability of individuals to meet and share new knowledge without concern for violating spoken or unspoken governmental policies.

Ambidextrous Capabilities

Managed economies, including China, are typically characterized by hierarchical leadership, limited information sharing, and authoritarian cultures (Audretsch, 2007). But, in order to promote entrepreneurialism, companies in these countries need to adopt a different set of strategic capabilities from ones characterizing their governments. These capabilities include senior leadership teams that possess leadership styles that will lead to the exploitation of existing

capabilities, on the one hand, and to the exploration of new knowledge and capabilities, on the other; systems and processes to facilitate tacit knowledge sharing that will facilitate these exploration and exploitation activities; and cultures that foster risk taking, freedom to fail, and openness (O'Reilly & Tushman, 2004; Gibson & Birkinshaw, 2004; Jansen et al., 2006).

Recent research suggests that what has been called a bounded delegation style of leadership (McDonough & Leifer, 1986) is particularly important in facilitating the development of cultures that foster risk taking, the freedom to fail, and openness, as well as knowledge sharing, all of which will lead to exploration and innovation (Lin & McDonough, 2009). A critically important aspect of a bounded delegation leadership style is the empowerment of individuals to make decisions with clear goal setting (McDonough & Leifer, 1986).

Ambidextrous Outcomes

A managed economy's policies, orientation, and capabilities are intended to lead to the exploitation of existing capabilities and an increasing emphasis on efficiency in order to drive down costs in order to facilitate growth and revenues. Any change that occurs is almost always of an incremental nature, and typically focuses on re-engineering efforts.

In contrast, outcomes resulting from an entrepreneurial orientation, entrepreneurial policies, and entrepreneurial capabilities include exploration activities, innovativeness, and adaptiveness. In

other words, whereas stability and routine are the goals of a managed economy, continual change and creativity are the goals of an entrepreneurial one (Thurik, 2009; Audretsch, 2007).

3.2. Research Question

The framework presented above includes the impact of governmental policy and organizational capabilities on a company's ability to generate efficient manufacturing, as well as innovation outcomes. While there has been a great deal of research on China's manufacturing economy and the impact it has had on their economic growth (Acs & Szerb, 2007), much less has been written about the innovative capability of companies, particularly smaller and medium sized ones. Yet, as Thurik (2009) proposes, for a country to continue to grow and develop economically requires that their companies develop an entrepreneurial, innovative orientation. Thus, the focus of this study, is on the relationship between organizational capabilities and innovation outcomes. In this chapter we investigate the innovativeness of Chinese companies by examining the following research questions: "What capabilities do Chinese companies possess that facilitate their ability to develop innovations?" "What factors influence these companies' ability to innovate?"

This research question is investigated through the use of a qualitative case study of Chinese companies. In the following section we elaborate on the methodology.

3.3. Methodology

Context

Among emerging countries, China is an ideal context for this study because the complexity and dynamism of this transitional environment means that firms must confront the challenges of new competition and dysfunctional capabilities (Li & Atuahene-Gima 2001, 2002; Atuahene-Gima, 2005). Thus, scholars suggest that company success in China requires that they posses both an exploration, as well as an exploitation orientation, capabilities that will support these orientations, and the strategic ability to successfully implement them (Luo & Park 2001; Atuahene-Gima, 2005). Atuahene-Gima (2005) has proposed, for example, that it is strategically important to simultaneously generate capabilities that allow for exploitation and exploration, which are differentially related to incremental and radical product innovation outcomes. Kodak's success in China, for instance, relies on the adaptation of its existing competencies and the development of new ones to respond to market changes (Luo, 2002). Moreover, scholars working in the field of societal culture research indicate that contextual factors influence managers' behaviors and management practices that in turn impact on capability exploitation and exploration (House et al., 2004).

Methods and Data

To investigate the innovativeness of Chinese companies, we used a case study research design. A case study design was particularly appropriate because our focus was on "how" and "why" questions

(Yin, 1994). A case study design is also appropriate for understanding the interaction among factors that impact on the process of innovation. It is also an important means of obtaining data from multiple sources, levels, and sections within the focal organization. A case study also allows us to access multiple sources of data from organizations and individuals outside of the focal organization.

We obtained our data through the use of a semi-structured interview instrument. This approach allowed us to be flexible in our questioning of respondents, to explain questions that were unclear, and most importantly, to allow us to probe into new areas and issues that arose during the interviews (Brown & Eisenhardt, 1997; McDonough & Leifer, 1986). Due to the exploratory nature of our research, and the inherent complexity of the innovation processes, we believe that a semi-structured interview was the best data collection procedure for our research. Moreover, studies suggest that senior managers are more likely to agree to be interviewed, rather than complete a questionnaire, especially where the interview topic is seen to be interesting and relevant to their own current work (Lawrence, 2000). An interview provides them with an opportunity to reflect on events without their needing to write down responses.

To develop insight into the broader process of innovation, we employed a grounded theory approach. Such an approach is ideal for searching for underlying patterns and consistencies (Stake, 1995). This search process and the subsequent data interpretation are at the heart of qualitative research (Erickson, 1986). Thus, instead of simply reporting on what was found, the researcher's role is to interpret

events and draw inferences from the data. A grounded theory approach is particularly well suited to aid in the understanding of the impact of contextual elements and the effect of key actors on this innovation process over time.

Data collection took place over a four year time span, beginning in 2005 and concluding in 2008. Our interview sample consisted of 36 managers from 24 companies who were students in Nanjing University's EMBA program, 26 managers from 21 companies who were participating in an executive training program in ShanDong province run by Cambridge College, and 13 managers from 10 companies that had received innovation funding from Zhoujong town in JiangSu province. The companies in our sample are small and medium sized companies, privately owned and state owned companies, joint ventures, and companies in a variety of industries including, automotive, plastic, leisure, and telecommunication and information technology. We conducted semi-structured face-to-face interviews with a total of 75 senior executives and managers in 55 companies. We interviewed these managers in Mandarin.

Based on accepted grounded theory methodology (Stake, 1995; Erickson, 1986; Eisenhardt, 1989; Brown & Eisenhardt, 1997; Strauss & Corbin, 1990; Glaser, 1992), each interview was conducted using a protocol that specified a relatively common set of open-ended questions. These questions (see Exhibit 3-1 below) stemmed from our review of the literature, interviews with three experts in the field, and interviews with senior executives in other firms engaged in R&D and new product development.

Our interview instrument asked questions to allow us to gather data regarding the management practices that these managers were employing, as well as the structure, operation, and performance of their companies as they impacted on their ability to generate innovations. Our interview questions also asked about the background of the participating companies, roles of individuals, relationships, capabilities, competitive advantages, and the importance of innovation to the company. As the interviews proceeded, follow-on questions were asked to pursue other relevant issues that arose during the course of each interview. Each interview took between 1½ to 2½ hours. During the data collection process each interview was recorded with the permission of the informant and subsequently transcribed. In addition, extensive notes were taken during the interviewing process. Exhibit 3-1 contains the questions of our semi-structured interview instrument.

Exhibit 3-1 - Interview Questions

1. What is your company's primary business? Who are your major customers?
2. What are the different ways companies compete in your industry?
3. Who are you major competitors? What is their key competitive advantage?
4. What is your company's competitive advantage? I.e., why do customers buy from you?
5. How does <u>your</u> company compete? What do you <u>know</u> that sustains that advantage?
6. How important is innovation to provide competitive advantage? Why do you say that? How innovative are you? What is the thrust of your innovation activity?
7. What does your company do to generate innovation?

In addition to the formal interviews, we talked with government officials, academics, and employees about the role and importance of innovation and factors that influence their ability to innovate. We also reviewed secondary data sources, company documents, as well as public documents. The reviewed data included organization charts, documents relating to each organization's new product development efforts and process, and information from the internet including each organization's web site. To these sources, we added the work of prior studies on innovation, and other Chinese companies' experiences in trying to innovate.

Data Analysis

Interview transcripts were content analyzed to identify general patterns in the data using an iterative process consisting of multiple readings of the interviews by the researchers. The goal of this process is to achieve convergence around a set of themes that emerge from the data. Not all aspects of the interviews and the data which result from the interviews are given equal emphasis in this process (Stake 1995). The authors read the interviews and took notes regarding themes and patterns in the data separately. Following this, the authors met to discuss each other's views. The transcripts were then read again. From this analysis, we were able to refine our thinking about the key patterns emerging from the data as they pertain to our proposed framework.

During this period we followed-up with discussions on key issues with some managers of our participating companies to clarify

points raised in the interviews. Following our preliminary analysis and sense-making, we provided on-site feedback to managers through dialogue sessions that involved many of the individuals interviewed at different locations. These feedback sessions were interactive and allowed us to reach a deeper understanding of our data, the process of innovation, and to obtain additional feedback.

3.4. Findings and Discussion

Our research questions asked, "What capabilities do Chinese companies possess that facilitate their ability to develop innovations?" and "What factors influence your ability to innovate?" In the following section, we present our findings and discussion as they relate to this research question.

The Process of Innovation

Before we discuss our findings, it is useful to consider the process of innovation. Innovation can be seen as a two step process. The first step is ideation or coming up with a new idea. However, while coming up with ideas is an essential first step in the innovation process, it is also critical to take the second step in the innovation process and put the idea into use, e.g., by commercializing a product or implementing a process (Porter & Ketels, 2003). While it is often an individual who comes up with an idea, executing the idea almost always requires the collective efforts of employees from different parts of the organization. This is why many studies of Western companies have found that more tightly controlled environments tend

to be associated with lower levels of innovation (McDonough & Leifer, 1983).

Innovativeness

In analyzing responses to the questions, “How innovative are you?” And “What is the thrust of your innovation activity?” (Exhibit 3-1), we found that 53 of our 55 companies (96%) responded that they are either innovative or very innovative. When asked to elaborate on the kinds of innovations that they are generating we found that they represented a considerable range of types. They included, management, process, and product and service innovation while time and money are concerns to the degree of innovativeness. These results suggest that the overall level of innovation in the Chinese companies in our sample is relatively high. Upon further examination of our data we found that it was the state-owned companies with almost monopoly products or services in their focused market that were non-innovative. We found that they faced little pressure to innovate as a result of their virtual monopoly status.

Contextual Factors and Capabilities

We next analyzed our data regarding responses to the question, “What does your company do to generate innovation?” (Exhibit 3-1) Analysis of these responses led to the identification of several capabilities, contextual factors, and best practices that facilitated innovation. The capabilities included senior leadership, the Confucian orientation, and the Chinese mindset. Innovation best practices

included 1) being close to the customer, 2) an awareness of the competition, 3) continuous learning, and 4) rewarding individuals for coming up with new ideas.

Senior Leadership and the Confucian Orientation

Given the command and control environment that generally permeates many Chinese companies (House et al., 2004), we might expect that teamwork and providing the team with authority to execute an innovation might be highly proscribed. Surprisingly, we found that this was not the case. In analyzing our results we found instead that the Confucian orientation that is central in Chinese companies played an important role in helping to overcoming the command and control environment.

The Confucian orientation that exists in China has created a society that accepts the notions of hierarchy and authority, deference to rank (wu-lun), and holds a deep respect for seniors, not just elders, in the social structure. Thus, when senior leaders make decisions and direct employees, employees accept this as appropriate and acceptable. Similarly, we found that when senior leaders came up with an innovative idea and asked employees to implement it, employees worked hard to ensure its successful implementation as a way of showing respect for their leader. As a result, instead of being a detriment, a command style of leadership actually became a facilitator of innovation by enabling the fast and effective execution of ideas.

A second critical aspect of the Confucian orientation that facilitated innovation is the importance placed on the collectivity and

ensuring the success of the group. We found that the desire of the group to be successful existed in all but three of the companies we studied. We present an example of this desire to illustrate the point.

In an effort to solve an overheating problem with an existing product, employees conducted a variety of experiments and searched for new materials. Unsuccessful on their own, they turned to their joint venture partner. They discovered that the partner had unique knowledge of a material that, when combined with their own knowledge about insulation and electrical current tolerances, enabled them to innovate a radically new type of transformer. Without a collective effort on the part of the employees, working with their partner, it would have been nearly impossible for them to have acquired the necessary new materials knowledge. In a society with a Confucian orientation, the combination of a command leadership style and a Confucian orientation ensure that useful ideas will be quickly acted upon and that they will be successfully implemented by the employees.

While the Confucian orientation helped to facilitate innovation, this same cultural heritage still plays a dampening role on innovation by not encouraging employees to voice ideas that could lead to innovations. Thus while the hierarchical orientation and respect for authority that pervades these companies helps facilitate the quick execution of the senior leader's ideas, it also serves to inhibit additional innovation by making employees reluctant to suggest ideas. Thus, this "capability" is, at present, only a partial aid to generating innovations.

The Chinese Mindset

The Chinese mindset is reflected in their philosophy drawn from Sun Tzu's "The Art of War." Chinese companies believe that they need to "use one's spear to attack one's shield," meaning that companies themselves need to recognize and probe for their own weaknesses and then turn these weaknesses into strengths before their competitors do through innovating and continual improvement. The war analogy is apt. We found a recurring theme in our data as illustrated in the following quote from the CEO of an automobile bumper manufacturer. "We have to continually innovate, always be better" according to." The almost insatiable desire to stay a step ahead of the competition meant that companies are always looking for the edge, in products, services, and new processes.

Another theme in our data was the mindset on winning. This focus on winning evidenced itself in managers continually looking for new ideas. They wanted to know how to do things better, faster, cheaper. We found that most Chinese managers felt that one either wins or loses, and losing is unacceptable.

The Frugality Orientation. We identified one other theme in our data with respect to the Chinese mindset. This aspect of the Chinese mindset is not rooted in the Confucian tradition and Chinese history, and yet, it may have one of the most powerful influences on Chinese companies' ability to compete on the basis of innovation. This aspect is the Chinese orientation toward frugality. A story that one Western

entrepreneur operating in China likes to share is telling. When he first started doing business in China (Perkowski, 2008), a potential vendor, who had come from the US to visit Jack, excitedly told him that he was able to get a great deal on a hotel he stayed in the night before. It was a four star hotel, and the asking price for a night's stay was $100, but he had managed to talk them down to only $50. When Jack didn't share the customer's excitement, the customer asked how come. Jack then told him that if it had been a Chinese manager from his company they would have started at 100 Chinese Yuan and bargained the hotel down to 50 Chinese Yuan for the night, and then two managers would have shared the same room! The point he was making was that US managers think about pricing and costs, they think in terms of $100, while Chinese managers think in terms of 100 Chinese Yuan.

This frugal focus represents a new source of innovation for Chinese companies. We found a focus on developing innovative low cost, low priced products for that segment of China's population numbering in the hundreds of millions who have the means to buy these products. These customers comprise what IBM calls the growth market in developing economies.

Innovation Best Practices

While managers in Western companies will say that their companies exhibit this same drive, our analysis of the data that we collected from Chinese executives suggests that Chinese workers are more motivated and hungrier than Chinese managers and their employees. The themes that we identified in our data included worker

intensity, very long work hours, and a fierce competitiveness on the part of worker. It's interesting to note how similar these are to the characteristics of workers in companies along Silicon Valley and Route 128 just a few decades ago. This is in line with another theme we identified in our data that these managers felt that the workers' motivation to work in Western countries has decreased, further widening the gap between Chinese and Western workers. As more and more workers in Western countries achieved their basic physiological needs, there may be less motivation to work as hard. Instead, their may focus increasingly on self-actualization (Maslow, 1943). Chinese workers, on the other hand, are still focused on achieving their basic physiological needs, thus fueling their desire to work exceptionally hard.

As a consequence of the constant probing for weaknesses and the focus on winning, we found that companies adopted a series of innovation best practices including, 1) being close to the customer, 2) an awareness of the competition, 3) continuous learning, and 4) rewarding individuals for coming up with new ideas. These practices are the same innovation best practices that companies in the West engage in (Cooper, 1976). More noteworthy is that these Chinese companies appear to have "caught up" with their Western counterpart companies. Below we elaborate on how these best practices manifested themselves in Chinese companies.

- **Close to the customer.** At an automobile parts manufacturer, for example, the CEO talked about how his

employees “are encouraged to meet with customers and to find out whether they are satisfied with the company’s products and services.” At an Assets and Equity Exchange company, they undertook a process innovation so that they could provide extra service. “Our competitive strategy is a service strategy,” the General Manager said. “We provide an integrated and complete range of services to the customer including, advice about assets rights, the load of assets, and how customers can protect their rights.”

- **Awareness of the competition.** We heard an almost constant refrain from the companies we studied that they make a conscious effort to collect information from the market and competitors in order to see whether any improvements can be made to their products and services.

- **Continuous learning.** The President of an investment and development company, for example, told us about his company’s training and learning programs for employees. “We use 10% of our sales revenue for training and every year, top management chooses one employee to go on an Executive MBA course. We also have team learning, professional workshops, and also send employees to visit overseas companies. We also encourage self-learning.”

- **Rewarding new ideas.** We also found that “new ideas creation” is increasingly being used in annual employee

evaluations. Giving employees rewards is also being used to encourage employees to generate more and more ideas. According to one President we spoke with, for example, “For any rational suggestion, we give a reward no matter if it is useful or not because we believe this promotes innovation in our company.” At a telecommunication company, the General Manager proudly declared that, “We reward employees who come up with at least two new ideas every three months, even if the idea is very small.”

3.5. Implications

The aim of this study was to investigate the capabilities that Chinese companies possess that might facilitate their ability to develop innovations. We employed a qualitative research approach to obtain insights into this question. We found that the Confucian tradition, the Chinese mindset, and a Frugal orientation all contributed to facilitating innovation. The ability of Chinese companies to innovate, although still in a formative state, suggests that they are becoming increasingly ambidextrous. As noted above, it is this ambidextrous orientation that is important to their ability to sustain growth in the long term.

Our findings suggest that Chinese companies are full of hungry entrepreneurs brimming with ideas for new products, new services, and new businesses. These companies are staffed by employees who enable the swift and effective implementation of these ideas and who are using innovation best practices. And, they are focusing on cost

containment allowing the development of inexpensive products for a vast market.

Add to this, China's increasing focus on creating an ambidextrous economy that is a combination of a managed economy focused on the low-cost manufacturing sector, and an entrepreneurial economy focused on generating innovation. China is keenly aware of the limitations of their low-cost manufacturing orientation and of the importance of competing on the basis of innovation. China's leadership has made clear China's ambition to become "an innovation-oriented country" by 2020[i]. China's goal is to take advantage of innovation to achieve its goal of growing its 2000 Gross Domestic Product by 400% by 2020, with a resulting per capita average income of US$3,000. It also expects to compete with the European Union, Japan, and the United States on R&D intensity[ii].

Heightening China's urgency to adopt an innovative orientation is the shift by international companies away from China as a low cost manufacturing economy and toward even lower cost countries including Vietnam, Malaysia, and Thailand. These countries are already beginning to replace China as the preferred location for low cost manufacturing. And as further demonstration of China's awareness of the need to shift from a low cost orientation, many Chinese companies are moving operations out of China and into Africa where they are able to manufacture goods at lower cost.

Recognizing the need to foster innovation, the Chinese

government is leading the country away from a managed economy to an entrepreneurial one by encouraging entrepreneurial behavior by providing billions of dollars in support for new ventures and research and development. So, as China begins to compete not simply on the basis of low cost, low value added manufacturing, but also on the basis of higher value added innovation for the fastest growing markets in the world, where does that leave Western companies? What course of action do they need to take?

Perhaps of most importance is for Western managers to recognize the current state of innovation in Chinese companies. In the past, many Western companies that have partnered with Chinese companies have tended to shy away from involving them in the innovation process, either out of concern for losing intellectual capital to their partner or because of the feeling that they were incapable of contributing to the innovation process. As the above analysis makes clear, the latter concern is no longer valid. Regarding the former issue, it is clear that Chinese are not waiting for the West to come to them to engage in innovation, particularly low-cost innovation. Given the huge disparity in mindset toward frugality between Chinese companies and their Western counterparts, Western companies may have little choice but to fully engage Chinese companies in the process of developing new products, new services, and new businesses. Such engagement will mean actually empowering Chinese managers and employees to make decisions relating to innovation and the innovation process.

3.6. Conclusions

The extent to which Chinese companies are engaging in innovation best practices is surprising. Given the Chinese mindset of constant probing and win at all costs, we should expect that Chinese companies will rapidly become more and more innovative, adapting more and more innovation best practices and doing an increasingly better and better job of implementing and executing them. In fact, new evidence suggests that Chinese companies are making much more progress innovating than western managers may be aware of. A 2009 report by INSEAD[iii], one of Europe's leading business schools, notes that innovation is becoming a key competitive advantage for China. Based on the huge sums of money being poured into R&D (China has already overtaken Japan to become the world's second largest investor in R&D - after the US), they conclude that China is indeed serious about moving up the innovation chain. Other reports, including the World Economic Forum's 2008 report and the 2008 OECD report, indicate that China is also moving up the innovation chain, spending huge sums on technology, professional education, and R&D.

To succeed, it will become increasingly important for western companies to leverage Chinese expertise and knowledge in the innovation process, and especially the art of low-cost innovation, in order to generate products and services for customers in growth markets that meet their needs and address their problems. Because it is not clear that Western companies are capable of adopting such a low-cost innovation mindset on their own, it may be necessary for

them to partner with Chinese companies. The nature of this partnering, however, will have to take on a significantly different form from earlier versions of US-Chinese partnerships. It will have to be much more equal, with senior management positions filled by Chinese nationals, and true empowerment accorded to these managers, as well as those on the front lines of the company. The cost orientation of the Chinese is so very different from that of Western managers that there may be little choice but to staff senior level positions with Chinese nationals and empower them to make decisions that will enable companies to be cost effective.

3.7. Limitation and Future Research

Our findings are limited as a consequence of the focus on companies in only one country, China, on companies that are small and medium sized, and by the relatively small sample. Given the huge territory of China, a comprehensive understanding into the capability that companies possess in the innovation intensive industries require much more study. Future research should continue to conduct in-depth case studies, while refining the research methods for large survey-based studies. What is clear is that small, new ventures are different from large corporations, and their capabilities are likely different. A more fine-grained approach investigating the extent of the capabilities that Chinese companies posses that enable them to innovate independently across provinces would be a promising future study. Capability, entrepreneurship and strategic management researchers would be well served to make this area a central tenet of

future study – as understanding and replicating successful innovation is a key to economic growth.

However, this is not only a Chinese phenomena; it may also apply to other emerging countries with competitive conditions similar to China's. It is interesting to speculate, for example, the extent to which the approach we are suggesting needs to be taken in China is also appropriate to India (Cappelli, Singh, Singh, and Useem, 2010).

Chapter 4

The Role of Antecedents In Fostering Innovation Ambidexterity: The First Taiwan Case

(This chapter is based upon an accepted article at IEEE Transaction Engineering Management)

ABSTRACT

This paper examines the relationships among two antecedents – the leadership styles of strategic leaders and the cultures of their organizations - and how these relationships impact on innovation ambidexterity, i.e., the attainment of high levels of both incremental and radical innovation. Using empirical data derived from a research study of 125 firms in Taiwan, we applied multiple regression analyses to test our hypotheses that a knowledge sharing organizational culture is directly associated with innovation ambidexterity, and strategic leadership is directly associated with knowledge sharing culture. The Sobel test and bootstrapping approach was used to test the mediating effect of organizational culture on the strategic leadership and innovation ambidexterity relationship. We find a significantly positive relationship between a higher the level of knowledge sharing organizational culture and greater innovation ambidexterity, and between strategic leadership and the development of a knowledge sharing organizational culture, and that a knowledge sharing culture

mediated the relationship between strategic leadership and innovation ambidexterity. Thus, our findings support our three hypotheses. We conclude with a discussion of the managerial implications of our findings, and directions for future research.

4.1. Introduction

A central tenant in the ambidexterity literature is the need for organizations to undertake exploitation and exploration simultaneously in order to succeed. The importance of ambidexterity in the form of exploration and exploitation lies in its potential for improving business performance and sustaining competitive advantage (cf., Gibson & Birkinshaw, 2004; He & Wong, 2004). Yet, the activities of exploration and exploitation are inherently inconsistent and contradictory (Simsek, 2009). Where exploration is rooted in variance-increasing activities, learning by doing, and trial and error, exploitation is rooted in variance-decreasing activities and disciplined problem solving. Where exploitation builds on an organization's past accomplishments and actions, exploration creates new capabilities and takes new approaches that may be quite different than the organization's past. Moreover, new products and processes born of exploration are often in direct competition with existing products and processes (Smith & Tushman, 2005).

It has been argued that strategic leadership plays a crucial role in mediating between forces for exploration such as innovation and change, and inertial forces for exploitation of the status quo (Virany, Tushman &.Romanelli, 1992; He & Wong, 2004). In mediating these contradictory forces, strategic leaders need to make decisions and take actions that enable and encourage the firm to balance exploration as well as exploitation. One action that leaders can take is the creation of an organization culture.

The purpose of this study is to investigate the role of strategic

leadership in creating an organization culture within which the contradictory forces for exploration and exploitation vie. Although it has been argued that strategic leadership plays a crucial role in fostering exploration and exploitation (Virany, Tushman & Romanelli, 1992; He & Wong, 2004), this is the first study to empirically investigate the role of leadership in creating a culture that in turn, facilitates exploration and exploitation activities in the form of incremental and radical product and process innovation. By doing so, our study contributes to our understanding of ambidexterity by identifying the role that particular organization cultures play in mediating the leadership and ambidexterity relationship.

The aim of this study is to add to the growing dialogue on ambidexterity (i.e., the ability to do different things at the same time) in three important ways. First, this study sheds light on how leaders of organizations can cope effectively with complex demands and contradictory situations that arise as a result of the need for ambidexterity. Second, our findings contribute to our understanding of ambidexterity by identifying the role that particular organization cultures play in mediating the leadership and ambidexterity relationship. To examine these issues, we rely on strategic leadership theory as it relates to fostering a sharing and learning organization culture that results in exploitative and explorative activities. In doing so, we explore the mediating role of culture types that form organizational routines to assist in achieving innovation ambidexterity. Ambidexterity research has examined the relationships between leadership and ambidexterity (Jung, Wu & Chow, 2008) and between

context and ambidexterity (Gibson & Birkinshaw, 2004), but has not empirically examined the role of leadership in creating a culture that, in turn, leads to ambidexterity.

A third important contribution of our study is to broaden our understanding of the leadership, culture, ambidexterity relationship in a non-Western country, Taiwan. Research on leadership and innovation has had a tendency to focus on Western countries such as North America or Western Europe (Jackson & Schuler, 1995; Porter, 1985; Wright & McMahan, 1992; Elenkov, Judge & Wright, 2005). With few exceptions (cf., Jung, Wu & Chow, 2008), there is a very limited base of knowledge regarding the leadership behaviors that enhance innovation performance in non-Western countries (House & Aditya, 1997). Thus, our study will contribute to our understanding of ambidexterity theory in a non-Western context, Taiwan.

Taiwan presents an interesting context for our study for at least two reasons. First, Taiwan has shown an innovation orientation in many aspects, e.g. the development of high technology products and creative design[2]. Thus, it provides an ideal context for a study that focuses on innovation. Second, Taiwan provides a unique context for studying the interplay between leadership styles and organizational

[2]Taiwan ranks at the top 1 in utility patents. Number of utility patents (i.e., patents for invention) per million people granted between January 1 and December 31, 2007. In addition, Taiwanese companies rank number 16 in terms of R&D spending. Source: World Economic Forum, Global Competitiveness Report 2008-2009, Section XII: Innovation, Executive opinion survey 2007, 2008, available at: www.weforum.org, accessed October 12, 2008.

culture. Taiwan is a country characterized by Western capitalism mixed with a Confucian orientation, which is manifested in many respects including management practices and individual behaviors thus making it important to study the leadership, culture, ambidexterity relationship in a variety of cultural contexts.

4.2. Background

4.2.1. Ambidexterity, Exploitation, Exploration, and Innovation

Ambidexterity literally refers to being equally skillful with each hand, but has been used increasingly by organizational researchers as a metaphor for organizations that are equally dexterous at exploiting and exploring activities (Simsek, 2009). Accordingly, an effective ambidextrous organization is expected to maintain a high degree of both exploitation and exploration (March, 1991). Earlier researchers used the term ‘ambidextrous’ to distinguish behaviors and outcomes within the organization (Duncan, 1976). Subsequently, the concept of ambidexterity has been used to more broadly refer to an organization’s ability to do different things at the same time, such as exploitation and exploration, efficiency and flexibility, alignment and adaptability, or incremental and radical innovation (McDonough & Leifer, 1983; Gibson & Birkinshaw, 2004; He & Wong, 2004; Lubatkin, Simsek, Ling, & Veiga, 2006; Simsek, 2009).

The term organizational ambidexterity has been inconsistently defined as referring to behavioral ambidexterity, structural ambidexterity, or realized ambidexterity (Simsek, 2009). In using these definitions of ambidexterity, researchers have implied in many

cases the achievement of high levels of both incremental and radical innovation, but have not been explicit in their definition. Thus to avoid ambiguity, we explicitly refer to what we call “innovation ambidexterity” (IA hereafter) to refer to the attainment of high levels of both incremental and radical innovation. In doing so, we distinguish our focus from other researchers who have studied structural or behavioral ambidexterity.

Research that has focused explicitly on an organization’s actual exploration and exploitation performance has suggested that ambidextrous organizations are capable of successfully attaining both incremental and radical innovations for products and processes (Bender, Cedeno, Cirone, Klaus, Leahy, & Menyhert, 2000; Smith & Tushman, 2005). Incremental innovations designed to meet the needs of existing customers are considered exploitative because they build upon existing organizational knowledge. In contrast, radical innovations or those intended for emergent customers or markets are considered exploratory, since they require new knowledge or departures from existing skills (Levinthal & March, 1993; March, 1991). Process innovations, on the other hand, are new processes within an organization, e.g., activity based accounting, new business practices, relationship marketing, organizational structures, virtual teams, and manufacturing processes. Thus, they can be either exploitative or exploratory or both (cf., Bender et al., 2000; Davenport, 1993).

It is also important to recognize that IA (i.e., the attainment of high levels of both incremental and radical innovation), as we have defined it, refers to a performance oriented outcome. Prior research has proposed specific behaviors and context that can help to facilitate and sustain ambidexterity (i.e., the ability to do different things simultaneously), and it has been proposed that such behaviors and context include strategic leadership behavior and organization culture (O'Reilly & Tushman, 2004; Gibson & Birkinshaw, 2004; Simsek, 2009; Vera & Crossan, 2004). We elaborate on the relationships among leadership behaviors, organizational culture, and IA (i.e., the attainment of high levels of both incremental and radical innovation) in next section.

4.2.2. Leadership Behaviors, Organizational Culture, and Innovation Ambidexterity

Because the tasks of exploring and exploiting involve radically different activities, they often require different skills and leadership styles (Leonard-Barton, 1992; Sutton, 2002; Quinn, 1984). Leaders who are effective in fostering both tasks need to have the ability to deal with the consequent behavioral complexity that is generated from needing to perform multiple and contradictory roles and to create meaning in the context of contradiction (Denison, Hooijberg, & Quinn, 1995; Hooijberg, 1992). Effectively managing these inconsistencies and contradictions requires that senior leaders juggle these internal inconsistencies (He & Wong, 2004; Tushman & O'Reilly, 1996).

Leaders without this ability or the desire to manage these contradictions, i.e., leaders who "privilege consistency over inconsistency," will respond to these uncertainties and contradictions by moving toward reducing inconsistencies (Lewis, 2000; Denison, Hooijberg & Quinn, 1995). This may result in an imbalance between exploration and exploitation, in turn leading to reduced IA (i.e., the attainment of high levels of both incremental and radical innovation).

In contrast, leaders who manage these internal inconsistencies take account of both inconsistencies and consistencies simultaneously and in so doing enable the organization and its members to manage and embrace the contradictions that they face Tushman & O'Reilly, 1996; Lubatkin, Simsek, Ling, & Veiga, 2006). For example, leaders can create a culture by sharing and fostering expectations, ideas, values, attitudes, and behaviors with the members of an organization. Thus organizational culture can be a mechanism that can infuse values such as uncertainty tolerance, openness to challenges, and trust that will not only enable the alignment of "inconsistencies," but also turn "inconsistencies into consistencies" by making them part of organizational routines. As a result, managing the paradoxes associated with consistencies and inconsistencies becomes a shared responsibility, not only of top management, but across organizational levels (Andriopoulos & Lewis, 2009).

Earlier work on leadership proposed that effective senior leaders were ones who were able to successfully manage the behavioral complexity that they confront in their daily work life. That is,

effective leadership must be the ability to both conceive and perform multiple and contradictory roles (Hooijberg, 1992). Research on ambidexterity (cf., O'Reilly & Tushman, 2004; Gibson & Birkinshaw, 2004; Vera & Crossan, 2004) has considered effective leadership as a critical component of achieving ambidexterity (i.e., the ability to do different things simultaneously). And recently, it has begun to examine TMT (i.e., top management team) characteristics and processes that can "*directly* enable the organization to manage and embrace the contradictions that they face" (Simsek, 2009). Smith and Tushman (2005), e.g., theorize that establishing paradoxical cognitive frames and processes among senior executives enables the organization to balance strategic contradictions between exploration and exploitation. Lubatkin et al., (2006) have synthesized these arguments by focusing on the pivotal role of behavioral integration, an all-inclusive TMT (i.e., top management team) process construct that captures the level of the senior team's wholeness and unity of effort. A behaviorally integrated team synchronizes the social and task processes associated with collaborative behavior, quality of information exchange, and joint decision making (Hambrick, 1995). Simsek et al. (2005) have argued that "a behaviorally integrated TMT (i.e., top management team) acts as a forum in which executives openly and freely exchange differing knowledge, resolve conflicts, and create a set of shared perceptions, which then can be integrated and acted upon to facilitate Organizational Ambidexterity (i.e., the organization's ability to do different things simultaneously).

But, as Vera and Crossan (2004) suggest, leaders also need to

promote learning in order to facilitate incremental and discontinuous innovation, exploration and exploitation, flexibility and control, and feed-forward and feedback learning. In developing their theoretical perspective, they recognize the role of strategic leadership in facilitating ambidexterity, but focus specifically on transactional and transformational leadership in the development of their theory on the processes facilitating followers' learning behaviors. We build on their theory by further delineating the differences between transformational leadership and strategic leadership.

Prior research (cf., Boal & Hooijberg, 2000) identifies strategic leadership as looking at the overall responsibilities of leaders, while transformational leadership emphasizes the interpersonal processes between leader and followers. That is, strategic leadership focuses on those who have overall responsibility for the organization, including not only the titular head of the organization, but also members of what are referred to as the top management team or dominant coalition (Cyert & March, 1963). Strategic leadership theorists (Hambrick & Mason, 1984) assert that top managers are crucial to firm outcomes because of the decisions they are empowered to make and because, "ultimately, they account for what happens to the organization" (Hambrick, 1989). Strategic leadership is thus defined as leadership which focuses on the creation of meaning and purpose for the organization along with the evolution of the organization as a whole. In other words, strategic leadership takes broad responsibility including strategy making, organizational operations, and their implementation (cf., Boal & Hooijberg, 2000).

Thus, while prior research provides insight into leadership behavior and ambidexterity (i.e., the ability to do different things at same time) by looking at transformational vs. transaction leadership (cf., Vera & Crossan, 2004), we focus on strategic leadership and organizational learning to extend our understanding of how senior leaders manage behavioral complexity in order to facilitate exploitation and exploration. To clarify the overall responsibilities and effects of strategic leadership, we examine the attributes of strategic leadership in terms of their external (to the organization) behaviors, as well as their internally oriented behaviors, and the effects of these behaviors on the development of a knowledge sharing organizational culture and IA. Figure 4-1 illustrates our proposed model.

Figure 4-1. Proposed Relationships among Strategic Leadership, Organization Culture, & Innovation Ambidexterity: The First Taiwan Case

In the following sections, we discuss the current literature on organizational culture in general, with a focus on knowledge sharing culture in particular, and both external and internal oriented leadership behaviors and their effects on innovation ambidexterity (i.e., the attainment of high level of both incremental and radical innovation). We use this discussion to develop our hypotheses.

Subsequently, our statistical approaches are elaborated. In the final section, we discuss our research contributions and limitations, and we explore the theoretical and managerial implications of our findings.

4.3. Hypotheses

4.3.1. Organizational culture and Innovation Ambidexterity

There is general agreement that context is an important antecedent of organizational ambidexterity (Gibson & Birkinshaw, 2004; Benner & Tushman, 2003; O'Reilly & Tushman, 2004; Tiwana, 2008; Simsek, 2009). Earlier work, e.g., Ghoshal and Bartlett (1994) depict context as the largely invisible set of stimuli and pressures that can shape individual and collective behaviors toward ambidexterity. Building on Ghoshal and Bartlett (1994), Gibson and Birkinshaw (2004) propose that enabling shared values that aid coordination may complement dual structures and strategies in achieving what they refer to as contextual ambidexterity. However, Benner and Tushman (2003) suggest that ambidextrous organizations should provide the complex context for both exploitative and exploratory activities to coexist. This complex context comprises of both loose cultures and processes for exploratory activity related to radical innovation on one hand, and tight cultures and processes for the exploitation of relatively incremental innovation on the other.

While prior research has provided insights on context and its possible influence on ambidexterity including exploitation and exploration activities, it has not actually looked at how to create a context with a specific type of culture that will enable the attainment

of exploitation and exploration simultaneously. Thus, while we concur with previous authors on the idea that ambidexterity is an organization's capacity to simultaneously achieve alignment and adaptability within a single business unit, we suggest that doing so requires that organizations create a culture that fosters learning and knowledge sharing that will enable members of the organization to exploit existing competencies on the one hand and explore new capabilities on the other, thus resulting in IA (i.e., the attainment of high level of both incremental and radical innovation).

Although variously defined, most scholars agree that organizational culture is something holistic, historically determined, socially constructed, soft, and difficult to change (Menzel, Krauss, Ulijn, & Weggeman, 2008). Organizational culture, as such, represents a complex pattern of expectations, ideas, values, attitudes, and behaviors shared by the members of an organization that evolve over time. None of these components individually represents the culture of the organization, but taken together they reflect and give meaning to the concept of organizational culture (Trice & Beyer, 1984).

The concept of organizational culture has long been recognized as a major factor for organizational success (Schein, 1992; Deal & Kennedy, 1982; Kotter & Heskett, 1992). Prior research, e.g., has found that the culture of an organization has a major influence on current strategies, future changes, and how pertinent decisions are made (Deal & Kennedy, 1982; Lee & Yu, 2004; Kotter & Heskett, 1992; Ouchi, 1980; Ireland & Hitt, 1999; Jung, Wu, Chow, 2008). In

particular, it has been suggested that organizational culture is an important influence in the process of innovating in organizations (Chandler, Keller, Lyon, 2000), because while an innovation is developed and carried out by individuals, the context within which innovation occurs is provided by organizations. And it is this context that can serve as a supportive foundation for innovation.

A knowledge sharing culture, e.g., that fosters the values of uncertainty tolerance, openness to challenge, and trust may help to enhance the exploitation of existing knowledge and the exploration for new capabilities (O'Reilly, Chatman, Caldwell, 1991). In order for people to be open, i.e., to reveal ideas, problems they have encountered, and new learning, individuals must trust the individuals with whom they are being open and with whom they are sharing. At the same time, trust needs to be built. It does not automatically flourish. One important means for trust to form is through the development of mutual respect. An individual is more willing to trust another if they respect that the other will do what they say they will do and that they are capable of doing what they say they can do (Wang, Lan & Xie, 2008).

Consequently, in a knowledge sharing culture, individuals or groups are more inclined to take innovation initiatives (Amabile et al., 1996). Thus, we may expect that a knowledge sharing culture will allow for different levels of creativity and allow for the transfer of knowledge that will result in both product and process innovation. And once a sharing culture is created it can lead to creative behaviors and knowledge transfer that can result in product and process

innovation. The sharing norm, in turn, is an important means of allowing organization members' views and opinions to be heard, for knowledge to be transferred, and for learning to occur (Damanpour, 1991; Ahmed, 1998; McDermott, 1999; Menzel et al., 2008), all of which, in turn, encourage exploitative and explorative activities.

Taken together, we suggest that organization cultures that foster learning and knowledge sharing are particularly conducive to the attainment of IA (the attainment of high level of both incremental and radical innovation) because they provide employees with opportunities to explore, investigate, experiment, and share knowledge and ideas, thus simultaneously fostering multiple types of innovation, i.e., innovation ambidexterity (Amabile et al., 1996; Anand, Gardner, Morris, 2007; Sackmann, 2003,2006; Ulwick, 2002; Woodman, Sawyer, Griffin, 1993). Based on the above, we propose:

H1. A stronger organizational culture that fosters knowledge sharing will lead to higher levels of innovation ambidexterity.

4.3.2. Strategic Leadership Styles and Organizational Culture

While an organizational culture foster knowledge sharing may lead to innovation ambidexterity (i.e., the attainment of high level of both incremental and radical innovation), it is important to address the question of how such a culture is formed. A number of researchers have suggested that the creation of a learning culture depends on the strategic leader (Hurley & Hult, 1998; McGill & Slocum, 1993; Sinkula, Baker, & Noordewler, 1997). Thus, it is important to

understand how the behaviors of a firm's strategic leaders and the roles they play affect the creation of such a culture (Vera & Crossan, 2004; Amabile et al., 1996). Some suggest that organizational culture is an intangible mechanism that leaders create by infusing members with values and norms that they wish their members to have (Amabile, 1997; Gibson & Birkinshaw, 2004; Leonard-Barton, 1992), while others propose that the promotion of a culture requires senior leaders' support and involvement (Ireland & Hitt, 1999; Elenkov et al., 2005; Vera & Crossan, 2004). In both cases, leadership is seen as playing an instrumental role in fostering innovation by affecting the type of organizational culture within which individual behavior is manifested.

Broadly speaking, strategic leaders engage in a dual set of behaviors. On the one hand they focus externally by going out into the organization's external environment to gather intelligence about changes in the environment, competitive conditions, and the organization's competitive position relative to their environment. Obtaining knowledge from outside of the organization is an important source of external learning and new knowledge exploration (Allen & Cohen, 1969; Laursen & Salter, 2006; Lorenzoni & Lipparini, 1999; Shan & Song, 1997) and helps leaders secure, absorb, understand, and integrate new knowledge and ideas (Tushman, Anderson, O'Reilly, 1997; Boal & Hooijberg, 2000). By monitoring the organization's external environment, leaders can gather competitive intelligence about market trends. Additionally, being immersed in the organization's external environment enables these leaders to obtain customer feedback, learn of their customers' problems and needs, and

obtain market information.

In serving as conduits for information between customers and the organization, leaders are in a position to link customer needs and problems with product development efforts within the organization. These efforts can lead to both exploitation and exploration behaviors (Auh & Menguc, 2005; Mom, Van den Bosch, & Volberda, 2007; Baum, Li, & Usher, 2000; Katila & Ahuja, 2002) that can result in incremental types of innovation (Damanpour, 1991; Damanpour & Evan, 1984; Ulwick, 2002; Knight, 1967), more radical innovation (Dodgson, 1993; Chesbrough, 2003; Hagedoorn & Cloodt, 2002), as well as process innovation (Damanpour, 1991).

Strategic leaders play a second key role in the creation of a learning culture. By bringing information and knowledge into the organization and circulating it, the leader is modelling the behaviour that they wish others in the organization to engage in and in this way is establishing norms and values, thus creating a culture for the organization. The learning that results from the knowledge that strategic leaders bring into the organization from the external environment serves as a platform for innovation. It can inform the organization regarding the need to update the ways of doing things better, as well as stimulate thinking about what new processes, workflows, and structures might look like. In this way the leader is creating a context for managing multiple types of innovation inside the organization which facilitate a balance of exploiting and exploring activities among organizational members.

But while strategic leaders play an important role in bringing

information, knowledge, and ideas into the organization, if left unused, such information, knowledge, and ideas are of little use to the organization. Thus, in order to ignite the creativity of employees, strategic leaders need to help employees exploit and explore this information and knowledge, by encouraging them to re-think ideas and look at problems from different angles, and to arouse their curiosity about new ways of doing things (Amabile, 1997; Ghoshal & Bartlett, 1994; Gibson & Birkinshaw, 2004). By engaging in these behaviors the strategic leader helps to create a knowledge sharing culture that is characterized by an openness for ideas and mutual trust among individuals that results in knowledge sharing and learning (Amabile et al., 1996; Anand et al., 2007; Sackmann, 2003, 2006; Ulwick, 2002; Woodman et al., 1993).

In facilitating these behaviors, strategic leaders are promoting cultural norms of behavior that also enhance interactions and collaboration among organizational members that can, in turn, lead to exploitation and exploration activities. Thus, while this knowledge sharing can have a direct effect on promoting learning, the act of sharing and circulating knowledge from outside to inside the organization and across departments also serves as a strong signal regarding the types of behaviors that are desired. Thus, by serving as a "role model," the leader is promoting norms of behavior that can help to facilitate innovation. Modeling behavior on the part of strategic leaders can also encourage organization members to share ideas and knowledge about new processes, solutions to customer problems, and radically new products.

Based on the above, we posit that by facilitating knowledge flows from outside the organization and fostering idea sharing within it, strategic leaders help to create an organizational culture fostering knowledge sharing.

H2: Strategic leadership is positively related to a knowledge sharing organizational culture.

4.3.3. The Mediating Effect of Organizational Culture

We also argue that organizational culture *mediates* the relationship between strategic leadership and innovation ambidexterity (i.e., the attainment of high level of both incremental and radical innovation). That is, strategic leadership influences the attainment of innovation ambidexterity *through* the creation of a knowledge sharing organizational culture. The reason for hypothesizing a mediating effect is that organizational culture is seen as a mechanism for reinforcing values, direction, goals, attitudes, and actions of organizational members that is generated by the various actions of strategic leaders. Further, we suggest that unless strategic leaders develop a knowledge sharing culture, strategic leadership, in and of itself will have a less positive impact on innovation ambidexterity than will the combined effects of leadership and culture.

Organizational capability theorists recognize that organizational culture is not only a mechanism but also a core capability for managing multiple types of innovation including product and process

and incremental and radical innovations (Leonard-Barton, 1992; Teece & Pisano, 1994). However, prior research also suggests that long-term competitive advantage does not lie in the capabilities themselves, but rather in the results obtained from employing these core capabilities, e.g., organizational culture (Eisenhardt & Martin, 2000). To employ organizational core capabilities, researchers have suggested that "behavioral integration" may be an effective approach for organizations to achieve ambidexterity in terms of exploiting existing capabilities and exploring new knowledge as a whole (Hambrick, 1995; Lubatkin et al, 2006). Hambrick (1995) describes behavioral integration as a unifying effort through which top leaders synchronize their strategies and task processes. Lubatkin et al. (2006) theorize that greater behavioral integration helps executives cope with the contradictory knowledge processes of exploitation and exploration and enable their joint pursuit. Specifically, capabilities, such as organization culture, that enhance interpersonal relations help organizational members throughout the firm think and act ambidextrously (Gibson & Birkinshaw, 2004). Using this line of reasoning, it is unlikely that a leader could simply institute exploitative and explorative activities to achieve ambidexterity (i.e., the ability to do different things simultaneously). Rather leaders need to shape and integrate the behaviors of the organization's members through the creation of norms of behavior that will lead to individuals pursuing exploitation and exploration and thus the generation of a high level of IA (i.e., the attainment of high level of both incremental and radical innovation) (Gibson & Birkinshaw, 2004; Vera & Crossan,

2004; Simsek, 2009). Based on the above, we propose:

H3: A knowledge sharing organizational culture mediates the relationship between strategic leadership and innovation ambidexterity.

4.4. Methodology

This section describes the methodology of the study. The first subsection presents the empirical context. We then describe data collection methods including sample, sample profile, questionnaire survey and respondents at each SBU/Company, and measures and control variables. We also present aggregation and measurement validation in the subsequent subsections.

4.4.1. Empirical Context

Our empirical setting was the companies listed on the General Chamber of Commerce of Taiwan and operating in chemicals, pharmaceuticals, financial management, mechanical engineering, and electronic engineering sectors. These sectors have been shown to be more innovation oriented than others in recent decades in terms of the number of processes and commercialized products and services. Prior research has suggested that this context could provide insights on the innovation processes and effectiveness (cf., Elenkov et al., 2005; Jibu, Yarime, Miyake, Fukuda, Nakagawa & Y. Harayama, 2007). Thus, we

invited companies in these sectors to participate in our survey within this sampling frame. The sampled companies had to meet two criteria including 1) the importance of innovation to the industry and 2) the importance of innovation to the company. Companies were contacted directly to ascertain their interest in participating once they fit the above criteria in the study.

Following the suggestion of research on ambidexterity that a business unit is a meaningful level at which to examine organizational ambidexterity (i.e., organization's ability to do different things at same time) (Simsek, 2009), our study was focused on the company's strategic business unit (SBU) level. A SBU is defined as a profit center responsible for performance in one or more markets with the authority to influence the choice of the business' competitive strategy in its target markets. By focusing on the SBU, the likelihood that each respondent is well acquainted with the strategies, general processes, management, and performance of the SBU is increased (Narver & Slater, 2004).

4.4.2. Data

To test our hypotheses, we gathered primary data from our sample. Following the suggestions of Podsakoff, MacKenzie, Lee and Podsakoff (2003), we constructed separate questionnaires to gather data for the independent (i.e., strategic leadership style and organizational culture) and dependent (i.e., innovation ambidexterity) variables in order to avoid self report and self evaluation that can result in common method bias. The set of survey questionnaires was

distributed via mail, fax, email, or in person. We administered the surveys to senior and middle level managers of the 190 SBUs from 178 parent companies. One questionnaire was administered to a senior level manager in each SBU who was asked about the innovation performance of the SBU. A different questionnaire was administered to middle level managers who were asked about their senior managers' leadership style and their organization's culture. After the initial survey mailing, we followed up with reminder letters and telephone calls to our company contacts. We received 125 sets of completed surveys by multiple informants including a total of 320 middle managers (1-12 respondents per SBU) and 125 senior managers in 125 SBUs. Thus, we had between 2 and 13 respondents per SBU, and a total of 445 respondents from 125 SBUs. The response rate for this study was 65% (125 SBUs completed out of the 190 SBUs that were initially approached).

Following Kanuk and Berenson (1975), we further assessed potential non-response bias by looking for differences between early and late respondents. We recorded the order of responses to the survey and found it to be non-significantly correlated with SBU industry (r =0.21, p =0.17)[3], SBU size (r =0.01, p =0.94). We further compared demographic characteristic on the early versus late-responders and also found it to be non-significantly correlated with respondents' age (r =0.16, p =0.19), suggesting that the concern regarding non-response bias is minimal (Combs & Ketchen, 1999).

[3] r refers to correlation coefficient. p refers to significant value.

As shown in Table 4-1, the size of the SBUs in our sample ranged from 45 employees to over 3,000. The mean size equaled 1,135 (standard deviation=3722). Average age of the SBUs in the sample was 16 years (standard error of mean=1.23). One hundred and seven SBUs (87%) were privately owned. Thirty six percent of the SBUs in the sample are in the business of producing consumer products, 38% produce industrial products, 20% produce consumer services, and 4% produce industrial services. Forty-five of the SBUs in our sample had revenues of 1 to 4.9 billion Taiwanese dollars (US$30 million to US$1.5 billion), seventeen SBUs had revenues of 500-999 million Taiwanese dollars (US$15-30 million) and nineteen SBUs had revenues of 10 billion Taiwanese dollars and above (US$3 billion).[4]

[4] Conversion based on an exchange rate of 1 US$ = 33 NTD

Table 4-1 Sample Profile

Characteristics		Number	Percent
SBU size (std. deviation=3722)	50 employees and below	43	34.8%
	51-500 employees	45	36.5%
	501-1000 employees	6	4.8%
	1001 and above …	23	19%
	Missing data	6	4.9%
Ownership	Public owned	14	11.4%
	Private owned	107	87%
	Missing data	2	1.6%
Business Product	Consumer products	44	35.8%
	Consumer services	24	19.5%
	Industrial products	47	38.2%
	Industrial services	5	4%
Industry[5]	Chemicals	5	4.1%
	Pharmaceuticals	23	18.7%
	Financial management	7	5.7%
	Mechanical engineering	17	13.8%
	Electronic engineering	55	44.7%
	Others	16	13.0%
Revenues	Less than10 million	10	8.2%
	10-99 million	12	9.8%
	100-250 million	7	5.7%
	251-499 million	5	4.1%
	500-999 million	17	13.8%
	1-4.9 billion	45	36.6%
	5-9.9 billion	5	4.1%
	10 billion & above	19	15.4%
	Missing data	3	2.4%
SBU average age (years)	16 (Standard Error of Mean=1.23)		
N			125

Note: Revenues are expressed in new Taiwanese dollars (NTD). 1 US$ = 33 NTD.

[5] Pharmaceuticals industry includes pharmaceuticals, health care and food industry. Mechanical engineering industry includes aerospace, car, and industrial equipments industry. Electronic engineering industry includes electronics, entertainment and telecommunication industry. Others include non-durable goods, services, construction and so on.

4.4.3. Measures

Our measures were originally constructed in English and were then translated into Chinese and back-translated into English to ensure the accuracy of the meaning of the questions. We also used a mixture of positive and negative questions in order to minimize response bias. The questionnaires were then pre-tested using a sample of managers in Taiwan. All constructs in this study were measured on a seven-point Likert type scale.

Dependent Variable

Innovation Ambidexterity. Innovation ambidexterity is the ability to generate multiple types of innovation in terms of internal process and incremental and radical product innovation simultaneously. Thus, innovation ambidexterity concerns a firm's combined magnitude of exploration and exploitation. Because there was no existing measure of ambidexterity exactly reflecting our research purpose, we developed a nine item measure that reflected the combination of internal process and incremental and radical product innovation performance. The measures for each type of innovation performance were adapted from the work of Atuahene-Gima (2005) and Cooper & Kleinschmidt (2000). (Appendix 4-1 contains these items). Because senior managers are in the best position to provide responses to our questions concerning innovation performance, we asked these managers to look backwards over the past 3 years and provide their perceptions of innovation performance. We felt it was important to use a 3 year time period because of the lag effects that

are likely to exist between leadership and its impact on innovativeness.

In order to operationalize the combined concept of innovation ambidexterity, we followed the approach of He and Wong (2004) and Cao et al., (2009) to generate a product term including incremental product, radical product, and process innovation. We began by assessing the reliability of the items used to measure incremental product, radical product, and process innovation. The Cronbach alpha[6] for the items measuring internal process innovation was .73. These items were combined into a single factor. The Cronbach alpha for the items measuring incremental product innovation was .78. These items were combined into a single factor. The Cronbach alpha for the items measuring radical product innovation was .77. These items were combined into a single factor. The overall Cronbach's α for innovation ambidexterity was 0.80.

Traditionally, the variables are centered before generating the product terms for the avoidance of multicollinearity. Thus, we centered the internal process, incremental product, and radical product innovation scales before obtaining their product to mitigate the potential for multicollinearity (Cao et al., 2009; He & Wang, 2004). We then multiplied the scores from these three factors for our overall measure of innovation ambidexterity.

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[6] Cronbach's α (alpha) is a statistic commonly used as a measure of the internal consistency or reliability of a psychometric test score for a sample of examinees. Alpha can take values between negative infinity and 1. The rule of thumb require a reliability of 0.70 or higher (obtained on a substantial sample) before they will use as a measure.

Independent Variables

Strategic Leadership Style. We asked middle managers to assess the leadership style of senior leaders. Our measure of strategic leadership was drawn from the work of Boal and Hooijberg (2000), McDonough & Leifer (1986), and Avolio & Bass (1999) and consisted of six questions.

To determine the number of items which contribute to common variance actually needed to describe leadership behaviors, we conducted common factor analyses on these items. Principal Components extraction with an Equamax rotation method (Eigenvalue > 1) resulted in two factors, both of which paralleled the original two dimensions of strategic leadership. One factor consisted of three items representing internal-oriented behaviors. Cronbach's α was 0.90. The other factor consisted of three items representing external-oriented behaviors. Cronbach's α was 0.89. In order to operationalize the combined concept of leadership style, we followed He and Wong (2004) and Cao et als'., (2009) approach to generate a product term. In order to avoid multicollinearity, we thus centered the internal-oriented and external-oriented behaviors scores before obtaining their product to mitigate the potential for multicollinearity (Cao et al., 2009; He & Wang, 2004). Then, we multiplied the scores from these two factors for our overall measure of strategic leadership. The overall Cronbach's α for strategic leadership was 0.89.

Mediating Variable

Organizational Culture. Our measure of organization culture

was adapted from the work of O'Reilly, Chatman, & Caldwell (1991) and consisted of three items representing an organizational culture that foster knowledge sharing. Cronbach's α was 0.85 for this measure.

Control Variables

Recognizing that innovation can come from firm and industry attributes, it is necessary to control for these effects. Accordingly, we included firm specific factor - SBU age and SBU size dummy, as well as industry specific factor – industry dummy as control variables because prior studies have documented their potential effects on organizational innovation (cf., Elenkov et al., 2005; Jung et al., 2008). We controlled for the SBU size effects by including dummy variables. Our sample distributed across four categories: 1 (50 employees and below), 2 (51-500 employees), 3 (501-1000 employees) and 4 (1001 and above). We therefore constructed three SBU size dummy variables: 1 (50 employees and below), 2 (51-500 employees) and 3 (501-1000 employees).

Industries may differ in technological opportunities and innovation types in terms of incremental, radical and process innovation. We controlled for the industry idiosyncratic effects by including dummy variables. Our sample distributed across six sectors: 1 (Chemicals), 2 (Pharmaceuticals), 3 (Financial management), 4 (Mechanical engineering), 5 (Electronic engineering) and 6 (others). Thus, we constructed five industry dummy variables: 1 (Chemicals), 2 (Pharmaceuticals), 3 (Financial management), 4 (Mechanical

engineering) and 5 (Electronic engineering).

4.4. 4. Aggregation

Because the theory and hypotheses of the study require an SBU level of analysis, we followed Keller's approach[7] (1986) to aggregate respondent's individual scores on each variable and computed the sampled strategic business unit mean responses for each question. After aggregation, we justified the aggregation of SBU-level variables by calculating an inter-rater agreement score (γ_{wg}) for each variable, and then used intra-class correlation (ICC) to examine the degree of agreement among respondents on each measure (cf., James, Demaree, Wolf, 1984,Goodman, Ravlin, Schminke, 1990). Average inter-rater agreement score (γ_{wg}) was 0.70 for external-oriented leadership, 0.72 for internal-oriented leadership, and 0.76 for knowledge sharing organizational culture, which were well above the cut-off value of 0.70. The ICC(1) and ICC(2) values, generated with two-way mixed effects model where people effects are random and measures effects are fixed, were .76 and .90 for external-oriented leadership, .73 and .89 for internal-oriented leadership, and .70 and .88 for sharing organizational culture. All ICC values are greater than or equal to .70 indicating acceptable reliability. Accordingly, aggregation was justified for these variables, and provided substantial support for the scales.

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[7] Keller (1986) points out that the aggregation of individual scores to the group level may be appropriate simply because the theory and hypotheses of the study require a certain level of analysis.

4.4.5. Measurement Validation

Following Anderson and Gerbing's (1988) suggestion, we performed a multistage process to further assess convergent and discriminant validity of strategic leadership styles and knowledge sharing culture through exploratory and confirmatory factor analysis. Exploratory factor analysis clearly replicated the three-factor model and did not reveal any evidence of a single underlying construct. Next, we used confirmatory factor analysis on all items pertaining to strategic leadership style and knowledge sharing organizational culture. This analysis yielded a measurement model that fitted the data adequately (χ^2 =18.09 (p=0.006), χ^2 / DF= 3.02, CFI=0.98, NFI=0.97, RMSEA=0.1)[8]. Item loadings were as proposed (>=0.6) and significant ($p < 0.01$), providing evidence for convergent and discriminant validity. Finally, we assessed the reliability of the constructs with Cronbach's coefficient alpha. All scales have reliabilities greater than 0.70.

4.5. Analytical Procedures

Multiple regression analyses were performed to test the hypotheses. We then used SPSS Macros[9] to estimate the mediating effect. The approach combines the Sobel test (1982) and bootstrapping method by calculating standard errors to obtaining

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[8] The indexes of measuring model fit. χ^2 refers to chi-square. χ^2 / DF refers to chi-square to degree of freedom ratio. CFI refers to Comparative Fit Index. NFI refers to Normed Fit index. RMSEA refers to Root Mean Square Error of Approximation.

[9] SPSS Macros is a program language; it can be used to generate SPSS Syntax.

confidence intervals. While using Baron and Kenny's (1986) 4-step criteria informally judges whether or not mediation is occurring, the Sobel test and bootstrapping methods proposed by MacKinnon and Dwyer (1993) is a formal statistically based assessment for mediation. We report the results of the Sobel test to provide powerful estimation for the mediating effect.

First, we included the control variables (i.e., SBU industry dummies, SBU age and SBU size dummy) and knowledge sharing organizational culture to examine the direct effect on innovation ambidexterity. Subsequently, we examined the effect of strategic leadership (i.e., the combined external and internal leadership styles) on knowledge sharing organizational culture. Then, we examined the mediating effect of knowledge sharing organizational culture on the relationship between strategic leadership and innovation ambidexterity.

4.6. Results

The means, standard deviations, and pairwise correlations for the variables in this study are listed in the Table 4-2. Since significant correlations were found among a number of the variables, we further investigated potential multicollinearity using variance inflation factors (VIFs). The maximum VIF obtained in any of the models for substantive variables was substantially below the rule-of-thumb cutoff of 2 for regression models (O' Brien, 2007). Therefore, multicollinearity was not considered an important issue for these results.

Table 4-2. Descriptive Statistics and Correlation Matrix

	Correlation[a]											Mean	Std. Dev.
	1	2	3	4	5	6	7	8	9	10	11		
1	-											.03	.17
2	-.08	-										.37	.77
3	-.04	-.11	-									.17	.69
4	-.05	-.13	-.06	-								.32	.74
5	-.16	-.43	-.22	-.25	-							.81	.98
6	-.12	.21	-.01	-.02	-.10	-						16.06	13.35
7	-.04	.01	.19	-.14	-.05	-.02	-					.34	.47
8	.05	.10	-.11	.17	-.05	.09	-.56	-				.75	.97
9	-.04	-.01	-.06	.08	-.06	-.04	-.16	-.17	-			.14	.64
10	.08	-.02	.07	-.02	.02	-.02	-.11	.12	-.01	-		34.38	26.62
11	.12	.03	.12	.05	-.10	-.01	.03	-.03	.12	.41	-	4.68	1.06
12	.07	.05	-.03	.11	-.03	.04	.-02	.06	.05	.40	.40	24.37	8.97

1= chemicals industry, 2= pharmaceuticals industry, 3= financial management industry, 4= mechanical engineering industry, 5= electronic engineering industry, 6=SBU age, 7=below 50 employees, 8=51-500 employees, 9=501-1000 employees, 10=innovation ambidexterity, 11=organizational culture, 12=strategic leadership behaviors

[a]Listwise deletion, N=117

p-value < 0.05 for correlation values greater than 0.15; p-value < 0.01 for correlation values greater than 0.20

Table 4-3 summarizes the results for direct effects of knowledge sharing organizational culture on innovation ambidexterity and strategic leadership on knowledge sharing organizational culture. Model 1 is the unconstrained controls-only model. The results showed that all SBU industry dummy were positively associated with innovation ambidexterity while SBU age was negatively associated with innovation ambidexterity but both were not significant. Small SBU size was negatively associated with innovation ambidexterity but relative large sized SBUs were positively associated with

innovation ambidexterity. The possible explanation is our sample was mainly from innovative industries. Attaining high level of innovation ambidexterity requires flexible and dynamic coordination that is more difficult in aged companies than in younger companies. Small sized SBU has relative limited resources that may hobble the attainment of innovation ambidexterity in the process.

The correlation results show a significantly positive correlation between a knowledge sharing organizational culture and innovation ambidexterity (r=.41, p<0.01), leading us to expect a positive causal relationship between a knowledge sharing organizational culture and innovation ambidexterity. To test hypothesis 1, which predicted that a stronger knowledge sharing organizational culture will lead to higher levels of innovation ambidexterity. Model 2 included the control variables and the knowledge sharing organizational culture. The result showed that the positive association between the knowledge sharing organizational culture with innovation ambidexterity (β=.44, p<.05). Hypothesis 1 was supported. The correlation result indicated the existence of a significant and positive correlation between strategic leadership behaviors and knowledge sharing organizational culture (r=.40, p<.01). Thus, Model 3 included the control variables and strategic leadership to test strategic leadership has positive effect on the knowledge sharing organizational culture. Hypothesis 2 was supported because the result showed the strategic leadership was positively related to a knowledge sharing organizational culture (β=.39, p<.05). We also conducted Model 4 and Model 5 to predict

the joint effect of strategic leadership and a knowledge sharing organizational culture has stronger impact on innovation ambidexterity than the strategic leadership itself. The result showed that strategic leadership itself has *less* impact on innovation ambidexterity than the joint effect of strategic leadership and a knowledge sharing organizational culture (R = .45 versus .52, respectively).

Table 4-3. Regression Results of Direct Effects

	Model 1	Model 2	Model 3	Model 4	Model 5
Dependent Variable	Innovation Ambidex-terity	Innovation Ambidex-Terity	Organiz-ational Culture	Innovation Ambidex-terity	Innovation Ambidex-terity
	Beta (t)	Beta (t)	Beta (t)	Beta (t)	Beta (t)
Chemicals Industry	.11 (1.06)	.09 (.94)	.11 (1.19)	.06 (.65)	.02 (.26)
Pharmaceuticals Industry	.05 (.44)	-.03 (-.23)	.03 (.27)	.001 (.01)	-.02 (-.19)
Financial management Industry	.13 (1.21)	.14 (1.37)	.16* (1.78)	.14 (1.40)	.08 (.84)
Mechanical engineering Industry	.01 (.05)	.05 (.49)	.02 (.23)	-.06 (-.57)	-.07 (-.73)
Electronic engineering Industry	.12 (.89)	.12 (1.01)	-.02 (-.14)	.07 (.60)	.07 (.56)
SBU Age	-.01 (-.08)	.01 (.03)	-.01 (-.15)	-.02 (-.20)	-.02 (-.17)
Below 50 employees	-.11 (-.82)	-.13 (-1.05)	.00 (-.002)	-.13 (-1.04)	-.12 (-1.04)
51-500 employees	.08 (.61)	-.01 (-.04)	-.01 (-.12)	.06 (.46)	.06 (.52)
501-1000 employees	.02 (.15)	-.01 (-.13)	.11 (1.20)	-.01 (-.14)	-.05 (-.52)
Organiz-ational Culture		.44*** (4.76)			.30** (3.07)
Strategic Leader-Ship			.39*** (4.48)	.41*** (4.47)	.29** (3.03)
R	.21	.47	.46	.45	.52
R^2	.05	.22	.21	.21	.27
F	.55	2.87	2.87	2.59	3.40
P	.84	.00***	.00**	.01**	.00***
N	110	110	110	110	110
Remarks	Standardized regression coefficients are shown here. * p< .1, ** p< .05, *** p< .01, **** p< .001, Listwise deletion				

We used the Sobel test (1982) and bootstrapping approach to test the mediating effect of knowledge sharing organizational culture on the relationship between strategic leadership and innovation ambidexterity (H3).

According to Sobel (1982), for either partial or complete mediation to be established, the reduction in variance explained by the independent variable must be significant, which was the case ($Z=2.70$, $p<0.05$). Accordingly, we can conclude that sharing organizational culture mediated the relationship between strategic leadership and innovation ambidexterity, providing support for Hypothesis 3 (Table 4-4). Table 3-4 first showed the results of mediator variable model that assessed Baron and Kenny's 4-step criteria (1986)[10]. Subsequently, the table showed the result of Sobel test including standard error (s.e.), confidence interval (CI) and standard score (Z)[11].

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[10] Baron and Kenny (1986) have four steps critera in establishing mediation. Step 1: show that the initial variable is correlated with the outcome. Use Y as the criterion variable in a regression equation and X as a predictor. Step 2: Show that the initial variable is correlated with the mediator. Use M as the criterion variable in the regression equation and X as a predictor. Step 3: Show that the mediator affects the outcome variable. Use Y as the criterion variable in a regression equation and X and M as predictors. Step 4: To establish that M completely mediates the X-Y relationship, the effect of X on Y controlling for M should be zero. If not, it means the existence of partial mediation.

[11] Sobel test was estimated with normal distribution. Thus, it needs to look at standard error, standard score and confidence interval to indicate the reliability of an estimate. The rule of thumb for the sobel test is the use of sticker significant level at p value smaller than 0.01.

Table 4-4. Results of Sobel Tests for Mediating

Mediator Variable Model					
Step	Predictor	Coefficient	s.e.	T	P
1	YX	3.23	0.69	4.68	0.00***
2	MX	0.05	0.01	4.78	0.00***
3	YM, X	20.70	6.20	3.34	0.00***
4	YX, M	2.24	0.72	3.10	0.00***
Results of Sobel Test					
Total	Value	s.e.	LL 95 CI	UL 95 CI	Z
Indirect Effect	1.41	0.53	0.38	2.44	**2.70*** **
Remarks	Y=innovation ambidexterity, X=combined leadership, M=sharing organizational culture * p< .1, ** p< .05, *** p< .01, **** p< .001				

4.7. Discussion and Conclusions

The purpose of this study was to investigate the roles of strategic leadership and organization culture in fostering innovation ambidexterity (i.e., the attainment of high level of both incremental and radical innovation). Although it has been argued that strategic leadership plays a crucial role in fostering exploration and exploitation (Virany, Tushman, Romanelli, 1992; He & Wang, 2004), this is the first study to empirically investigate the role of leadership in creating a culture that facilitates exploration and exploitation activities in the form of incremental and radical product and process innovation. By doing so, our study contributes to our understanding of ambidexterity by identifying the role that particular organization cultures play in mediating the leadership and ambidexterity relationship.

At the same time, we have added to the growing dialogue on ambidexterity in three important ways. First, this study sheds light on

how leaders of organizations can cope effectively with complex demands and contradictory situations that arise as a result of the need for ambidexterity. Second, our findings contribute to our understanding of ambidexterity by identifying the role that particular organization cultures play in mediating the leadership and ambidexterity relationship. Third, our study has broadened our understanding of the leadership, culture, innovation ambidexterity relationship in a non-Western country, Taiwan. This study also raises important issues for both theory and practice.

While correlation analysis cannot indicate the existence of a causal relationship, a correlation can be taken as evidence of a possible causal relationship. The result of our correlation test indicated a significantly positive correlation between a knowledge sharing organizational culture and innovation ambidexterity, and between strategic leadership behaviors and a knowledge sharing culture as well. These results provided an impetus for further examining our hypotheses in terms of the effect of a knowledge sharing culture on innovation ambidexterity, as well as the impact of strategic leadership behaviors on knowledge sharing culture.

As hypothesized, we found a significantly positive relationship between a higher level of knowledge sharing organizational culture and greater innovation ambidexterity (H1), as well as a significant and positive relationship between strategic leadership and the development of a knowledge sharing organizational culture (H2). Our results suggest that strategic leadership is helpful to foster a knowledge sharing culture while a knowledge sharing culture with its

aggregation of values, behaviors, and norms is an effective means of fostering innovation ambidexterity. Our findings not only lend support for suppositions of prior ambidexterity research on leadership and culture (cf., Vera & Crossan, 2004), but also go beyond earlier work by clarifying the roles and effects of bidirectional (i.e., external and internal-oriented) strategic leadership styles for the creation of knowledge sharing culture. Our results suggest that the strategic leaders in an organization need to look not only outward toward the competitive environment, market trends, and customers' current and potential needs, but also inward in order to create a working context that enables organization members to respond to the information and demands coming into the organization from the external environment.

While earlier theoretical reasoning suggested simple relationships between transformational leadership and radical innovation, on the one hand, and transactional leadership and incremental and internal process innovation on the other (cf., Vera & Crossan, 2004), our findings suggest that this is a considerable oversimplification of the actual situation found in companies. It appears, based on what we found, that fostering greater innovation ambidexterity requires values and norms for knowledge sharing and learning among organizational members, and that these norms, in turn, require strategic leadership that is both externally and internally focused.

Finally, we hypothesized that a knowledge sharing organizational culture *mediates* the relationship between the firm's strategic leadership styles and subsequent innovation ambidexterity

(i.e., the attainment of high level of both incremental and radical innovation). Prior research has been ambiguous about whether leadership has a direct impact on innovation or an indirect one, by creating an organization culture that in turn impacts on innovation. While some researchers have found a relationship between leadership and innovation (cf., Stata, 1989; Tushman & Nadler, 1986; Mumford & Licuanan, 2004; Jung et al., 2008; Elenkov et al., 2005; Chen, 2007), others have found that organizational culture is a major factor influencing innovation (cf., Deal & Kennedy, 1982; Kotter & Heskett, 1992; Lee & Yu, 2004; Ouchi**,** 1980; Ireland & Hitt, 1999; Jung et al., 2008). The results from this study suggest organization culture plays a much more important role in facilitating innovation than does leadership. Specifically, we found strong evidence that knowledge sharing organizational culture mediates the relationship between strategic leadership and innovation ambidexterity.

Our results also provide support for the suggestion that strategic leadership, in and of itself, has *less* impact on innovation ambidexterity than does the joint effect of strategic leadership and a knowledge sharing organizational culture (R = .45 versus .52, respectively). Our findings suggest that strategic leadership and culture work in conjunction with each other. Thus, failing to take into account the role of either strategic leadership or organizational culture may present a distorted picture of how leadership influences an organization's ability to generate innovation ambidexterity.

These findings thus reinforce the notion that leadership and an organization's culture are intimately intertwined and that both are

needed in order to successfully generate innovation ambidexterity. While prior research suggests that strategic leadership plays a crucial role in mediating between forces for exploration such as innovation and change, and inertial forces for exploitation of the status quo (Virany, Tushman, Romanelli, 1992; He & Wang, 2004), our findings provide a more fine grained perspective on just how leadership and culture work together, for what purpose, and in what situation, to foster multiple types of innovation. At the same time, we have been able to provide a more nuanced perspective on an organization's culture in promoting greater innovation ambidexterity (i.e., the attainment of high level of both incremental and radical innovation).

It is also important to emphasize that, while some of the literature on ambidextrous organizations suggests that leadership within organizations needs to be capable of shifting back and forth between a more transformational style of leadership and a more transactional style of leadership (Vera & Crossan, 2004), we believe that this does not reflect the reality facing the organizations that we studied. In these organizations, which were relatively small, innovation was a multidimensional activity, i.e., these organizations generated internal process innovations, incremental product innovations, and radical innovations - all at the same time. Indeed, "best practice" in the new product development literature suggests that organizations should develop a portfolio of innovation projects that include some that are more incremental and some that are more radical (McDonough & Spital, 2003). In most organizations, the innovation projects within this portfolio are undertaken

simultaneously. At the same time, many argue that internal innovation needs to be a continuous activity (cf., Davenport, 1993;Bender et al., 2000). This implies that the organization's leadership needs to enact different oriented styles of leadership simultaneously that will lead to the creation of a variety of cultures that will foster these different types of innovation outcomes (McDonough &.Leifer, 1983).

Our findings also suggest the importance of taking a "fine grained" approach in order to understand more deeply and accurately how the leadership of an organization and its culture influence the variety of types of innovation that organizations need to generate. An important extension of our study would be to more systematically examine multiple dimensions of leadership, organization culture, and multiple dimensions of innovation, in an effort to understand how they help to generate greater innovation ambidexterity. We believe that by taking a more nuanced approach this research has helped to clarify the interrelationship between organization culture and leadership, as well as the relationship among leadership, organizational culture, and innovation ambidexterity.

Beginning with the work of March (1991), research has made clear the need for organizations to exploit their current capabilities as a way of generating revenues and harvesting the fruits of their innovative activities. At the same time however, simply focusing on harvesting revenues from current products and innovative activity is unlikely to lead to sustained competitive advantage. To maintain long run competitive advantage organizations also need to continually

investigate new opportunities and develop new knowledge that will enable them to generate leading edge innovations. Research that focuses on only one dimension of innovative activity, i.e., research that does not investigate the simultaneous generation of multiple types of innovation, will only be able to provide a limited understanding of the interplay between product and process and incremental and radical innovation. As well, it will be limited in terms of its ability to provide insights into the factors driving each type of innovative activity, and into innovation ambidexterity.

It has also been pointed out recently that there has been virtually no research that has examined the international context impacting on ambidexterity research (Raisch & Birkinshaw, 2008). Yet, given the evidence of the impact of societal culture in other management areas of research (Hofstede, 1983; House et al., 2004; Elenkov et al., 2005), it is important to investigate whether the international context plays a role. The tendency for research on leadership and culture to focus on Western countries such as North America or Western Europe (Jackson & Schuler, 1995; Porter, 1985; Wright & McMahan, 1992; Elenkov et al., 2005), means that we have little understanding of what leadership styles, as well as combined leadership affect different types of innovation in non-Western countries (for exceptions see, House & Aditya, 1997;, Jung et al., 2008).

Managerial Implications

Our findings have implications for the actions that Taiwanese senior managers and perhaps non-Taiwanese senior managers as well, need to consider in order to facilitate innovation ambidexterity. Our findings suggest that in order to effectively execute the strategy for different types of innovation simultaneously, leaders need to focus on creating a culture of innovation that will lead to innovation ambidexterity. Thus leaders need to be aware of the need for them to not only be the eyes and ears of the organization by bringing in knowledge, ideas and information from outside of the organization, but also to be the role model for behaviors that will foster knowledge sharing and circulation to foster innovation. Stated differently, if leaders fail to engage in dual sets of behaviors including both internal and external-oriented leadership behaviors, it may cause any leadership behavior, strategy, ideas and information to be dysfunctional. Beyond its single effect, this study emphasizes the importance of behavioral integration that not only complements each behavior but together they also create another powerful strength by unifying all efforts for managing routine and non routine tasks (Smith & Tushman, 2005; Lubatkin et al., 2006). Effectively creating innovation ambidexterity is not simply a matter of employing leadership styles or creating an organization culture. Instead, it is a matter of knowing how to use both in order to foster all types of innovation. Further, if necessary, it can also integrate other functions of the firms as a whole.

Limitations and Future Research

Clearly, there is a need for further study to investigate exactly how leaders actually promote innovative activities among their subordinates. While cross sectional research is useful, we need to add the more dynamic perspective that real-time case studies could provide. Because our sample focused on organizations in Taiwan, the generalizability of our results is limited. Thus, there is also a need to replicate this study in Western organizations, as well as in non-Western, emerging economies in order to more systematically investigate how cultural heritage influences leadership behaviors and decision-making, and their impact on innovation performance.

This study is limited as well as a consequence of our having investigated only a few dimensions of leadership and organization culture. Thus, we can provide only an incomplete picture of the role of leadership and culture in affecting innovation. This calls for more research that looks at additional aspects of these variables. But, by taking a more fine grained approach to investigating the relationships among leadership, organization culture and innovation our study has made clear the need for future research to include multiple dimensions of each of these variables in their investigations. Additionally, it makes clear the importance of examining each leadership style separately in order to understand each style's effect and their synergistic effects on innovation ambidexterity, as well as their interactions with other factors, including organization culture, as they influence innovation ambidexterity.

Remarks

This study used the same data set as the author's published doctoral thesis for Maastricht School of Management in June, 2009. The prior thesis was entitled: "The Impact of Senior Leadership and Organizational Culture on Innovation in Taiwanese Companies". The MSM thesis used data from 123 Taiwanese companies to investigate the influence of strategic and transformational leadership styles and three types of organization culture on three modes of innovations - internal process, incremental product, and radical product innovations. We found that strategic leadership was found to be significantly related to both internal process innovation and incremental product innovation. In addition, an entrepreneurially oriented organization culture was found to be related to radical innovation performance. Further, we found that each type of organizational culture mediated the relationship between strategic leadership and radical product innovation performance, while each type of organizational culture mediated the transformational leadership-internal process innovation performance relationship. An entrepreneurially oriented culture and customer-focused culture, mediated the transformational-radical performance relationship.

The present chapter is different from the prior thesis in four respects. In a certain sense, the prior thesis was a comprehensive literature review on strategic leadership and innovation that I used to develop a new study that I present here as Chapter 4.

1) Research focus: the present chapter focuses on ambidexterity and its antecedents. In this chapter I advanced the

concept of strategic leadership and organizational culture as antecedents for achieving innovation ambidexterity. Further, I proposed the concept of dual sets of leadership behaviors is required to foster innovation ambidexterity. In contrast, the prior thesis focused simply on identifying what type of leadership style impacts on what type of innovation, as well as what type of organizational culture fosters what type of innovation.

2) Theoretical construct: the present chapter links ambidexterity, strategic leadership, behavioral complexity, and organizational culture as an holistic concept. Specifically, this study was built on strategic leadership theory and the notion of ambidexterity to investigate leadership-based antecedents of innovation ambidexterity. In contrast, the MsM thesis did not use the concept of behavioral integration by leaders to manage behavioral complexity and ambidexterity.

3) Academic contributions: in the prior thesis I made contributions to the literature on leadership and innovation by identifying what type of leadership fosters either product or process innovation, as well as what type of organization culture fosters either product or process innovation. In contrast, this study made two main contributions to the literature on antecedents of ambidexterity. First, this study sheds light on how the leaders of organizations can enable behavioral integration to cope effectively with complex demands and contradictory situations that arise as a result of the need for ambidexterity. Second, this study contributes to our understanding of ambidexterity by identifying the role that

particular organization cultures play in mediating the relationship between a combined set of leadership behaviors and innovation ambidexterity.

With respect to the methodology section, I used the final version of surveys to collect data (N=125). The result of Factor Analysis represented a factor named “knowledge sharing culture”. I used multiple regression analysis for testing direct effects and used Sobel and Bootstrapping to test for mediating effects. in contrast, in the prior thesis, the sample size was 123, which combined my initial and second version surveys. Factor analysis yielded two factors of leadership styles and three factors of organizational culture. I used multiple regression analysis and relied on Baron & Kenny’s 4 step approach for testing direct and indirect effects.

Chapter 5

The Role of Capability In Fostering Innovation Ambidexterity and Business Performance: The Second Taiwan Case

(This chapter is based upon an article under reviewing at Journal of Product Innovation Management)

Abstract

We examined the impact of three resource-based capabilities – organizational culture, intraorganizational collaboration, and interorganizational collaboration, on a firm's innovation ambidexterity, i.e., the attainment of both incremental and radical innovation simultaneously, as well as innovation ambidexterity's subsequent impact on business performance. We gathered primary data from 214 Taiwanese owned SBUs drawn from several industries. Our results suggest that entrepreneurial organizational culture and a combination of interorganizational and intraorganizational collaboration facilitate innovation ambidexterity. We also found that innovation ambidexterity mediates the relationship between bundled capabilities and firm performance.

Our study makes four important contributions to the ambidexterity literature. First, it adds to the dialogue on the antecedents of ambidexterity by exploring the impact of bundling

resources and capabilities on a company's ambidextrous performance. Ours is the first study to examine how the combination of tangible and intangible and formal and informal resources and capabilities affect an organization's ability to achieve a combination of high levels of incremental and radical product innovation. Second, it adds to the dialogue on the role of ambidexterity in facilitating a company's business performance. While prior research has examined ambidexterity's impact on a variety of outcomes, few studies have addressed the question of how achieving simultaneously high levels of incremental and radical product innovation affects a firm's business performance relative to its competitors. Third, our study contributes to our understanding of ambidexterity as a mediator in the relationship between a company's resources and capabilities and its performance. As a number of scholars have pointed out, the relationship among ambidexterity, its antecedents and outcomes are quite complex and research needs to reflect this complexity. Thus, our research will contribute to a more fine grained understanding of the role that ambidexterity plays in fostering business performance by examining ambidexterity as a mediating variable affecting the relationship between capabilities and performance. Lastly, we add depth to our insight into the relationships among ambidexterity, firm performance, and its capabilities by investigating these relationships in a non-Western country, Taiwan.

5.1. Introduction

The test of a first-rate intelligence is the ability to hold two opposing ideas in mind at the same time and still retain the ability to function. – F. Scott Fitzgerald

Just as juggling paradoxes is the test of a first rate intelligence, so too is it a test of successful companies. It has become clear, that success requires companies to be equally adept at engaging in different types of innovation at the same time. Too much focus on incremental product development and the firm runs the risk of becoming obsolete. But too much focus on radical innovation runs the risk of bankrupting the company before it has the chance to profit from its investment. For many firms, perhaps most, succeeding in the long term means finding the right way to undertake incremental and radical innovation at the same time. But, identifying the "right" way is not a simple task, and indeed, has consumed researchers for quite some time. Researchers who have focused on this task have been drawn to the notion of ambidexterity to help resolve this paradox.

Ambidexterity has traditionally referred to the ability to do two things at the same time (McDonough & Liefer, 1983; Gibson & Birkinshaw, 2004; He & Wang, 2004; Lubatkin et al., 2006; Simsek, 2009). But increasingly, researchers have used the notion of ambidexterity to refer to a firm's ability to engage in exploratory activities on the one hand and exploitative activities on the other - two very different activities (Gibson & Birkinshaw, 2004; He & Wong,

2004; Lubatkin et al., 2006; Smith & Tushman, 2005; Tushman & O'Reilly, 1996). The importance of ambidexterity in the form of exploration and exploitation lies in its potential for improving business performance and sustaining competitive advantage (cf., Gibson & Birkinshaw, 2004; He & Wong, 2004).

It has been noted however, that these two activities compete for the same pool of scarce resources which has often resulted in firms favoring one at the expense of the other (March, 1991). Thus, the challenge facing firms, and researchers, is to discover how to leverage the firm's resources and capabilities in ways the will enable them to successfully engage in both types of activities simultaneously. Some researchers suggest that it is possible to balance the pursuit of exploitation and exploration by creating a behavioral context that is characterized by the interaction of stretch, discipline, support, and trust (Gibson & Birkinshaw, 2004). Beyond the importance of fostering a behavioral context (Gibson & Birkinshaw, 2004), however, we have little understanding of the specific capabilities that are required to achieve ambidexterity (Adler, Goldoftas, & Levine, 1999; Simsek et al., 2009). And, as Simsek and his colleagues (2009) point out, we simply do not know what organizations need to do in order to simultaneously attain exploitation and exploration.

Other researchers have also explicitly cited the need for additional research that examines the effects of both behavioral and structural, i.e., informal and formal, capabilities on the combined effects of incremental and radical innovation (He and Wong, 2009). These researchers note that doing so "may shed additional light on the

subtle and complex processes through which organizations achieve and benefit from various combinations of exploration and exploitation."

The Resource Based View of the firm (RBV) may provide a productive avenue for addressing the need to increase our understanding of how companies can achieve ambidexterity through leveraging their resources and capabilities (Kang & Snell, 2009; Simsek et al., 2009). The RBV literature views the firm as a bundle of resources and capabilities which consist of a firm's tangible and intangible assets that are firm-specific and are developed over time through complex interactions among the firm's resources and capabilities (Barney, 1991; Amit & Schoemaker, 1993). It has been proposed that the resulting "bundle" of resources and capabilities can be used to generate processes that avoid the need to allocate resources separately for exploitation and exploration, thus reducing the conflict and competition for them (Ray, et al., 2004).

While there is a wealth of research on capability and business performance, no studies have investigated the relationships among a firm's capabilities, ambidexterity, and business performance. Thus, the purpose of this study is to empirically investigate how resource-based capabilities enable exploitation and exploration to achieve ambidexterity, and how ambidexterity impacts on a company's business performance. By doing so, our study contributes to our understanding of what organizations need to do in order to achieve ambidexterity, as well as greater business performance.

We use RBV theory to investigate how a bundle of resource-based capabilities facilitate the attainment of ambidexterity, i.e., high levels of incremental and radical innovation. To foster ambidexterity, the combination of resources and capabilities that are relied upon need to enable the acquisition, dissemination, integration, and development of knowledge over time (Kogut & Zander, 1992; Teece & Pisano, 1994). Knowledge is at the core of an organization's ability to generate innovation and the resources and capabilities that are relied on need to assist the organization in facilitating the search for, acquisition of, and sharing of this knowledge. Interorganizational and intraorganizational collaboration are two resources and capabilities that assist organizations in searching for knowledge. These capabilities, which are relatively formal and tangible, enable the organization to create routine and to structure mechanisms for exchanging information and knowledge. A third resource that is informal and intangible is an organization's culture, which encompasses its values and norms of behavior. An organization's culture can provide the impetus to utilize the more formal mechanisms. Indeed, without norms and values that emphasize collaborating internally and externally, these more formal and tangible mechanisms, by themselves, will have a limited effect on fostering the exchange of information and knowledge either within or outside the organization. Thus, we examine the combined effects of three capabilities including, intraorganizational collaboration, interorganizational collaboration, and organization culture, on the

ability of a firm to attain a high level of ambidexterity in the form of a combination of incremental and radical innovation.

We also investigate how attaining a high level of incremental and radical innovation combined, impacts on a firm's business performance. Prior ambidexterity research has examined the relationships between different types of ambidexterity and outcomes (Gibson & Birkinshaw, 2004; He & Wong, 2004; Cao et al., 2009; Simsek et al.,2009), while RBV research has investigated the impact of capabilities on business performance (Ray et al., 2004; Teece, 2007; Leonard-Barton, 1992; Eisenhardt & Martine, 2000). But neither has empirically examined the role of ambidexterity in mediating the relationship between a bundle of capabilities and business performance.

In sum, our study seeks to make four important contributions. First, it adds to the dialogue on the antecedents of ambidexterity by exploring the impact of bundling resources and capabilities on a company's ambidextrous performance. Ours is the first study to examine how the combination of tangible and intangible and formal and informal resources and capabilities affect an organization's ability to achieve a combination of high levels of incremental and radical product innovation.

Second, it adds to the dialogue on the role of ambidexterity in facilitating a company's business performance. While prior research has examined ambidexterity's impact on a variety of outcomes, few studies have addressed the question of how achieving simultaneously high levels of incremental and radical product innovation affects a

firm's business performance relative to its competitors.

Third, our study contributes to our understanding of ambidexterity as a mediator in the relationship between a company's resources and capabilities and its performance. As a number of scholars have pointed out, the relationship among ambidexterity, its antecedents and outcomes are quite complex and research needs to reflect this complexity. Thus, our research will contribute to a more fine grained understanding of the role that ambidexterity plays in fostering business performance by examining ambidexterity as a mediating variable affecting the relationship between capabilities and performance.

Lastly, we add depth to our insight into the relationships among ambidexterity, firm performance, and its capabilities by investigating these relationships in a non-Western country, Taiwan. Research on ambidexterity has had a tendency to focus on Western countries such as North America or Western Europe (Gibson & Birkinshaw, 2004; Kyriakopoulos & Moorman, 2004; Lubatkin et al., 2006; Prieto et al., 2007). With few exceptions (cf., He & Wong, 2004; Yang & Atuahene-Gima, 2007), there is a very limited base of knowledge regarding how bundles of capabilities enhance ambidexterity and performance in non-Western countries. Thus, our study will contribute to our understanding of ambidexterity theory in a non-Western context, Taiwan.

Taiwan presents an interesting context for our study for at least two reasons. First, Taiwan has shown an innovation orientation in many aspects, e.g. the development of high technology products and

creative design.[12] Thus, it provides an ideal context for a study that focuses on new product innovation. Second, Taiwan provides a unique context for studying the interplay between capabilities and ambidexterity. Taiwan is a country characterized by Western capitalism mixed with a Confucian orientation, which is manifested in many respects including management practices and individual behaviors thus making it important to study the capabilities - ambidexterity relationship in a variety of cultural contexts.

5.2. Theory and Definitions

5.2.1. Resource-based Theory of the Firm and Capability

The resource based view (RBV) of the firm views the firm as a bundle of resources and capabilities that have the potential to provide the firm with a sustainable competitive advantage (Amit & Schoemaker, 1993). Resources, in this view, are defined as stocks of available factors that are owned or controlled by the firm. These resources are converted into final products or services by using a wide range of other firm assets and bonding mechanisms such as technology, management information systems, incentive systems, and trust between management and labor (Barney, 1991; Amit &

[12]Taiwan ranks at the top 1 in utility patents. Number of utility patents (i.e., patents for invention) per million people granted between January 1 and December 31, 2007. In addition, Taiwanese companies rank number 16 in terms of R&D spending. Source: World Economic Forum, Global Competitiveness Report 2008-2009, Section XII: Innovation, Executive opinion survey 2007, 2008, available at: www.weforum.org, accessed October 12, 2008.

Schoemaker, 1993). Capabilities are distinguished from resources. They reflect a firm's capacity to deploy resources. Thus, in contrast to resources, capabilities are based on developing, carrying, and exchanging information. There is general agreement among organizational capability's scholars that a *firm's capabilities* are those things that it does particularly well and cannot be readily imitated and substituted by competitors (Eisenhardt & Martin, 2000; Teece & Pisano, 1994).

Generally, scholars working in this stream agree that capabilities and resources can be formal or informal and tangible or intangible (Ray, Barney & Muhanna, 2004; Nelson & Winter, 1982; Porter, 1991). Examples of formal and tangible resources and capabilities include such assets as technology, management information systems, and incentive systems, while examples of informal and intangible resources and capabilities include such assets as values, norms, and trust.

Taking a slightly different approach, Ray, Barney and Muhanna (2004) suggest that the concepts of resources and capabilities can be used interchangeably to refer to the tangible and intangible assets firms use to develop and implement their strategies through impacting on business processes. In contrast to the earlier view of RBV, Ray et al., (2004) propose that business processes, rather than capabilities or resources, are the routines that a firm develops to perform activities (Nelson & Winter, 1982; Porter, 1991). And it is these business processes that provide competitive advantage (Ray, et al. 2004). That is, it is not the resources or capabilities themselves, but rather the

application and use of these resources or capabilities that enable the firm to perform the activities they need to perform, which provide advantage (Porter, 1991; Stalk, Evans, & Shulman, 1992). Further advantage can result from bundling or combining resources and capabilities. This bundling results in unique, and thus competitively advantaged, business processes that can enable firms to act ambidextrously by engaging in both exploration and exploitation activities (Leonard-Barton, 1992).

5.2.2. Ambidexterity, Exploitation, Exploration, Innovation and Business Performance

The concept of ambidexterity refers to the ability to do two things at the same time (McDonough & Liefer, 1983; Gibson & Birkinshaw, 2004; He & Wang, 2004; Lubatkin et al., 2006; Simsek, 2009). Researchers who have focused on ambidexterity have taken a variety of viewpoints and defined ambidexterity in a variety of ways resulting in confusion and inconsistencies (Simsek, 2009). One issue has been the various levels of analysis that researchers have focused on including, a single business unit, diversified organizations with several SBUs, and the realized view, which focuses on either SBUs or more diversified organizations (Simsek, 2009).

A second issue is the focus on behavioral and structural processes that organizations use to strive toward ambidexterity versus the focus on ambidexterity as an outcome, i.e., the actual attainment of both incremental and discontinuous innovation. As we see below the choice of focus with respect to both issues has implications for the

overall perspective of ambidexterity and its role that scholars elect to adopt.

One key debate in this literature has been about the role of exploration and exploitation in fostering organization success. Some argue that to ensure the long term survival of an organization, it is necessary for it to both exploit its existing capabilities, as well as explore new opportunities (March, 1991; Tushman & O'Reilly, 1996). Exploiting existing capabilities and exploring new capabilities can result in both incremental product innovations that build on existing products, as well as more radical product innovations that are a significant step beyond existing products. A subset of researchers within this group has proposed that ambidexterity can be interpreted as simultaneously pursuing both exploration and exploitation (Beckman, 2006; Jansen et al., 2006; Lavie & Rosenkopf, 2006; Lubatkin et al., 2006), while another subset has suggested that ambidexterity refers to the sequential pursuit of exploration and exploitation (Duncan, 1976; Burgelman, 2002).

Still others argue that exploitation and exploration can be viewed as independent activities, thus enabling some organizations, under the right conditions, to focus on exploiting or exploring while still achieving long term survival (Gupta, Smith, & Shalley, 2006). Gupta et al., (2006), e.g., suggest that when organizations are seen as part of larger systems, interacting with other organizations with whom interdependencies are created, exploration and exploitation may be achieved at the systems level through having some firms specializing in exploitation and others specializing in exploration.

In our research, we adopt what Simsek (2009) calls the "realized" view of ambidexterity, which suggests that ambidexterity is an organizational level construct that is applicable to a single business unit whose goal is to achieve high levels of both exploitation and exploration simultaneously (Simsek, 2009). We also adopt the perspective on ambidexterity as an outcome resulting from inputs at the organizational and interorganizational levels. These inputs are in the form of resources and capabilities.

Simultaneously pursuing exploitation and exploration within a single organizational unit is inherently challenging, however, as a consequence of the competition for scarce resources that often leads to conflicts, contradictions, and inconsistencies (Simsek et al., 2009). In order to handle these competing claims, organizations need to find the right combination of different types of resources and capabilities, i.e., tangible and intangible and formal and informal, (Leonard-Barton, 1992).

To foster ambidexterity, the combination of resources and capabilities that are relied upon need to enable the integration and development of knowledge over time (Kogut & Zander, 1992; Teece & Pisano, 1994). Knowledge is at the core of an organization's ability to generate innovation and the resources and capabilities that are relied on need to assist the organization in facilitating the search for, acquisition of, and sharing of this knowledge. Resources and capabilities that are more formal and tangible enable the organization to create routine and to structure mechanisms for exchanging information and knowledge, while resources and capabilities that are

informal and intangible, e.g., values and norms of behavior, provide the impetus to utilize these mechanisms. Without norms and values that emphasize collaboration, for example, the more formal and tangible mechanisms, by themselves, will have a limited affect on fostering the exchange of information and knowledge either within or outside the organization.

It is for this reason that the combination or bundling together of resources and capabilities is critical in the creation of business processes that can provide competitive advantage (Ray, et al., 2004; Leonard-Barton, 1992). While a particular resource or capability may provide some utility, it is when a set of resources and capabilities are bundled together that they provide a combinative effect (Leonard-Barton, 1992). And it is this combinative effect among these bundled resources and capabilities that enables the simultaneous pursuit of explorative and exploitative activities that lead to simultaneously generating multiple types of innovation including incremental and radical (Gupta, et al., 2006). Attaining high levels of both incremental and radical innovation simultaneously results in what we define as, “innovation ambidexterity” (IA)

Building on Ray et al.’s (2004) model, we suggest that simultaneously attaining high levels of exploration and exploitation and the accompanying high levels of incremental and radical innovation is likely to lead to greater business performance in terms of revenues, profits and productivity growth relative to competitors (Barney & White, 1998; Barney, 1991; Porter, 1991). Figure 4-1 depicts these relationships.

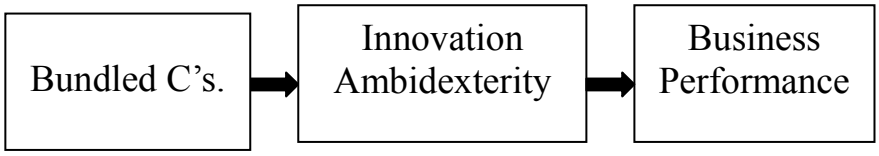

Figure 5-1. Proposed Relationships among Bundled "C"'s, Innovation Ambidexterity & Business Performance: The Second Taiwan Case

In the following section, we elaborate our hypotheses.

5.3. Hypotheses

5.3.1. Innovation Ambidexterity and Business Performance

Prior research suggests that firms capable of achieving ambidexterity (i.e., the ability to engage in exploitation and exploration simultaneously) are more likely to generate outcomes that are not attainable than if they emphasize one of these activities at the expense of the other (Tushman & O'Reilly, 1996; Gibson & Birkinshaw, 2004; He & Wong, 2004; Cao et al., 2009). Indeed, as Colbert (2004) points out, interactions, such as the interaction between incremental and radical innovation, give "rise" to emergent properties that are irreducible because they exist only in relationship.

The outcomes from achieving ambidexterity that have been studied are quite varied. Atuahene-Gima (2005), e.g., suggests that the interaction of exploiting existing competencies and renewing and replacing them with new competencies is positively related to radical

innovation performance, while Prieto et al. (2007) found that competence is positively related to new product development performance in general. Simsek et al., (2009) found that simultaneously combining exploitation and exploration within a single unit can improve the satisfaction of stakeholders including customers and upper-level managers. Concerning financial performance, Han et al. (2001) suggest that a firm's pursuit of ambidexterity is positively associated with financial performance, measured in terms of market share and return on investment, as compared to firms that only pursue incremental innovation. He and Wong (2004) also found that the ambidexterity achieved by the interaction of exploitation and exploration learning is positively related to self-reported compounded average rate of sales growth over a three year period. Further, Schulze et al., (2008) suggest that ambidexterity has a positive effect on subjective ratings of performance, measured as a latent composite of operational and strategic planning.

These studies suggest that relationships exist between exploitation, exploration, ambidexterity, and various sorts of performance outcomes. Prior research, however, has not investigated the attainment of the combination of incremental and radical innovation, i.e., innovation ambidexterity, on business outcomes. Yet, there are suggestions that innovation ambidexterity may indeed lead to enhanced business performance.

By engaging in both incremental and radical innovation, firms benefit by evading the disadvantages associated with becoming overly

focused on one or the other (c.f., Han et al. 2001). However, pursuing radical innovation typically requires much more development time, capital investment, risk-taking, and failure tolerance than does incremental innovation (Amabile, 1997; Farson & Keyes, 2002). Engaging in radical innovation also takes more time as companies identify and search for sources of useful knowledge within and outside the organization. It is also relatively more difficult to estimate real-time returns from radical innovation, although there is an expectation that very large profits may result from the commercialization of radical innovations (Levinthal & March, 1993).

Incremental innovations, on the other hand, are built on existing products and exploiting proximate knowledge, information, and feedback from customers, competitors, and markets (Tushman & O'Reilly, 1996). And they are relatively effective in achieving predicted returns in the short term (Raisch & Birkinshaw, 2008). While incremental innovations are typically effective at responding to the needs of customers and markets, they are, at the same time, more easily imitated and substitutable. Thus, it has been argued that organizations that engage solely in incremental innovation risk failing to stay abreast of new knowledge (e.g., new technology and materials) thus generating small returns. Researchers also point out that a narrow knowledge search may lead to highly limited specialized knowledge and know-how that may eventually create rigidity in the organization (Atuahene-Gima, 2005; Leonard-Barton, 1992), as well as technological and knowledge obsolescence (Levinthal & March, 1993).

In contrast, the combination of radical and incremental innovation can provide significant advantage for the organization. On the one hand, radical innovation is more likely to create new markets, generate greater market share, and result in substantially higher returns for the firm in the long term (Cao et al., 2009). While incremental innovation is more apt to improve and extend the quality and added value of existing products that will satisfy current customers' needs, on the other (Cao et al., 2009).

This suggests that advantages can be gained from undertaking both types of innovation and that the disadvantages associated with one type can be offset by the other. Thus, when organizations engage in high levels of both incremental and radical innovation (i.e., innovation ambidexterity) it is more likely to result in greater overall business performance than if only one form of innovation is undertaken.

Thus, we propose:

H1. A higher level of innovation ambidexterity will lead to higher business performance in the business unit.

5.3.2. Bundled C's and Innovation Ambidexterity

As noted above, resources and capabilities consist of the tangible and intangible assets that enable the integration and development of knowledge that is critical to an organization's ability to generate innovation over time (Kogut & Zander, 1992; Teece & Pisano, 1994). And, although prior research has focused on investigating the separate effects of tangible and intangible and formal and informal assets

(Lawson, et al., 2009) on generating innovations, we argue below that in order to generate innovation ambidexterity (i.e., the attainment of high level of both incremental and radical innovation), organizations need to bundle assets together in ways that will generate high levels of radical innovation and incremental innovation simultaneously. Indeed, it has been argued that sustainable competitive advantage relies on an organization's ability to "reconfigure" its knowledge (Rosenkopf & Nerkar, 2001). Kogut and Zander (1992) refer to this as combinative capability, i.e., the ability 'to synthesize and apply current and acquired knowledge."

The sources of the knowledge that are needed to generate innovation can be internal, i.e., inside the organization from other individuals, units, departments, etc., or external, i.e., outside the organization, e.g., universities, other companies, etc. (Jansen, et al. 2006; March & Simon, 1958; Nelson & Winter, 1982; Helfat, 1994; Rosenkopf & Nerkar, 2001; Hull & Covin, 2010).

Some researchers have found that the innovation activity of companies is closely related to their previous innovation activity, i.e., that it relies primarily on internal sources (March & Simon, 1958; Nelson & Winter, 1982; Helfat, 1994). But innovative products emerge from variation and from pursuing the untried instead of simply improving the existing ways of doing things (Sethi & Sethi, 2009). Thus, when collaboration occurs only with others in the organization it may limit the potential for tapping into ideas that are foreign to the firm (cf. Jansen et al., 2006). If individuals within an organization hold the same basic experiences, values, and capabilities,

it makes it difficult to explore fundamentally different knowledge bases and to create opportunities for acquiring new knowledge and capabilities. And, since units operate as part of a single firm, they are more likely to exchange knowledge that is related to what they already know or that is similar to their existing knowledge base. Thus, they are more likely to pursue exploitative innovations (cf. Jansen et al., 2006) and there is less likelihood that radically new ideas will be generated when only intraorganizational collaboration is relied upon. However, such exploitative innovation can lead to useful and important "next generation" products that can add significantly to a company's revenues stream (Benner & Tushman, 2003).

Other research suggests that external knowledge sourcing through interorganizational collaboration is an important source of learning that can enhance a firm's innovativeness (Allen & Cohen, 1969; Laursen & Salter, 2006; Lorenzoni & Lipparini, 1999; Shan & Song, 1997). Lorenzoni and Lipparini (1999), e.g., found that a firm's ability to combine its knowledge with external sources influences its innovativeness, while Rosenkopf and Nerkar (2001) in a study of firms in the optical disk industry found that search beyond organizational boundaries had more impact, as measured by patent citations, than exploration within organizations. Laursen and Salter (2006) also investigated the relationship between external search and innovation performance and found that focusing on a limited number of organizations to search for new knowledge was associated with radical innovation.

The search process, whether it is externally or internally focused, involves acquiring knowledge and begins as an individual activity (Kim, 1993). But the development of innovations usually requires teams of individuals (Edmondson & Nembhard, 2009). Thus, organizations need to find ways to bundle or combine resources and capabilities in ways that will facilitate the synthesis, exchange, and application of acquired knowledge across individuals in the company (Kogut & Zander, 1992; Teece & Pisano, 1994). One resource that is available to companies to accomplish this is social mechanisms such as the culture of the organization (Lawson, et al., 2009).

An organization's culture (Schein, 1986) reflects the personality of the organization that arises from the assumptions, values, and norms that guide the behavior of its members (Schein, 2004). In this sense, the culture of the organization influences the way that people in the organization accomplish their work, relate to one another, and solve the problems that confront them on a daily basis (Fayolle, Ulijn, & Degeorge, 2005). Because an organization's culture represents the values and norms of behavior that are embraced by the members of the organization, it is likely to have a significant and enduring impact on the behavior of people in the organization. Thus, a culture that is competitive may cause individuals to withhold knowledge from each other, whereas a culture that promotes sharing and trust is likely to help the distribution of knowledge and ideas (Hansen, Mors & Løvås, 2005; Lorenzoni & Lipparini, 1999).

Creating a culture with entrepreneurial spirit where individuals are willing to take risks, trust and respect each other, learn, and search

for opportunities may be an effective means of fostering the values, behaviors, and norms that will result in the exchange, synthesis and application of knowledge (Hurley & Hult, 1998). Innovation requires flexibility, collaboration, and sharing. But these behaviors entail risk and indeed demand that risks be taken. Sethi and Sethi, e.g., found that "teams that are strongly encouraged to take risk focus more on exploration and are expected to question and challenge the existing ways of doing things" (Sethi & Sethi, 2009). Also, rewarding risk taking behavior has been found to encourage people to look for new ideas, technologies, and approaches that can result in more radical new products (Amabile, 1988; Mason & Mitroff, 1981; Kanter, 1988; Van de Ven, 1986).

But managing these risk-taking behaviors cannot be accomplished through formal monitoring and control (McDonough & Leifer, 1986). Instead, facilitating these behaviors requires trust (Rousseau, et al., 1998). A culture where individuals trust each other emboldens people to take risks in the form of exploring new technologies, trying out new ideas, and sharing untested ideas.

We also argue that it would be incorrect to assume that individuals erect artificial boundaries in their discussions with each other restricting their sharing to only exploitative or exploratory ideas. Practically speaking, it is difficult, if not impossible, to know in advance the outcome of an idea or if it will lead to a major breakthrough or a more modest advance. Thus, we suggest that it is the presence of a culture of sharing that is important to fostering exploitative and exploratory ideas that have the potential to lead to

incremental and radical innovations.

By creating an organization culture with this sort of "entrepreneurial mind set," organizations can facilitate the synthesis, exchange, and application of knowledge that has been acquired from internal and external sources. And it is this combination of tangible and intangible and formal and informal assets that enables the organization to generate radical and incremental simultaneously (Lawson, et al., 2009). In some sense, then, bundled capabilities become a higher order capability that enables organizations to "skillfully escape from the inability of their current capabilities to enhance product innovation" (Danneels, 2002; March, 1991). Accordingly, it would enable the firm to engage in both exploitative and explorative learning, thus leading to higher level of both incremental and radical innovation simultaneously (Collis, 1994; Danneels, 2002; Gibson & Birkinshaw, 2004). Leonard –Barton (1992) and March (1991) have pointed out that a firm may underestimate the down side of its capabilities that may inhibit innovation thus falling into a "capability trap or competence trap". Combining its existing capabilities together into a higher order capability is likely a promising way to generate relative higher level of both incremental and radical innovation. Thus, we propose that:

> H2: When used in conjunction with each other three capabilities – intraorganizational collaboration, interorganizational collaboration and an entrepreneurial

organization culture will have a positive impact on innovation ambidexterity.

5.3.3. The Mediating Effect of Innovation Ambidexterity

Finally, we argue that innovation ambidexterity *mediates* the relationship between the bundled capabilities consisting of intra and interorganizational collaboration and entrepreneurial culture and business performance. That is, the combination of collaboration and culture impact on performance *through* achieving innovation ambidexterity (i.e., the attainment of high level of both incremental and radical innovation). When the organization has not attained a high level of both incremental and radical innovation, the Bundled C's, by themselves, are likely to have no or less influence on performance. In the view of RBV theory of the firm, it is the application and use of a firm's resources or capabilities that enable the firm to perform the activities it needs to perform, which provide advantage.

Thus, the reason for hypothesizing a mediating effect is that innovation ambidexterity (i.e., the attainment of high level of both incremental and radical innovation) is seen as a business process involving the executing of both incremental and radical innovation. And that it is the outcome of the application and use of these resources or capabilities that enable the firm to perform the exploitative and exploratory activities that are needed to produce both incremental and radical innovations, which, in turn, generate greater business performance (Porter, 1991; Stalk, Evans, & Shulman, 1992; Ray et al., 2004). Therefore, we suggest that unless these capabilities

are bundled together so as to generate innovation ambidexterity, the bundled capabilities, in and of themselves will have a less positive impact on business performance than will the combined effects of bundled capabilities and innovation ambidexterity.

Organizational capability theorists have indicated that the importance of capabilities to organizations today is much more than it was before because of the relatively open and diverse sources of innovation now available to organizations (Teece, 2000). However, most scholars also acknowledge that resources and capabilities, by themselves, cannot be a source of competitive advantage (Eisenhardt & Martin, 2000; Ray et al., 2004). That is, resources and capabilities can only be a source of competitive advantage if they are used to 'do something;' i.e., if those resources and capabilities are exploited through business processes (Ray et al. 2004). Further, RBV-based logic suggests that in order to realize the full competitive potential of its resources and capabilities, a firm must organize its business processes efficiently and effectively (Barney and Wright, 1998). Thus, Porter (1991) suggests that valuable resources and capabilities allow firms to perform activities, i.e., business processes that are the determinants of business success (cf., Ray et al., 2004).

We have stated above that bundled-capabilities comprise both tangible and intangible resources of a firm that are developed to carry, share and exchange information and knowledge that enables organizations to perform exploitative and exploratory activities. Accordingly, in our study, we propose that bundled capabilities can be employed to facilitate both exploitative and exploratory activities that

will lead to IA (i.e., the attainment of high level of both incremental and radical innovation). RBV views IA as a business process responsible for attaining both incremental and radical innovation leading to greater business performance. In doing so, we reason that firms can have competitive advantages in some business activities and competitive disadvantages in others. Thus, simply examining the separate relationships between one capability and firm performance or one capability and one process can lead to misleading conclusions (Ray et al., 2004),. For example, a firm may have resources and capabilities that have the potential for generating competitive advantage but not fully realize this potential as a result of a failure to leverage the individual strengths associated with each one. Similarly, if we claim that bundled capabilities can only foster a process that will result in incremental innovation or radical innovation but not both, we may end up with misleading results.

Additionally, RBV-based logic also suggests that business processes that exploit valuable but common resources can only be a source of competitive parity; business processes that exploit valuable and rare resources can be a source of temporary competitive advantage; and business processes that exploit valuable, rare, and costly-to-imitate resources can be a source of sustained competitive advantage (Barney, 1991). Thus, while every firm may possess resources and capabilities such as culture, intraorganizational and interorganizational collaboration, not every firm can effectively and efficiently employ its resources and capabilities in ways that will create unique and costly-to-imitate processes (Colbert, 2004). When

the capabilities are bundled together appropriately, however, the bundle creates properties that exist only as a consequence of the individual capabilities being part of the whole. And these properties, in turn, create outcomes that are unavailable in their absence (Colbert, 2004). Consequently, the joint effect of bundled capabilities through the process of innovation ambidexterity would generate greater business performance (Porter, 1991; Stalk, Evans, & Shulman, 1992; Ray et al., 2004).

Combining these reasoning, we propose:

H3: Innovation ambidexterity mediates the relationship between bundled capabilities and business performance.

5.4. Methodology

This section describes the methodology of the study. The first subsection presents the empirical context. We then describe data collection methods including sample, sample profile, questionnaire survey and respondents at each SBU/Company, and measures and control variables. We also present aggregation and measurement validation in the subsequent subsections.

5.4.1. Empirical Context

Our empirical setting was the companies listed on the General Chamber of Commerce of Taiwan and operating in chemicals, pharmaceuticals, financial management, mechanical engineering, and electronic engineering sectors. These sectors have been shown to be more innovation oriented than others in recent decades in terms of the

number of commercialized products and services. Additionally, Taiwan has shown an innovation orientation in many aspects. For example, Taiwan ranks number one in patents per million people granted between January 1 and December 31, 2007 and Taiwanese companies rank number 16 in the world in terms of R&D spending (see World Economic Forum, Global Competitiveness Report 2008-2009). Prior research has suggested that this context could provide insights on the innovation processes and effectiveness (cf., Elenkov et al., 2005; Jibu et al., 2007). Thus, we invited companies in these sectors to participate in our survey within this sampling frame. The sampled companies had to meet two criteria including 1) the importance of innovation to the industry and 2) the importance of innovation to the company. Companies were contacted directly to ascertain their interest in participating once they fit the above criteria in the study.

Following the suggestion of research on ambidexterity that a business unit is a meaningful level at which to examine organizational ambidexterity (Simsek, 2009), our study was focused on the company strategic business unit (SBU) level. A SBU is defined as a profit center responsible for performance in one or more markets with the authority to influence the choice of the business' competitive strategy in its target markets. By focusing on the SBU, the likelihood that each respondent is well acquainted with the strategies, general processes, management, and performance of the SBU is increased (Narver & Slater, 2004).

5.4.2. Data

To test our hypotheses, we gathered primary data from our sample. Following the suggestions of Podsakoff, MacKenzie, Lee and Podsakoff (2003), we constructed separate questionnaires to gather data for the independent (i.e., bundled capabilities including organizational culture, intraorganizational and interorganizational collaboration) and dependent variables (i.e., innovation ambidexterity and business performance) in order to avoid self report and self evaluation that can result in common method bias. To mitigate the potential problem of self-report bias because the senior managers filled out our questions about both business and innovation performance, we used a combination of prevention and detection methods suggested by Podsakoff et al. (2003). Prevention methods included collecting data at two different points in time, approximately one year apart (Jansen et al., 2006). We also asked our company contacts to give the questionnaire in person to the best qualified person to answer. The detection method consisted of conducting a validity check as described in the measurement validation section. As Podsakoff, et al. (2003) suggest using these methods minimizes self report bias as a concern in our study.

The set of survey questionnaires was distributed via mail, fax, email, or in person. We administered the surveys to senior and middle level managers of 580 SBUs from 558 parent companies. One questionnaire was administered to a senior level manager in each SBU who was asked about the innovation and business performance of the SBU. A different questionnaire was administered to middle

level managers who were asked about organization culture, intraorganizational collaboration, and interorganizational collaboration. After the initial survey mailing, we followed up with reminder letters and telephone calls to our company contacts. We received 214 sets of completed surveys by multiple informants including a total of 729 middle managers (1-12 respondents per SBU) and 214 senior managers in 214 SBUs. Thus, we had between 2 and 13 respondents per SBU, and a total of 943 respondents from 214 SBUs. The response rate for this study was 37% (214 SBUs completed out of the 580 SBUs that were initially approached).

Following Kanuk and Berenson (1975), we further assessed potential non-response bias by looking for differences between early and late respondents. We recorded the order of responses to the survey and found it to be non-significantly correlated with SBU industry (r =0.05, p =0.32) or SBU size (r =0.01, p =0.47). We further compared performance differences on the early versus late-responding SBUs and also found it to be non-significantly correlated with responding SBU's revenue (r =0.02, p =0.42), suggesting that the concern regarding non-response bias is minimal (Combs & Ketchen, 1999).

As shown in Table 5-1, the size of the SBUs in terms of the number of employee in our sample ranged from 45 employees to over 3,000. The mean size equaled 1,037 (standard deviation=3197). Average age of the SBUs in the sample was 17 years (standard error of mean=0.97). One hundred and ninety SBUs (89%) were privately owned. Twenty eight percent of the SBUs in the sample are in the

business of producing consumer products, 36% produce industrial products, 22% produce consumer services, and 8% produce industrial services. Sixty-six of the SBUs in our sample had revenues of 1 to 4.9 billion Taiwanese dollars (US$30 million to US$1.5 billion), thirty-five SBUs had revenues of 500-999 million Taiwanese dollars (US$15-30 million) and thirty-four SBUs had revenues of 10 billion Taiwanese dollars and above (US$3 billion).[13]

[13] Conversion based on an exchange rate 1 US$ = 33 NTD

TABLE 5-1 Sample Profile

Characteristics		Number	Percent
SBU size (standard deviation=3197)	50 employees and below	76	35.9%
	51-500 employees	84	40.8%
	501-1000 employees	12	5.8%
	1001 and above …	34	13.8%
	Missing data	8	3.7%
Ownership	Public owned	21	9.8%
	Private owned	190	88.8%
	Missing data	3	1.4%
Business Product	Consumer products	60	28.1%
	Consumer services	46	21.5%
	Industrial products	78	36.4%
	Industrial services	17	7.9%
	Missing data	13	6.1%
Industry	Chemicals	9	4.2%
	Pharmaceuticals	25	11.6%
	Financial management	17	7.9%
	Mechanical engineering	26	12.1%
	Electronic engineering	89	41.5%
	Others	30	14.0%
	Missing data	12	5.6%
Revenues	Less than10 million	14	6.5%
	10-99 million	23	10.7%
	100-250 million	9	4.2%
	251-499 million	13	6.1%
	500-999 million	35	16.4%
	1-4.9 billion	66	30.8%
	5-9.9 billion	14	6.5%
	10 billion & above	34	15.9%
	Missing data	6	2.8%
SBU average age (years)	17 (Standard error of Mean=0.97)		
N			214

Note: 1) missing data means no answer from respondent. 2) for revenue, the currency in Taiwan is new Taiwan dollars. Conversion based on an exchange rate 1 US$ = 33 NTD.

Note: 2) Pharmaceuticals industry includes pharmaceuticals, health care and food industry. Mechanical engineering industry includes aerospace, car, and industrial equipments industry. Electronic engineering industry includes electronics, entertainment and telecommunication industry. Others include non-durable goods, services, construction and so on.

5.4.3. Measures

Our instruments were originally constructed in English and were then translated into Chinese and back-translated into English to ensure the accuracy of the meaning of the questions. We also used a mixture of positive and negative questions in order to minimize response bias. The questionnaires were then pre-tested using a sample of managers in Taiwan. All constructs in this study were measured on a seven-point Likert type scale.

Dependent Variable

Business Performance. Prior literature indicated that innovative products and services favor to profits and revenues (He & Wang, 2004; Cao et al., 2009) on one hand; the more focus on innovation is likely to generate higher productivity that ultimately contributes to overall returns, on the other hand and (Wakelin, 2001). Accordingly, we measured the dependent variable with three items that required senior management respondents to reflect on performance relative to their competitors along three dimensions, revenues, profits, and productivity (Appendix 5-1 contains these items). Respondents were asked to indicate on a 7-point Likert scale where they felt their SBU belonged on each of these dimensions. Responses could range from much lower, the same, to much lower (cf., Gibson & Birkinshaw, 2004). We conducted common factor analyses on these items. Principal Components extraction with an Equamax rotation method

(Eigenvalue > 1) resulted in one factor. The Cronbach alpha[14] was 0.82.

Mediating Variable

Innovation Ambidexterity. Innovation ambidexterity is the attainment of multiple types of innovation in terms of incremental and radical product innovation simultaneously. Because there was no existing measure of ambidexterity exactly reflecting our research purpose, we developed a six item measure that reflected the combination of incremental and radical product innovation performance. The measures for each type of innovation performance were adapted from the work of Atuahene-Gima (2005) and Cooper & Kleinschmidt (2000). (Appendix 5-1 contains these items). Because senior managers are in the best position to provide responses to our questions concerning innovation performance, we asked these managers to look backwards over the past 3 years and provide their perceptions of innovation performance. We felt it was important to use a 3 year time period because of the lag effects that are likely to exist between a firm's innovativeness and its actual impact on innovation performance.

In order to operationalize the combined concept of innovation ambidexterity, we followed the approach of He and Wong (2004) and Cao et al., (2009) to generate a product term including incremental

[14] Cronbach's α (alpha) is a statistic. It is commonly used as a measure of the internal consistency or reliability of a psychometric test score for a sample of examinees.

product and radical product innovation. We began by assessing the reliability of the items used to measure incremental product and radical product. The Cronbach alpha for the items measuring incremental product innovation was 0.78. These items were combined into a single factor. The Cronbach alpha for the items measuring radical product innovation was 0.77. These items were combined into a single factor.

Traditionally, the variables are centered before generating the product terms for the avoidance of multicollinearity. Thus, we centered the internal process, incremental product, and radical product innovation scales before obtaining their product to mitigate the potential for multicollinearity (Cao et al., 2009; He & Wang, 2004). We then multiplied the scores from these three factors for our overall measure of innovation ambidexterity.

Independent Variables

Bundled Capabilities. We asked middle managers to assess the resource-based capabilities of the firm. Our measure of resource-based capabilities was drawn from the work of O'Reilly, Chatman, & Caldwell (1991), Tsai (2002) and Faems, Van Looy & Debackere (2005) and consisted of eleven questions in total (Appendix 5-1 contains these items). Because O'Reilly, Chatman, & Caldwell (1991)’s measure of organization culture was broader in scope than required for the purposes of this study, we used a subset of their items consisting of five items representing organizational culture. Our measure of intraorganizational collaboration was drawn from the

work of Tsai (2002) and consisted of three questions. The measure of interorganizational collaboration was adapted from the work of Faems, Van Looy & Debackere (2005) and consisted of three questions.

To determine the number of items which contribute to common variance actually needed to describe resource-based capabilities, we conducted common factor analyses on these items. Principal Components extraction with an Equamax rotation method (Eigenvalue > 1) resulted in three factors, which paralleled the original three dimensions of resource-based capabilities. One factor consisted of five items representing organizational culture. Cronbach's α was 0.91. One factor consisted of three items representing intraorganizational collaboration. Cronbach's α was 0.90. The other factor consisted of three items representing interorganizational collaboration. Cronbach's α was 0.90. In order to operationalize the combined concept of bundled capabilities, we followed He and Wong (2004) and Cao et als'., (2009) approach to generate a product term. In order to avoid multicollinearity, we thus centered the organizational culture, intraorganizational collaboration and interorganizational collaboration scores before obtaining their product to mitigate the potential for multicollinearity (Cao et al., 2009; He & Wang, 2004). Then, we multiplied the scores from these three factors to assess the reliability for our overall measure of bundled capability. The overall Cronbach's α for bundled capabilities was 0.92.

Control Variables

Recognizing that innovation can come from firm and industry attributes, it is necessary to control for these effects. Accordingly, we included firm specific factor - SBU age and size dummy, and industry specific factor – industry dummy as control variables because prior studies have documented their potential effects on organizational innovation (cf., Elenkov et al., 2005; Jung et al., 2008). We controlled for the SBU size effects by including dummy variables. Our sample distributed across four categories: 1 (50 employees and below), 2 (51-500 employees), 3 (501-1000 employees) and 4 (1001 and above). We therefore constructed three SBU size dummy variables: 1 (50 employees and below), 2 (51-500 employees) and 3 (501-1000 employees).

Industries may differ in technological opportunities and innovation types in terms of incremental, radical and process innovation. We controlled for the industry idiosyncratic effects by including dummy variables. Our sample distributed across six sectors: 1 (Chemicals), 2 (Pharmaceuticals), 3 (Financial management), 4 (Mechanical engineering), 5 (Electronic engineering) and 6 (others). Thus, we constructed five industry dummy variables: 1 (Chemicals), 2 (Pharmaceuticals), 3 (Financial management), 4 (Mechanical engineering) and 5 (Electronic engineering).

5.4.4. Aggregation

Because the theory and hypotheses of the study require an SBU level of analysis, we aggregated respondent's individual scores on

each variable and computed the sampled strategic business unit mean responses for each question (Keller, 1986). After aggregation, we justified the aggregation of SBU-level variables by calculating an inter-rater agreement score (γ_{wg}) for each variable, and then used intra-class correlation (ICC) to examine the degree of agreement among respondents on each measure (cf., James et al., 1984; Goodman et al., 1990). Average inter-rater agreement score (γ_{wg}) was .70 for organizational culture, .72 for intraorganizational collaboration, and .73 for interorganizational collaboration, which were well above the cut-off value of 0.70. The ICC(1) and ICC(2) values, were .62 and .91 for organizational culture, .63 and .90 for intraorganizational collaboration, and .75 and .90 for interorganizational collaboration were obtained. All ICC values are greater than or equal to .60 indicating acceptable reliability (Schneider, White, & Paul, 1998). Accordingly, aggregation was justified for these variables, and provided substantial support for the scales.

5.4.5. Measurement Validation

Following Anderson and Gerbing's (1988) suggestion, we performed a multistage process to further assess convergent and discriminant validity of resource-based capabilities and innovation ambidexterity through exploratory and confirmatory factor analysis. Exploratory factor analysis clearly replicated the five-factor model and did not reveal any evidence of a single underlying construct. Next, we used confirmatory factor analysis on all items pertaining to

resource-based capability and innovation ambidexterity. This analysis yielded a measurement model that fitted the data adequately (χ^2 =18.30, p<0.05, χ^2 / DF= 2.29, CFI=0.98, NFI=0.96, RMSEA=0.06)[15]. Item loadings were as proposed (>=0.6) and significant (p < 0.01), providing evidence for convergent and discriminant validity. As noted in the measures subsection, all scales have reliabilities that Cronbach's coefficient alpha were greater than 0.70.

5.5. Analytical Procedures

Multiple regression analyses were performed to test the hypotheses. We then used SPSS Macros[16] to estimate the mediating effect. The approach combines the Sobel test (1982) and bootstrapping method by calculating standard errors to obtaining confidence intervals. While using Baron and Kenny's (1986) 4-step criteria informally judges whether or not mediation is occurring, the Sobel test and bootstrapping methods proposed by MacKinnon and Dwyer (1993) is a formal statistically based assessment for mediation. We report the results of the Sobel test to provide powerful estimation for the mediating effect.

Firstly, we included the control variables (i.e., SBU industry dummy, SBU age and SBU size dummy) and innovation ambidexterity (i.e., the combination of incremental and radical

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[15] The indexes of measuring model fit. χ^2 refers to chi-square. χ^2 / DF refers to chi-square to degree of freedom ratio. CFI refers to Comparative Fit Index. NFI refers to Normed Fit index. RMSEA refers to Root Mean Square Error of Approximation.

[16] SPSS Macros is a program language; it can be used to generate SPSS Syntax.

innovation) to examine the direct effect on business performance. Secondly, we included the control variables and bundled capabilities which are organizational culture, intra and interorganizational collaboration to examine the direct effect on innovation ambidexterity. Then, we examined the mediating effect of innovation ambidexterity on the relationship of the bundled capabilities and business performance.

5.6. Results

The means, standard deviations, and pairwise correlations for the variables in this study are listed in the Table 5-2. Since significant correlations were found among a number of the variables, we further investigated potential multicollinearity using variance inflation factors (VIFs). The maximum VIF obtained in any of the models for substantive variables was substantially below the rule-of-thumb cutoff of 2 for regression models (O'Brien, 2007). Therefore, multicollinearity was not considered an important issue for these results.

Table 5-2. Descriptive Statistics and Correlation Matrix

	Correlation[a]											Mean	Std. Dev.
	1	2	3	4	5	6	7	8	9	10	11		
1	-											.04	.20
2	-.07	-										.23	.64
3	-.06	-.11	-									.24	.81
4	-.06	-.11	-.09	-								.34	.70
5	-.18	-.30	-.25	-.25	-							.60	.49
6	.07	.12	-.05	.08	-.23	-						17.58	13.88
7	-.05	-.05	.18	-.04	-.01	-.13	-					.35	.48
8	-.03	.13	-.13	.07	-.05	.06	-.58	-				.79	.98
9	.06	-.02	-.07	.16	-.02	-.02	-.17	-.19	-			.15	.66
10	-.03	.14	-.16	.03	-.15	.12	-.11	.09	-.01	-		4.23	1.34
11	-.06	.07	-.11	-.06	-.02	.01	.01	.17	-.06	.49	-	19.18	11.54
12	-.02	.15	.01	.05	-.11	.03	.03	.01	.04	.33	.34	115.62	59.91

1= chemicals industry, 2= pharmaceuticals industry, 3= financial management industry, 4= mechanical engineering industry, 5= electronic engineering industry, 6=SBU age, 7=below 50 employees, 8=51-500 employees, 9=501-1000 employees, 10= Business performance, 11=Innovation ambidexterity, 12=Bundled capabilities
[a]Listwise deletion, N=214
p-value < 0.05 for correlation values greater than 0.15; p-value < 0.01 for correlation values greater than 0.20

Table 5-3 summarizes the results for direct effects of innovation ambidexterity on business performance, and bundled capabilities on innovation ambidexterity. Model 1 is the unconstrained controls-only model. The results showed that only SBU industry dummy 2 (i.e., Pharmaceuticals) and SBU age were positively associated with business performance. It is not surprising because Pharmaceuticals is a relative higher innovative industry. The more established company is more conducive to business performance than the less established.

Given the positive correlation between innovation ambidexterity and business performance (r=.49, p<.01), Model 2 included the control variables and the innovation ambidexterity to test whether

innovation ambidexterity is positively related to business performance. The result showed that the positive association between the innovation ambidexterity with business performance (β=.45, p<.05). Hypothesis 1 was supported. The result of a correlation test also indicated the existence of a significant and positive correlation between bundled capabilities and innovation ambidexterity (r=.34, p<.01). It provided the impetus to examine the causal relationship between bundled capabilities and innovation ambidexterity. To test hypothesis 2, which predicted that the interaction of bundled capabilities are positively related to innovation ambidexterity, Model 3 included the control variables and bundled capabilities. The result showed the bundled capabilities was positively related to innovation ambidexterity (β=.35, p<.05). Hypothesis 2 was supported as well.

We also conducted Model 4 and Model 5 to predict the joint effect of bundled capabilities and innovation ambidexterity has stronger impact on business performance than the bundled capabilities itself. The result showed that the bundled capabilities itself has *less* impact on business performance than the joint effect of bundled capabilities and innovation ambidexterity does (R = .43 versus .55, respectively).

Table 5-3. Regression Results of Direct Effects

	Model 1	Model 2	Model 3	Model 4	Model 5
Dependent Variable	Business Performance	Business Performance	Innovation Ambidex-Terity	Business Performance	Business Performance
	Beta (t)	Beta (t)	Beta (t)	Beta (t)	Beta (t)
Chemicals Industry	-.05 (-.58)	-.02 (-.28)	-.05 (-.76)	-.02 (-.30)	-.01 (-.14)
Pharmaceuticals Industry	.05 (.57)	.03 (.38)	-.06 (-.79)	.01 (.10)	.01 (.16)
Financial management Industry	-.20** (-2.43)	-.13* (-1.69)	-.14* (-1.87)	-.21** (-2.69)	-.14* (-1.92)
Mechanical engineering Industry	-.04 (-.51)	.02 (.26)	-.12 (-1.63)	-.05 (-.68)	.004 (.06)
Electronic engineering Industry	-.21 (-2.29)	-.15* (-1.83)	-.07 (-.87)	-.18** (-2.01)	-.14 (-1.70)
SBU Age	.04 (.54)	.05 (.71)	-.02 (-.30)	.05 (.67)	.05 (.76)
Below 50 employees	-.10 (-.99)	-.05 (-.59)	-.03 (-.33)	-.07 (-.74)	-.05 (-.50)
51-500 employees	-.01 (-.08)	-.05 (-.56)	.14 (1.51)	.01 (.10)	-.04 (-.40)
501-1000 employees	-.04 (-.41)	-.01 (-.17)	-.04 (-.52)	-.04 (-.54)	-.02 (-.28)
Innovation Ambidex-terity		.45*** (6.45)			.38*** (5.04)
Bundled Capabilities			.35*** (5.18)	.33*** (4.50)	.18** (2.50)
R	.30	.53	.42	.43	.55
R^2	.09	.28	.17	.19	.30
F	1.74	6.12	4.00	3.69	6.19
P	.08*	.00***	.00***	.00***	.00***
N	170	170	170	170	170
Remarks	Standardized regression coefficients are shown here. * p< .1, ** p< .05, *** p< .01, **** p< .001, Listwise deletion				

We used the Sobel test and bootstrapping approach to test the mediating effect of innovation ambidexterity on the relationship

between bundled capabilities and business performance (H3). According to Sobel (1982), for either partial or complete mediation to be established, the reduction in variance explained by the independent variable must be significant. Our results found a significant reduction in variance (our result Z=3.938, p<0.01). Accordingly, we can conclude that innovation ambidexterity mediated the relationship between bundled capabilities and business performance, providing support for Hypothesis 3 (Table 5-4). Table 5-4 first showed the results of mediator variable model that assessed Baron and Kenny's 4-step criteria (1986)[17]. Subsequently, the table showed the result of Sobel test including standard error (s.e.), confidence interval (CI) and standard score (Z)[18].

[17] Baron and Kenny (1986) have four steps criteria in establishing mediation. Step 1: show that the initial variable is correlated with the outcome. Use Y as the criterion variable in a regression equation and X as a predictor. Step 2: Show that the initial variable is correlated with the mediator. Use M as the criterion variable in the regression equation and X as a predictor. Step 3: Show that the mediator affects the outcome variable. Use Y as the criterion variable in a regression equation and X and M as predictors. Step 4: To establish that M completely mediates the X-Y relationship, the effect of X on Y controlling for M should be zero. If not, it means the existence of partial mediation.

[18] Sobel test was estimated with normal distribution. Thus, it needs to look at standard error, standard score and confidence interval to indicate the reliability of an estimate.

TABLE 5-4. Results of Sobel Tests for Mediating

		Mediator Variable Model			
Step	Predictor	Coefficient	s.e.	T	P
1	YX	0.007	0.002	4.676	0.000***
2	MX	0.068	0.013	5.255	0.000***
3	YM, X	0.048	0.008	6.056	0.000***
4	YX, M	0.004	0.002	2.537	0.012**
	Results of Sobel Test				
Total	Value	s.e.	LL 95 CI	UL 95 CI	Z
Indirect Effect	0.003	0.001	0.002	0.005	**3.938*** **
Remark	Y=business performance, X=bundled capabilities, M=innovation ambidexterity * p< .1, ** p< .05, *** p< .01, **** p< .001				

5.7. Discussion and Conclusions

As Simsek and his colleagues (2009) have pointed out, prior research has not provided answers to the question of what organizations need to do in order to simultaneously attain exploitation and exploration. Put differently, we have not been able to suggest to managers the specific levers that they can pull to generate incremental and radical innovation simultaneously. Our study, which was intended to help answer this question, suggests that one set of levers that may be important are the firm's tangible and intangible resources and capabilities.

Scholars have also explicitly cited the need for additional research that examines the effects of both behavioral and structural, i.e., informal and formal, capabilities on the combined effects of incremental and radical innovation (He and Wong, 2004). These researchers note that doing so "may shed additional light on the subtle

and complex processes through which organizations achieve and benefit from various combinations of exploration and exploitation." Our results provide some intriguing insights into how firms may be able to foster higher firm performance using innovation ambidexterity (i.e., the attainment of high level of both incremental and radical innovation) to do so.

Managing the paradoxes that crop up in organizations has been a source of fascination, as well as consternation, for management researchers for many years (March, 1991). Our results lend support to the notion that bundling a firm's resources and capabilities may be one way of effectively managing at least one of the paradoxes of organization life – how to foster exploitation and exploration activities simultaneously. By bundling the two capabilities that facilitate internal and external collaboration with a third capability - an entrepreneurial culture, organizations are apparently able to overcome the barricades that so often arise in the sharing of knowledge. Doing so seemingly has the follow on effect of stimulating both exploration and exploitative activities simultaneously and subsequently, the generation of incremental and radical innovation.

Further, when capabilities are bundled together appropriately, the bundle creates properties that exist only as a consequence of the individual capabilities being part of the whole. And these properties, in turn, create outcomes that are unavailable in their absence (Colbert, 2004). In this sense, then, these bundles represent a means for organizations to create a sustained competitive advantage. A useful

next step for our future research would be to identify specifically how to bundle capabilities appropriately.

This finding has potentially important implications for managers. It suggests relatively specifically "the levers" they need to pull in order to overcome the conflicts and competition that arise in developing two different types of innovations. Building an entrepreneurial culture appears to have an impact on developing not only radical new products, but also on incremental ones. Knowledge is not inherently or "naturally" divided according to its utility in discovering breakthrough ideas versus line extensions and often where an idea will lead is not knowable in advance. But what is known is that sharing those ideas increases the likelihood that the idea will grow and blossom into an innovation of some sort of.

Clearly more work is needed to understand more thoroughly what is going on here. How does an entrepreneurial culture influence the circulation of ideas and knowledge coming from both external as well as internal sources? What is the process by which this takes place? What does it look like? These are questions that require qualitative inquiry.

Our findings also provide additional insight into the debate about the value of achieving high levels of incremental and radical innovation, versus a balance between the two, and achieving both simultaneously versus sequentially. Within the context of Taiwanese SBUs it appears that achieving simultaneously high levels of both types of innovation has a significant impact on a firm's performance. In short, high on both is better than balanced, and simultaneous is

better than sequential. The implications of this finding are profound. It suggests that those firms that are able to achieve high levels of both incremental and radical innovation by effectively bundle the appropriate set of capabilities will have a substantial competitive advantage, while those firms that are less capable of doing so will find themselves at distinct competitive disadvantage.

It will be interesting and important for future research to investigate the ease with which the bundling process takes place and over what time period so that we may obtain a sense of the sustainability of this advantage. It will also be important to identify other bundles that may also provide advantage. While we believe we have identified one important bundle, it is unlikely to be the only important one.

This research has also been an attempt to take a peek inside the black box of relationships among a firm's capabilities, innovation ambidexterity, and performance. We've done so by examining the possibility that innovation ambidexterity (i.e., the attainment of high level of both incremental and radical innovation) plays a mediating role between capabilities and performance. Our results suggest that it does. It is innovation ambidexterity and not the firm's capabilities themselves that have the most direct and significant impact on business performance. From a managerial perspective, affecting business performance requires first identifying and developing very specific sets of capabilities that will result in innovation ambidexterity. Our findings also suggest that it is important that this set of capabilities enable the organization to acquire information from

sources that are both internal and external to the firm. Further, within this set is needed the capability to motivate individuals to share the acquired knowledge. This may be induced through a variety of means including fostering mutual trust, risk taking and the like.

It is also important to point out that our results may be contextually derived. Our sample is of SBUs in innovation focused Taiwanese industries. This raises the general question of their generalizability to larger organizations, as well as ones in other industries and countries. Taiwan is an emerging economy with deep ties culturally and historically to mainland China. As such, it is influenced by the Confucian tradition and Chinese way of thinking. It is thus interesting to speculate on whether what we found in Taiwanese firms could be expected to hold for firms in more developed economies, Western countries, as well as companies in China. Research relating to country culture indicates that Taiwan is group versus individual oriented. That is it values collective action over individual action. Does this group orientation have an impact on an organization's ability to bundle the three capabilities we have examined or on the ability to create an entrepreneurial culture that promotes risk taking and sharing across the organization? These are questions that require additional research.

5.7.1. Implications for Research

Support for our first hypothesis, which proposed that there would be a positive relationship between a higher level of innovation ambidexterity and greater business performance, lends support to

prior research on managing apparent paradoxes such as managing exploitative and exploratory activities (Lewis, 2000), as well as prior research on managing ambidexterity (Gibson & Birkinshaw, 2004; Gupta et al., 2006). Based on what we have found, it appears that greater business performance results from managing ambidextrously, i.e., from "harvesting" investment in current products through exploitative activities, while at the same time creating a sustainable market position for the future through exploratory activities.

In addition, support for our second hypothesis that bundled capabilities would lead to higher innovation ambidexterity suggests that a bundle of capabilities provides a significant advantage over a collection of capabilities, even when those capabilities are complementary (Gupta et al., 2006). Apparently, it is the result of the bundling process that provides the ability to effectively foster multiple and conflicting activities simultaneously. Thus, while earlier studies have suggested that ambidexterity arises from valuable resources and core capabilities (Eisenhardt & Martin, 2000; Teece et al., 1997), this study advances our knowledge of the relationship among resources, capabilities and innovation ambidexterity by suggesting that generating higher innovation ambidexterity requires that all three capabilities work together for a synergistic effect. While learning, exchanging and acquiring knowledge begins as an individual activity (Kim, 1993); the development of innovations requires the involvement of teams of individuals in the organization (Edmondson & Nembhard, 2009). One means of facilitating the synthesis, exchange, and application of acquired knowledge across

individuals in the company appears to be through the bundling or combining of these resources and capabilities (Kogut & Zander, 1992; Teece & Pisano, 1994). The idea of bundled capabilities is in line with the notion of higher-level capabilities (cf., Collis, 1994; Danneels, 2002; Gibson & Birkinshaw, 2004). Prior research has proposed that such bundling enables organizations to "skillfully escape from the inability of their current capabilities to enhance product innovation" (Danneels, 2002; March, 1991), thus suggesting that innovation ambidexterity is a higher level capability that goes beyond the separate capabilities of collaboration and culture.

Finally, we hypothesized that innovation ambidexterity *mediates* the relationship between the firm's bundled-capabilities and subsequent business performance (H3). We found strong evidence that innovation ambidexterity, i.e., the attainment of incremental and radical innovation, mediates the relationship between bundled-capabilities and firm performance. The results also provide support for the suggestion that bundled-capabilities, in and of themselves, have less impact on business performance than does the joint effect of bundled-capabilities and innovation ambidexterity (R = . 43 versus .55, respectively, Table 4-3). Our findings suggest that bundled-capabilities and innovation ambidexterity work in conjunction with each other. Thus, in seeking to create greater business performance organizations need to employ capabilities that allow both exploitative and exploratory activities for incremental and radical innovation leading to greater business performance. As Ray et al., (2004) suggest business performance requires a firm to not only

employ its specific capabilities, but also require an effective process (i.e., innovation ambidexterity) to optimize the potential of the capabilities. In other words, failing to take into account the role of either capabilities or ambidexterity may present a distorted picture of how capabilities enable an organization's ambidexterity to generate greater business performance.

5.7.2. Limitations and Future Research

While this study is limited as a consequence of our having investigated only a few dimensions of capabilities and indicators of business performance, it makes a strong argument for the importance of taking a "fine grained" approach in order to understand more deeply and accurately how resources and capabilities of an organization influence ambidexterity and business performance that organizations need to generate. Such an approach entails investigating multiple dimensions of capabilities, innovation, and different indicators of business performance, within the same study. For example, an important extension of our study would be to more systematically examine a broader array of capabilities and contextual factors in an effort to understand how they help create innovation ambidexterity. Also, future research investigating an even greater array of industries, varying even more than those in our sample in terms of business environment, would be another important extension of our study. We believe that by taking a more "fine grained" approach future research could help to clarify the interrelationship between capabilities and innovation ambidexterity, as well as the

relationship between capabilities and business performance.

Additionally, in order to determine whether this finding holds in other contexts, it is important to replicate this study in other industries and in the other countries, including developed and emerging economies.

Chapter 6

Effects of Strategy, Context, and Antecedents and Capabilities on Outcomes of Ambidexterity - A Multiple Country Case Study of the US, China and Taiwan : Conclusions

This chapter discusses the important findings pertaining to the research framework of the thesis. We first discuss how the findings contribute to prior research on innovation and knowledge strategies, contextual factors (i.e., cultural heritage and mindset), antecedents (i.e., strategic leadership behaviors and organizational culture) and capabilities (i.e., intraorganizational and interorganizational collaboration and organizational culture) as they relate to innovation, innovation ambidexterity and business performance. Subsequently, we discuss the academic contributions and managerial implications of the results. We conclude by pointing out the limitations of the thesis and provide suggestions for future research.

6.1. Discussion and Conclusion

In the face of increasing and increasingly sophisticated global competition, many organizations are struggling to become more innovative and ambidextrous to secure their competitive advantage. However, as scholars have indicated our understanding of the linkages among innovation and knowledge, their impact on

innovation, and how ambidexterity can be achieved remains largely unexplored (cf., McDonough et al., 2008; Raisch & Birkinshaw, 2008; Simsek et al., 2009).

In this thesis, we examined the factors that were assumed to influence *the extent to which* innovation and ambidexterity occur; and *how* innovation and ambidexterity are likely to be undertaken and executed to generate greater innovation and ambidexterity that in turn results in higher business performance and sustainable competitive advantage. In this way, our study goes beyond prior research by examining strategies, contextual factors, antecedents and capabilities. While prior research suggests a linkage among antecedents, innovation, ambidexterity and performance outcomes (Raisch & Birkinshaw, 2008), our results provide more specific insight into how the variables are linked and their joint effects on greater business performance.

Our results provide some intriguing insights into how firms may be able to foster innovation by managing their contextual facilitators and antecedents to enable effectively executing innovation, knowledge strategies and fostering multiple types of innovation simultaneously. Firms may also use our studies to understand how innovation ambidexterity can generate higher firm performance. Specifically, at the intraorganizational level, fostering innovation along with organizational evolution requires the ability to manage complexity that involves factors that facilitate capabilities for generating multiple types of innovation. The effects of contextual factors may facilitate or inhibits a firm's ability to implement

practices and execute strategies for innovation. Further, leaders' ability to integrate dual leadership behaviors is an important antecedent to foster innovation ambidexterity and thus leads to higher business performance. At the interorganizational level, the benefit of interorganizational collaboration in the form of knowledge sharing and transfer may become a critical capability that enables firms' ability to explore new knowledge and to compete not only what firms innovate but also what they know. We elaborate on the important findings below.

Firstly, in an effort to increasing our understanding of the linkages among innovation and knowledge, and knowledge's impact on innovation, we conducted semi-structured face-to-face interviews to gain in-depth insights into the interactions of innovation and knowledge strategies. We found that competitive organizations employ a strategy that is comprised of three key components including product/market, knowledge and innovation positions (McDonough, Zack, Lin, & Berdrow, 2008). And, the organization is capable of aligning its product/market, innovation and knowledge position over time, and realigning the three positions if required. The findings can be applied in both emerging and developed economies. In the case of Acer Inc., the largest manufacturer of laptop computers in Taiwan, its product/market position is to offer computers with user-friendly technologies that make life easier for home and commercial users (please refer to chapter 2, p.35). To accomplish its goal, Acer gains knowledge about industrial and fashion trends so that it can make its products as appealing as possible. In Acer, everything

the company does when it comes to the three parts of strategy supports that overarching goal. While in the United States, Buckman Laboratories International Inc., a Memphis, Tennessee-based manufacturer of specialty chemicals operating in over 90 countries is another example of a company that has been able to do this successfully. Buckman has gone through three major strategic transition phases since its founding in 1945. Maintaining strategic alignment as the competitive landscape changes provides an even greater challenge. The key to Buckman's long success has been its ability to explicitly bring all three positions into alignment.

In addition to the ability to align and realign, our research made clear the importance of the interrelationship between innovation and knowledge. A competitive organization may choose to innovate based on what it already knows, but if existing knowledge alone is not sufficient to enable the level of innovation required, they also attempt to obtain or develop new knowledge. In other words, the focus of an organization's innovation activity needs to be guided by the knowledge they currently have and the knowledge they need, while the focus of their innovation activity influences the knowledge they have and the knowledge they need in order to compete in the particular arena that they have chosen.

The findings support our proposition concerning the need to integrate the strategic aspects of innovation and knowledge into a coherent whole. Our research suggests strongly that competing effectively is based not only on what an organization makes or the service it provides, but also on what it knows, and how it innovates.

The key to competing effectively is based on a well integrated product, knowledge and innovation strategy and the ability to align, and if necessary realign, all three positions.

Secondly, we looked at how China and Chinese companies balance an innovation and low cost manufacturing orientation. Specifically, we investigate the innovativeness of Chinese companies by examining two issues. First, "What capabilities do Chinese companies possess that facilitate their ability to develop innovations?" Second, "What factors influence these companies' ability to innovate?" While prior research suggests that innovation can never succeed in a situation of command, control, hierarchy and authority, we found that these conditions play important roles in fostering innovation best practices in Chinese companies. We found that three aspects of China's cultural heritage, senior leadership and the Confucian tradition, the Chinese mindset and best practices, are particularly important to fostering innovation while their frugality orientation is an important determinant of its innovation strategy. Together they are a powerful force that works as a counterbalance against Chinese leaders' inclination toward command, control, thus enabling innovation.

The findings from our data suggest that Chinese entrepreneurs have the ability to come up with a plethora of new ideas. But, while coming up with ideas is an essential first step in the innovation process, it is also critical to take the second step in the innovation process and put the idea into use, e.g., by commercializing a product or implementing a process. The impact of the Confucian orientation

in China has created a society that accepts the notions of hierarchy and authority, and holds a deep respect for seniors, not just elders, in the social structure. Consequently, employees accept senior leaders' decisions as appropriate and acceptable. Thus, employees work hard to ensure the successful implementation of ideas from senior leaders as a way of showing respect for the leader. In this way, a command style of leadership actually becomes a facilitator of innovation by enabling the fast and effective execution of ideas. We also found that the Chinese mindset exhibited two significant strengths - the constant probing for weaknesses and the focus on winning that were useful for innovation. One common characteristic of Chinese enterprises, the almost insatiable desire to stay a step ahead of the competition, meant that companies were always looking for the edge, in products, services, and new processes. To satisfy this desire, our data revealed that Chinese companies had also adopted a series of innovation best practices including, being close to the customer, an awareness of the competition, continuous learning, and rewarding individuals for coming up with new ideas. We believe that the remarkable thing is not that the Chinese are engaging in a set of innovation practices that is different from Western best practice, but that they are engaging in the same innovation best practices that companies in the West engage in. This suggests that they no longer lag behind their Western counterparts. Chinese companies are now embracing innovation best practices.

Thirdly, this study has helped contribute to an increased understanding of the relationship between antecedents and

ambidexterity. Specifically, we examined the impact of two antecedents - strategic leadership and an organization's culture, on the organization's ability to achieve innovation ambidexterity, i.e., the attainment of multiple types of innovation simultaneously. We found a significantly positive relationship between a higher the level of knowledge sharing organizational culture and greater innovation ambidexterity, and between strategic leadership and the development of a knowledge sharing organizational culture, and that a knowledge sharing culture mediated the relationship between strategic leadership and innovation ambidexterity. Our results suggest that the strategic leaders in an organization need to look not only outward toward the competitive environment, market trends, and customers' current and potential needs, but also inward in order to create a working context that enables organization members to respond to the information and demands coming into the organization from the external environment. Our results further suggest that the way in which leadership affects innovation is complex. While prior research has suggested that transformational leadership will foster radical innovation and that transactional leadership will foster incremental and internal process innovation, our findings suggest that this is a considerable oversimplification of the relationship between leadership and innovation. Our findings suggest that culture is crucial to enable innovation ambidexterity and further, that leadership and culture work in conjunction with each other to generate innovation. Thus, failing to take into account the role of organizational culture presents a distorted picture how leadership influences an organization's ability to generate

multiple types of innovation simultaneously.

Fourthly, we examined the relationships among resource-based capabilities, innovation ambidexterity and business performance to understand how resource-based capabilities enable exploitation and exploration, the achievement of innovation ambidexterity and subsequent greater business performance. We found a significantly positive relationship between higher levels of innovation ambidexterity and greater business performance. We also found that the confluence of the two types of collaboration with organization culture enables the attainment of higher innovation ambidexterity. Thus, our results indicate that innovation ambidexterity, i.e., the attainment of incremental and radical innovation, mediates the relationship between bundled-capabilities and firm performance. Based on our findings, we suggest that higher performing organizations were able to simultaneously manage incremental and radical innovation. Specifically, in order to foster innovation ambidexterity (i.e., the attainment of both incremental and radical innovation) requires bundled-capabilities rather than a single capability. Further, bundled-capabilities and innovation ambidexterity work in conjunction with each other for generating greater performance. Thus, in seeking to create a greater business performance organizations need to employ capabilities that allow both exploitative and exploratory activities to generate incremental and radical innovation that will lead to greater business performance.

6.2. Academic Contributions and Managerial Implications

This thesis made several important contributions to the literature of innovation and ambidexterity by analyzing factors impacting on innovation and ambidexterity that have yet to receive sustained attention. First, we investigated the linkage and alignment of innovation, knowledge, product and market strategies. By doing so, we add to the dialogue on how and what helps to maintain innovation advantages along with the organization's competitive demands. Second, we analyzed the impact of contextual factors on firms' capabilities to innovate. In so doing, we add to our understanding of the relationships among firm's facilitators / inhibitors of innovation and how managers manage it effectively. Third, we tested the notion of dual strategic leadership behaviors within the context of organizational ambidexterity. By doing so, we add to the dialogue on how to manage incremental and radical innovation simultaneously. Fourth, we analyzed the impact of firms' bundled capabilities on a company's innovation ambidexterity, as well as their joint effects on a company's business performance. Thus, we add to our understanding of the relationships among capability, ambidexterity and business performance by exploring the mediating effects of innovation ambidexterity on the relationship between bundled capabilities and a company's business performance. Lastly, we add depth to our insight into the relationships among strategies, contextual factors, antecedents and capabilities by investigating these relationships in three countries that are at different stages of their economic development, US, China and Taiwan.

Meanwhile, this thesis also aimed to provide meaningful managerial implications for companies not limited to the countries we investigated but also companies with similar settings in different regions or in other innovation-oriented industries. First, the product/market position is only one part of an organization's competitive strategy. Organizations also need to explicitly evaluate their knowledge position and innovation position. Along with the organization's evolutionary and competitive demands, managers should consistently ask themselves the following: (1) Are all three positions aligned and mutually reinforcing? (2) Is each position unique or superior to competitors' positions? and (3) Does that position align with their capabilities? Accordingly, mapping competitors based on knowledge and innovation positions can provide results that differ significantly from traditional product/market mapping.

Second, effectively managing facilitators and inhibitors within the firm's contextual environment enables a firm to effectively employ it's capabilities for innovation. Fostering innovation ambidexterity in terms of generating multiple types of innovation simultaneously relies on dual leadership behaviors that take into account both external environments and internal capabilities is likely lead to greater business success in short and long term.

Lastly, this thesis conducted in-depth interviews with executives and mangers in the US and China and collected primary survey data on a firm's leadership behaviors, capabilities and direct measures of innovation and business performance in Taiwan. At the micro

economic level, the insights of managers and executives on innovation practices in US companies provides a good Western role model to demonstrate the strategies and practices for innovation that in turn leads to economic sustainability., These insights can be used by Chinese managers and executives in conjunction with Chinese practices to help them to foster innovation in an effort to quickly catch up with the developed economies. Indeed, Taiwan presents an important context for our empirical test with its relatively complex economic and cultural background in terms of adopting Western capitalism mixed with a Chinese cultural heritage. Our empirical findings thus provide implications not only for companies but also the development of innovation in other economies in the region such as South Korea, Singapore and Japan that have cultural and economic relationships with China and the US.

6.3. Limitations and Suggestions for Future Research

This study is limited as well as a consequence of our having investigated only a few dimensions of contextual factors, antecedents, and capabilities in innovation intensive industries. Thus, we can provide only an incomplete picture of the roles of strategies, contextual factors, antecedents, capabilities in affecting innovation and ambidexterity. This calls for more research that looks at additional aspects of these variables. And, by taking a more fine grained approach to investigating the relationships among strategies, contextual factors, antecedents, capabilities, innovation and ambidexterity, our study has made clear the need for future research to include multiple dimensions

of each of these variables in their investigations. Also, this suggests that it is useful to examine these relationships in industries that are less innovation intensive in order to see their applicability in a different competitive landscape. In our future work, we plan on continuously conducting both qualitative in-depth case studies and quantitative studies to explore the interaction effects among variables that may impact on the development of innovation and ambidexterity and that will promote their sustainability in a variety of contexts.

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199. This conclusion is based on a knowledge strategy audit performed at Polaroid by one of the authors shortly before Polaroid's turn towards bankruptcy.

200. The case study is based on primary research conducted over several years by one of the authors and the company's 2005-2007 annual reports.

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Appendix 1-1

The Entire Set of Questionnaires used for This Thesis:

Innovation Outcome Assessment (English Version)

Thank you for assisting us in our study. This questionnaire will take about 20 minutes to fill out. Your answers will be completely **confidential**. In addition, in the analysis, responses will be grouped such that individuals cannot be identified.

In this survey, we define an "innovation" as generating a new idea that is useful and actionable. There are two types of innovations: 1) internal innovations, which improve the internal processes of the strategic business unit (SBU), and 2) external innovations, which are products or services intended for sale to customers or consumers. The questions below focus on the SBU in which you work. We define an SBU as having its own business strategy, objectives, and competitors. There may be only one SBU in an entire Company or there may be several SBUs in the Company.

Thank you for your assistance.

Internal process innovations are new processes that represent better ways of doing things. Internal process innovations are not intended for sale to other companies. Instead, they are intended for use internally by the SBU to help it to work more effectively, efficiently, or both. They may come from any individual or department in the SBU.

	Strongly disagree 1	2	3	4	5	6	Strongly agree 7
1. This SBU frequently implemented new internal processes in the last three years.	☐	☐	☐	☐	☐	☐	☐
2. Compared to your major competitor, this SBU implemented more new internal process innovations in the last	☐	☐	☐	☐	☐	☐	☐

three years

The following questions ask about **service** innovations.

	Strongly disagree 1	2	3	4	5	6	Strongly agree 7
3. This SBU frequently introduced new services into existing markets in the last three years.	☐	☐	☐	☐	☐	☐	☐
4. This SBU frequently introduced new services into new markets in the last three years.	☐	☐	☐	☐	☐	☐	☐
5. Compared to your major competitor, this SBU introduced more new services in the last three years	☐	☐	☐	☐	☐	☐	☐

The following questions ask about **incremental** product innovations. We define incremental product innovations as product improvements and line extensions that are usually aimed at satisfying the needs of existing customers. They involve small changes in technology and little deviation from the current product-market experiences of the firm. Please circle the response that best describes your SBU.

	Strongly disagree 1	2	3	4	5	6	Strongly agree 7
6. This SBU frequently introduced incremental new products into new markets in the last three years.	☐	☐	☐	☐	☐	☐	☐
7. Compared to your major competitor, this SBU introduced more incremental new products in the last three years.	☐	☐	☐	☐	☐	☐	☐

The following questions ask about **radical** product innovations. Radical product innovations involve fundamental changes in technology for the firm, typically address the needs of emerging customers, are new to the firm and/or industry, and offer substantial new benefits to customers.

	Strongly disagree 1	2	3	4	5	6	Strongly agree 7
8. This SBU frequently introduced radical new products into new markets in the last three years.	☐	☐	☐	☐	☐	☐	☐
9. Compared to your major competitor, this SBU implemented more radical new products in the last three years	☐	☐	☐	☐	☐	☐	☐

10. On average, how would you characterize the technological innovativeness of your SBU's products? (Please check one of the following categories)

    ☐ a. Breakthrough Technology

    ☐ b. Significant Extension of the State-of-Art Technology

    ☐ c. Technological leapfrog

    ☐ d. Minor adaptation

    ☐ e. Imitation

11. On average, are your SBU's products usually (check only one):

    ☐ a. First-to-market

    ☐ b. A fast-follower of a competitor's product

    ☐ c. A late entrant into the market for this product

12. Are your SBU's products typically aimed at a new market or a market that your SBU already sells to? Please check one.

    ☐ a. New market ☐ b. Market that your SBU already sells to

13. How would you characterize your SBU's business environment on the following dimensions?

		Very				low
		1	2	3	4	5
a.	Dynamic	☐	☐	☐	☐	☐
b.	Competitive	☐	☐	☐	☐	☐
c.	Bureaucratic	☐	☐	☐	☐	☐
d.	Regulated	☐	☐	☐	☐	☐

Business Performance

	Strongly disagree						Strongly agree
	1	2	3	4	5	6	7
14. Compared to your major competitor, this SBU had revenues that were…	☐	☐	☐	☐	☐	☐	☐
15. Compared to your major competitor, this SBU's operating profit was…	☐	☐	☐	☐	☐	☐	☐
16. Compared to your major competitor, this SBU's growth in R&D spending was…	☐	☐	☐	☐	☐	☐	☐

Background Information About Your SBU

43. Is your company public or private? ☐ Public ☐ Private

44. What is your SBU's **primary** business category: Please check one.

☐ a. Consumer products ☐ c. Industrial (business-to-business) products

☐ b. Consumer services ☐ d. Industrial (business-to-business) services

45. Which industry category best describes your SBU's business? Please check one.

☐ a. Aerospace ☐ h. Financial services

☐ b. Automotive components ☐ i. Food

☐ c. Chemicals ☐ j. Healthcare equipment

☐ d. Consumer non-durables ☐ k. Industrial equipment

☐ e. Electronic goods ☐ l. Insurance
☐ f. Entertainment ☐ m. Pharmaceuticals
☐ g. Telecommunications ☐ n. Transportation

Other_____

46. Approximately, what are your SBU's annual sales? Please check one.

☐ a. Less than 1 million ☐ f. 251 to 499 million
☐ b. 1 to 9 million ☐ g. 500 million to 999 million
☐ c. 10 to 24 million ☐ h. 1 billion to 4.9 billion
☐ d. 25 to 99 million ☐ i. 5 billion to 9.9 billion
☐ e. 100 to 250 million ☐ j. 10 billion & above

47. How many employees are there in your SBU? _____

48. How many employees are there in your entire Company? _____

49. How many years has your SBU been in business? _____ years

50. In what country is your SBU located?_____

51. If different, in what country is your company headquartered?_____

INDIVIDUAL BACKGROUND INFORMATION

52. What is your current job position _____

53. Which hierarchical level are you located in your SBU? 1.Top ☐ 2.Middle ☐ 3.Low ☐

54. In what country were you born? country:_____

55. Are you female or male? Please circle one: Female☐ Male☐

56. To which age category do you belong? *Please circle the appropriate number:*

a. ☐ 25 or younger
b. ☐ 26 – 30
c. ☐ 31 – 35
d. ☐ 36 – 40
e. ☐ 41 – 45
f. ☐ 46 – 50
g. ☐ 51 – 55
h. ☐ 56 – 60
i. ☐ 61 – 65
j. ☐ 66 or over

57. Additional thoughts or comments? _____

Thank you for participating!

Appendix 1-2

The Entire Set of Questionnaires used for This Thesis:

Innovation Infrastructure Assessment (English Version)

Thank you for assisting us in our study. This questionnaire will take about 20 minutes to fill out. Your answers will be completely **confidential**. In addition, in the analysis, responses will be grouped such that individuals cannot be identified.

In this survey, we define an "innovation" as generating a new idea that is useful and actionable. There are two types of innovations: 1) internal innovations, which improve the internal processes of the strategic business unit (SBU), and 2) external innovations, which are products or services intended for sale to customers or consumers. The questions below focus on the SBU in which you work. We define an SBU as having its own business strategy, objectives, and competitors. There may be only one SBU or there may be several SBUs in the Company.

Thank you for your assistance.

Please check the box under the number to the right of each question which best describes the senior leaders of your SBU.

		Strongly disagree 1	2	3	4	5	6	Strongly agree 7
1.	The senior leaders of this SBU have the ability to continually learn.	☐	☐	☐	☐	☐	☐	☐
2.	The senior leaders of this SBU use new information to keep the SBU competitive.	☐	☐	☐	☐	☐	☐	☐
3.	The senior leaders of this SBU meet change with open minds.	☐	☐	☐	☐	☐	☐	☐
4.	The senior leaders of this SBU accept change in accordance with competitive conditions.	☐	☐	☐	☐	☐	☐	☐
5.	The senior leaders of this SBU are	☐	☐	☐	☐	☐	☐	☐

	able to perceive variations in the environment in a timely manner.							
6.	The senior leaders of this SBU have the ability to understand relationships between our SBU and the environment.	☐	☐	☐	☐	☐	☐	☐
7.	I trust the senior leaders of this SBU to overcome any obstacle.	☐	☐	☐	☐	☐	☐	☐
8.	If there is a risk involved for us, the senior leaders of this SBU take the first step.	☐	☐	☐	☐	☐	☐	☐
9.	The senior leaders of this SBU articulate a vision of future opportunities.	☐	☐	☐	☐	☐	☐	☐
10.	The senior leaders' ideas make me re-think ideas which I had never questioned before.	☐	☐	☐	☐	☐	☐	☐
11.	The senior leaders of this SBU arouse my curiosity about new ways of doing things.	☐	☐	☐	☐	☐	☐	☐
12.	The senior leaders of this SBU show me how to look at problems from new angles.	☐	☐	☐	☐	☐	☐	☐

Innovation, i.e., the creation and implementation of ideas can be accomplished through formal procedures or informal activities. Please indicate the extent to which you think each of the following activities is applicable within your SBU by circling a number to the right of each question from 1 to 7.

		Strongly disagree						Strongly agree
		1	2	3	4	5	6	7
13.	The SBU has formalized processes for generating innovation.	☐	☐	☐	☐	☐	☐	☐
14.	These formalized processes are actively used within the SBU.	☐	☐	☐	☐	☐	☐	☐
15.	The SBU has formalized knowledge sharing tools.	☐	☐	☐	☐	☐	☐	☐
16.	The formalized knowledge sharing	☐	☐	☐	☐	☐	☐	☐

tools are actively used within the SBU.	
17. The employees of this SBU learn from one another.	☐ ☐ ☐ ☐ ☐ ☐ ☐
18. The employees of this SBU exchange ideas with people from different areas of the SBU.	☐ ☐ ☐ ☐ ☐ ☐ ☐
19. If I am working on a problem or new idea I am likely to seek out someone in the SBU with whom to collaborate.	☐ ☐ ☐ ☐ ☐ ☐ ☐
20. This SBU partners with other organizations for the specific purpose of innovating.	☐ ☐ ☐ ☐ ☐ ☐ ☐
21. This SBU considers it important to partner with other organizations for the purpose of innovating.	☐ ☐ ☐ ☐ ☐ ☐ ☐
22. Partnerships have been an important source of innovations for the SBU.	☐ ☐ ☐ ☐ ☐ ☐ ☐

23. Please rank order the following reward from 1 (least) to 5 (most) according to the extent your SBU uses them to motivate innovation activities. Put a 1 next to the rewards that your SBU uses the least, a 2 next to the one it uses more, and so on to 5 next to the one that it uses the most.

_____ i. Rewards that provide more freedom, more responsibility, greater challenges and opportunities for personal growth

_____ ii. Rewards that provide opportunities for professional development and enhanced industry recognition.

_____ iii. Monetary rewards that are directly tied to performance outcomes.

_____ iv. Rewards of monetary value but not tied to salary or bonuses.

_____ v. Non-financial rewards that could be considered perks or

symbols of prestige.

Questions 24 – 34 ask about your beliefs about what the norms, values, and practices are in the SBU in which you work as a manager. In other words, we are interested in the way your SBU is - not the way you think it should be. There are no right or wrong answers and answers don't indicate goodness or badness of the SBU. Please respond to the questions by circling the number that most closely represents your observations about your SBU.

	Strongly disagree 1	2	3	4	5	6	Strongly agree 7
24. Decisions are usually made at the level where the best information is available.	☐	☐	☐	☐	☐	☐	☐
25. Knowledge is widely shared in this SBU.	☐	☐	☐	☐	☐	☐	☐
26. This SBU emphasizes openness between people.	☐	☐	☐	☐	☐	☐	☐
27. Mutual trust and respect are very important in this SBU.	☐	☐	☐	☐	☐	☐	☐
28. This SBU is a very entrepreneurial place.	☐	☐	☐	☐	☐	☐	☐
29. This SBU continually searches for new opportunities.	☐	☐	☐	☐	☐	☐	☐
30. This SBU encourages employees to take risks.	☐	☐	☐	☐	☐	☐	☐
31. This SBU rewards those who take risk.	☐	☐	☐	☐	☐	☐	☐
32. This SBU helps our customers anticipate developments in their markets.	☐	☐	☐	☐	☐	☐	☐
33. This SBU continuously tries to discover additional needs of our customers of which they are unaware.	☐	☐	☐	☐	☐	☐	☐

34. This SBU incorporates solutions to unarticulated customer needs in our new products and services.	☐ ☐ ☐ ☐ ☐ ☐ ☐

The following are a series of statements. Please show the extent to which you think each is applicable *by circling a number from 1 to 7.* **There are no wrong responses to any of these statements; it is most important that you record your own true perspectives on each one.** We have found that for each of these statements, there are some people who believe they always apply, others who believe they never apply, and still others who fall between these two extremes.

	Strongly disagree 1	2	3	4	5	6	Strongly agree 7
35. It is important not to depend on other people.	☐	☐	☐	☐	☐	☐	☐
36. People should expect to look after themselves.	☐	☐	☐	☐	☐	☐	☐
37. People who rely on themselves will be successful.	☐	☐	☐	☐	☐	☐	☐
38. People should always think carefully before they act.	☐	☐	☐	☐	☐	☐	☐
39. It is always better to stop and plan than to act quickly.	☐	☐	☐	☐	☐	☐	☐
40. Decisions should be made based on analysis, not intuition or emotional feelings.	☐	☐	☐	☐	☐	☐	☐
41. Decisions should be analyzed from every possible angle before they're implemented.	☐	☐	☐	☐	☐	☐	☐
42. No matter what the situation, it is always worth the extra time it takes to develop a comprehensive plan.	☐	☐	☐	☐	☐	☐	☐

INDIVIDUAL BACKGROUND INFORMATION

58. What is your current job position _____

59. Which hierarchical level are you located in your SBU? 1.Top ☐
2.Middle ☐ 3.Low ☐

60. In what country were you born? country:_____

61. Are you female or male? Please circle one: Female ☐
Male ☐

62. To which age category do you belong? *Please circle the appropriate number:*

a. ☐ 25 or younger
b. ☐ 26 – 30
c. ☐ 31 – 35
d. ☐ 36 – 40
e. ☐ 41 – 45
f. ☐ 46 – 50
g. ☐ 51 – 55
h. ☐ 56 - 60
i. ☐ 61 - 65
j. ☐ 66 or over

63. Additional thoughts or comments? _____

Thank you for participating!

Appendix 1-3

The Entire Set of Questionnaires used for This Thesis:

Innovation Outcome Assessment (Chinese Version)

親愛的朋友, 您好:

這是一項有關策略領導/企業文化/創新績效/企業成果與國家文化相關之學術研究,期望能藉著跨國界文化的比較,提供企業內部一個及時評價診斷工具,以提高競逐全球之競爭力.

謝謝您對我們研究的幫助.這份問卷將需大約 10 分鐘填答,您可隨意在空白邊或問卷背面寫下任何意見.為祈能獲得詳實資料提供,您的答案將完全保密.此外,在分析過程中,所有的回答將被歸類,因此個人是無法被辨識出,請您放心填答.請在填答後,交由發卷者回收,或 E-mail 回傳給主要調查執行者.

感謝您的協助!

在這次調查過程中,我們定義［創新］為產生有用及可訴諸行動的一種有創造性的新想法. 有兩種型態的創新: 1)內部創新, 則是改進公司策略性營業單位(SBU)內部流程; 2)外部創新,為打算銷售給顧客或消費的產品和服務.

下列的問題集中在於您所工作的 SBU.我們定義 SBU 為一策略性營業單位,每一個 SBU 策略性營業單位有它自己的經營策略,目標和競爭者.在整個集團 SBU 裡只可能有一 SBU 或者在這整個 SBU 裡可能有幾個 SBU.

內部流程創新是描述幫助事情做的更好的一種新流程.
內部的流程創新不是用來生產銷售給其他公司. 相反地, 而是打算用來幫助 SBU 內部使它更有效率,有效能地工作. 內部流程創新可能來自 SBU 裡任何個人或者部門.

	非常不同意 1	2	3	4	5	6	非常同意 7
1. 在過去3 年, 我的SBU經常實施新內部流程創新.	☐	☐	☐	☐	☐	☐	☐
2. 與你的主要的競爭者相比, 這SBU 在過去3 年實施更多的內部流程創新.	☐	☐	☐	☐	☐	☐	☐

下列問題詢問關於創新服務.

	非常不同意 1	2	3	4	5	6	非常同意 7
3. 在過去3 年, 這SBU經常介紹創新服務到既有市場上.	☐	☐	☐	☐	☐	☐	☐
4. 在過去3 年, 這SBU經常介紹創新服務到新市場上.	☐	☐	☐	☐	☐	☐	☐
5. 與你的主要的競爭者相比, 這SBU 在過去3 年介紹更多的創新服務.	☐	☐	☐	☐	☐	☐	☐

下列問題詢問關於加值型的產品創新.
我們把加值型創新定義為通常用於滿足現有用戶的需要的產品改進和直線擴展為目的. 新產品涉及技術上的小改變與公司現有的產品市場經驗有些小差異.

	非常不同意 1	2	3	4	5	6	非常同意 7
6. 在過去3 年, 這SBU經常介紹加值型創新產品到新市場上.	☐	☐	☐	☐	☐	☐	☐
7. 與你的主要的競爭者相比, 這SBU在過去3年介紹更多的加值型新產品.	☐	☐	☐	☐	☐	☐	☐

下列問題詢問關於全新的產品創新. 全新型產品創新通常涉及根本的技術變化,特別針對新興客戶的需要,對公司和/或產業都是全新的, 並且給客戶提供實際的新好處.

	非常不同意						非常同意
	1	2	3	4	5	6	7
8. 在過去3 年,這SBU經常介紹全新的創新產品到新市場上.	☐	☐	☐	☐	☐	☐	☐
9. 與你的主要的競爭者相比,這SBU在過去3年介紹更多全新的創新產品.	☐	☐	☐	☐	☐	☐	☐

10. 平均而言,你SBU的產品在技術創新上的特性是如何？

☐ a. 具突破性技術
☐ b. 最先進技術的顯著擴展延伸
☐ c. 技術上的跳躍
☐ d. 較小的改編適應
☐ e. 模仿

11. 平均而言, 你SBU的 產品通常是(只選一項)：

☐ a. 第 1 個到市場上

☐ b. 一種競爭者產品的最快隨從者

☐ c. 最晚進這種產品的市場者

12. 你的產品通常針對一全新市場還是現有市場？

☐ a. 新市場　　☐ b. 現有的市場

13. 你如何描繪你SBU的工作環境特徵? 例如:一點也不動態,你將選1或2, 反之高動態,則選5.

	非常低 1	2	3	4	非常高 5
a. 動態的	☐	☐	☐	☐	☐
b. 具有競爭性的	☐	☐	☐	☐	☐
c. 官僚政治的	☐	☐	☐	☐	☐
d. 條理化的	☐	☐	☐	☐	☐

<u>營業績效</u>

	比較低 1	2	3	相同 4	5	6	比較高 7
14. 與你的主要的競爭者相比,這 SBU 的收入	☐	☐	☐	☐	☐	☐	☐
15. 與你的主要的競爭者相比,這 SBU 的營業利潤…	☐	☐	☐	☐	☐	☐	☐
16. 與你的主要的競爭者相比,這 SBU 的研發費用…	☐	☐	☐	☐	☐	☐	☐

SBU 背景資料

17. SBU型態: ☐公營 ☐私營

18. 請指出 貴SBU主要營業類別:

☐ a. 消費產品
☐ b. 消費服務
☐ c. 工業產品(公司 - 公司)
☐ d. 工業服務(公司 - 公司)

19. SBU所屬產業類別:

☐ a. 航空航天
☐ b. 汽車零件
☐ c. 化學製品
☐ d. 非耐用消耗品
☐ e. 電子商品
☐ f. 娛樂
☐ g. 電信
☐ h. 金融服務
☐ i. 食品
☐ j. 保健設備
☐ k. 工業設備
☐ l. 保險
☐ m. 藥物
☐ n. 運輸

其他_____

20. 貴SBU年營業銷售額大約多少?

☐ a. 低於 1 百萬
☐ b. 1 ~ 9 百萬
☐ c. 10 ~ 24 百萬
☐ d. 25 ~ 99 百萬
☐ e. 100 ~ 250 百萬
☐ f. 251 ~ 499 百萬
☐ g. 500 ~ 999 百萬
☐ h. 10 億 ~ 49 億
☐ i. 50 億~ 99 億
☐ j. 100 億或以上

21. 貴SBU員工人數? _____ 人

22. 整集團SBUs員工人數? _____ 人

23. 貴SBU已經營運多久? _____ 年

24. 貴SBU位於哪個國家? _____

25. 如果SBU與總公司不同,總公司位於哪個國家?_____

個人背景資料

26. 你現在的職位是 _____

27. 你的職級在你的 SBU 是位於 1. 高階☐ 2. 中階☐ 3. 低階☐

28. 您出生於哪個國家? 國家:_____

29. 您是女性或男性? : 請選擇: 女性☐ 男性☐

30. 您屬於哪個年齡範圍? 請選擇適合的數字:

a. ☐ 25 或更年輕
b. ☐ 26 - 30
c. ☐ 31 - 35
d. ☐ 36 - 40
e. ☐ 41 - 45
f. ☐ 46 - 50
g. ☐ 51 - 55
h. ☐ 56 - 60
i. ☐ 61 - 65
j. ☐ 66 或以上

31. 對你所屬 SBU 創新績效的其他想法或意見? _____

謝謝您的參與!

Appendix 1-4

The Entire Set of Questionnaires used for This Thesis:

Innovation Infrastructure Assessment (Chinese Version)

親愛的朋友, 您好:

這是一項有關策略領導/企業文化/創新績效/企業成果與國家文化相關之學術研究,期望能藉著跨國界文化的比較,提供企業內部一個及時評價診斷工具,以提高競逐全球之競爭力.

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感謝您的協助!

在這次調查過程中,我們定義［創新］為產生有用及可訴諸行動的一種有創造性的新想法. 有兩種型態的創新: 1)內部創新, 則是改進公司策略性營業單位(SBU)內部流程; 2)外部創新,為打算銷售給顧客或消費的產品和服務.

下列的問題集中在於您所工作的 SBU.我們定義 SBU 為一策略性營業單位,每一個 SBU 策略性營業單位有它自己的經營策略,目標和競爭者.在整個集團 SBU 裡只可能有一 SBU 或者在這整個 SBU 裡可能有幾個 SBU.

請依據您對 貴營業單位(SBU)中高階領導人的實際觀察,圈選出最適當的回答,表明您對下列各項描述的同意程度.

		非常不同意						非常同意
		1	2	3	4	5	6	7
1.	我 SBU 的高階領導人有持續學習的能力.	☐	☐	☐	☐	☐	☐	☐
2.	我 SBU 的高階領導人使用新資訊以保持公司具有競爭性.	☐	☐	☐	☐	☐	☐	☐
3.	我 SBU 的高階領導人以開放的心態面對改變	☐	☐	☐	☐	☐	☐	☐
4.	我 SBU 的高階領導人隨著競爭性的條件變化而接受改變.	☐	☐	☐	☐	☐	☐	☐
5.	我 SBU 的高階領導人能以及時的態度洞察環境方面的變化.	☐	☐	☐	☐	☐	☐	☐
6.	我 SBU 的高階領導人有理解在我們的公司和環境之間的關係的能力.	☐	☐	☐	☐	☐	☐	☐
7.	我相信我 SBU 的高階領導人能克服任何障礙	☐	☐	☐	☐	☐	☐	☐
8.	如果我們涉及危險,我 SBU 的高階領導人會跨出第一步.	☐	☐	☐	☐	☐	☐	☐
9.	我 SBU 的高階領導人闡明一個將來機會的願景.	☐	☐	☐	☐	☐	☐	☐
10.	我 SBU 的高階領導人的想法讓我重新思考我以前從未表示懷疑的想法.	☐	☐	☐	☐	☐	☐	☐
11.	我 SBU 的高階領導人激起我用新方法做事情的的好奇心.	☐	☐	☐	☐	☐	☐	☐
12.	我 SBU 的高階領導人指導我如何從新角度看問題.	☐	☐	☐	☐	☐	☐	☐

[創新],換句話說,是創造和實際的想法能透過正式或非正式活動來實現。
請依據您對 貴 SBU 內活動的實際觀察感受,圈選出最適當的回答,表明您對下列各項描述的同意程度.

	非常不同意						非常同意
	1	2	3	4	5	6	7
13. SBU 已經使產生創新的過程正式化.	☐	☐	☐	☐	☐	☐	☐
14. 正式化的創新過程被積極在 SBU 內使用.	☐	☐	☐	☐	☐	☐	☐
15. SBU 已經使知識分享工具正式化.	☐	☐	☐	☐	☐	☐	☐
16. 被正式化的知識分享工具積極在 SBU 內使用	☐	☐	☐	☐	☐	☐	☐
17. 我們 SBU 的員工互相學習.	☐	☐	☐	☐	☐	☐	☐
18. 我們 SBU 的員工與來自 SBU 內不同領域的人們交換想法.	☐	☐	☐	☐	☐	☐	☐
19. 當我正在處理問題或新點子時, 我很可能尋找 SBU 內某人的合作.	☐	☐	☐	☐	☐	☐	☐
20. 這 SBU 為創新的具體目的與其他公司合作	☐	☐	☐	☐	☐	☐	☐
21. 這 SBU 認為, 為了創新與其他公司合作是重要的.	☐	☐	☐	☐	☐	☐	☐
22. 夥伴關係已經是這 SBU 創新的一個重要來源.	☐	☐	☐	☐	☐	☐	☐

23. 請 根據你 SBU 在促進創新活動所運用的激勵酬賞,為下列報酬系統根據程度從 1(低)到 4(高)排序.1 為最少用, 2 為常用、3 為更常用、4 為最常用.

_____ 1. 提供更多的自由, 更多的責任, 為個人成長的更大挑戰與機遇的報酬.

_____ 2. 提供專業發展和提高產業認同機會的報酬.

_____ 3. 直接與績效成果相關的貨幣性報酬.

_____ 4. 貨幣性報酬但不是發工資或者紅利.

_____ 5. 可能被考慮的津貼或者象徵威望的 非財務性報酬.

下列問題有關 SBU 的規範,價值和慣例.並沒有正確或者錯誤的標準答案,也沒有所謂”優秀”或”惡劣”的 SBU. 請依據您對 貴 SBU 的實際觀察,圈選出最適當的回答,表明您對每項描述的同意程度.

		非常不同意						非常同意
		1	2	3	4	5	6	7
24.	通常在可得到最佳的情報資訊水準下做決定.	☐	☐	☐	☐	☐	☐	☐
25.	在這 SBU, 知識是廣泛地分享.	☐	☐	☐	☐	☐	☐	☐
26.	這 SBU 強調人與人之間的開放.	☐	☐	☐	☐	☐	☐	☐
27.	相互信任和尊敬在這 SBU 是非常重要.	☐	☐	☐	☐	☐	☐	☐
28.	這 SBU 是一個非常有活力的創業地方.	☐	☐	☐	☐	☐	☐	☐
29.	這 SBU 強調嘗試新事情並且尋找機會.	☐	☐	☐	☐	☐	☐	☐
30.	這 SBU 鼓勵員工冒險.	☐	☐	☐	☐	☐	☐	☐
31.	這 SBU 獎勵冒險的那些人.	☐	☐	☐	☐	☐	☐	☐
32.	這 SBU 幫助我們的顧客預期他	☐	☐	☐	☐	☐	☐	☐

們的市場發展.

33. 這 SBU 持續努力發現顧客未知的額外需要. ☐ ☐ ☐ ☐ ☐ ☐ ☐

34. 這 SBU 在新產品和服務內包含了解決未知客戶的需求. ☐ ☐ ☐ ☐ ☐ ☐ ☐

	決不或幾乎決不					總是或幾乎總是	
	1	2	3	4	5	6	7
35. 不依賴其他人是重要的.	☐	☐	☐	☐	☐	☐	☐
36. 人們應該期望照顧自己.	☐	☐	☐	☐	☐	☐	☐
37. 倚賴自己的人將成功.	☐	☐	☐	☐	☐	☐	☐
38. 在行動之前，人們應該總是仔細想想.	☐	☐	☐	☐	☐	☐	☐
39. 停下並計畫比迅速行動來得好.	☐	☐	☐	☐	☐	☐	☐
40. 應該基于分析做決定，而不是憑直覺或者感情感覺.	☐	☐	☐	☐	☐	☐	☐
41. 在實現之前，決定應該被從一切可能的角度分析.	☐	☐	☐	☐	☐	☐	☐
42. 不管情勢是什麼，總是值得花費額外的時間發展一個全面性計畫.	☐	☐	☐	☐	☐	☐	☐

個人背景資料

43. 你現在的職位是 _____

44. 你的職級在你的 SBU 是位於 1. 高階☐ 2. 中階☐ 3. 低階☐

45. 您出生於哪個國家? 國家:_____

46. 您是女性或男性? : 請選擇: 女性☐ 男性☐

47. 您屬於哪個年齡範圍? 請選擇適合的數字:

a. ☐ 25 或更年輕　　e. ☐ 41 - 45　　h. ☐ 56 - 60
b. ☐ 26 - 30　　f. ☐ 46 - 50　　i. ☐ 61 - 65
c. ☐ 31 - 35　　g. ☐ 51 - 55　　j. ☐ 66 或以上
d. ☐ 36 - 40

48. 對你所屬 SBU 創新績效的其他想法或意見? _____

謝謝您的參與!

Appendix 4-1

Survey Items used for The First Taiwan Case

Innovation Ambidexterity

Internal process innovation performance

- This SBU frequently implemented new internal processes in the last three years
- Compared to your major competitor, this SBU implemented more new internal process innovations in the last three years
- The percentage of new internal processes implemented in this SBU in the last three years

Incremental product innovation performance

- This SBU frequently introduced incremental new products into new markets in the last three years
- Compared to your major competitor, this SBU introduced more incremental new products in the last three years
- The percentage of new incremental product innovation implemented in this SBU in the last three years

Radical product innovation performance

- This SBU frequently introduced radical new products into new markets in the last three years
- Compared to your major competitor, this SBU introduced more radical new products in the last three years
- The percentage of new radical product innovation implemented in this SBU in the last three years

Strategic Leadership Style

External-oriented leadership behaviors

- The senior leaders of this SBU accept change in accordance with competitive conditions.
- The senior leaders of this SBU are able to perceive variations in the environment in a timely manner.
- The senior leaders of this SBU have the ability to understand relationships between our SBU and the environment.

Internal- oriented leadership behaviors

- The senior leaders' ideas make me re-think ideas which I had never questioned before.
- The senior leaders of this SBU arouse my curiosity about new ways of doing things.
- The senior leaders of this SBU show me how to look at problems from new angles.

Organizational Culture with a focus on knowledge sharing

1. Knowledge is widely shared in this SBU.
2. This SBU emphasizes openness between people.
3. Mutual trust and respect are very important in this SBU.

Appendix 5-1

Survey Items used for The Second Taiwan Case

Business Performance

- Compared to your major competitor, this SBU had revenues that were… [much lower (1) to much higher (7)]
- Compared to your major competitor, this SBU's operating profit was… [much lower (1) to much higher (7)]
- Compared to your major competitor, this SBU's growth in productivity was… [much lower (1) to much higher (7)]

Innovation Ambidexterity

Incremental product innovation performance

- This SBU frequently introduced incremental new products into new markets in the last three years
- Compared to your major competitor, this SBU introduced more incremental new products in the last three years
- The percentage of new incremental product innovation implemented in this SBU in the last three years

Radical product innovation performance

- This SBU frequently introduced radical new products into new markets in the last three years
- Compared to your major competitor, this SBU introduced more radical new products in the last three years
- The percentage of new radical product innovation implemented in this SBU in the last three years

Bundled Capabilities
Organizational Culture

4. Knowledge is widely shared in this SBU.
5. Mutual trust and respect are very important in this SBU.
6. This SBU continually searches for new opportunities.
7. This SBU rewards those who take risk.
8. This SBU helps our customers anticipate developments in their markets.

Inter-organizational Collaboration

- This SBU partners with other organizations for the specific purpose of innovating.
- This SBU considers it important to partner with other organizations for the purpose of innovating.
- Partnerships have been an important source of innovations for the SBU.

Intra-organizational Collaboration

- The employees of this SBU learn from one another.
- The employees of this SBU exchange ideas with people from different areas of the SBU.
- If I am working on a problem or new idea I am likely to seek out someone in the SBU with whom to collaborate.