Strategic Information Systems in the Digital Age: Case Studies on the Attainment of IT-Enabled Enterprise Agility

BARNEY TAN CHEE CHANG
(B.Comp. (Hons), National University of Singapore, Singapore)

A THESIS SUBMITTED FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

DEPARTMENT OF INFORMATION SYSTEMS

NATIONAL UNIVERSITY OF SINGAPORE

2011

ACKNOWLEDGEMENTS

From serendipitously finding myself working with one of the most established case researchers in the world, and achieving Dean's List-type results in the final year of my undergraduate study that enabled me to make the minimum requirements for the PhD program, to eventually finding employment with a well-regarded institution of higher education, my PhD journey has been nothing short of a miracle from the very beginning. For this, I would first like to offer my thanks to God. For without him nothing would have been possible, especially for someone as limited and flawed as me.

I would also like to express my heartfelt gratitude to my PhD supervisor Prof. Pan Shan Ling, who believed in me and took a leap of faith by accepting me as his student despite my very apparent shortcomings. For teaching me all that I know about research, for giving me countless opportunities (including providing me with access to the organizations that made this thesis and every other of my research projects possible), for his inexhaustible patience, constant support and encouragement, as well as his invaluable pieces of advice on life, I am eternally indebted. He is, and will always be, more than a supervisor to me.

During my time at NUS, I was also privileged to be given the opportunity to learn from, and work with, some of the very best scholars and educators in the IS discipline. In no particular order, these include Prof. Bernard Tan, Prof. Teo Hock Hai, Prof. Chan Hock Chuan, Dr. Calvin Xu, Dr. Tan Gek Woo, and Dr. Francis Yeoh. I am also immensely grateful to Prof. Ray Hackney, Dr. Jimmy Huang, Prof. Lu Xianghua, Prof. Huang Lihua, Prof. Zuo Meiyun, and Prof. Jason Chou who have worked with me and provided me

with guidance over the course of a number of research projects. The combination of what I learnt from each of them has been instrumental to both my intellectual development and my PhD candidature. All of them are sources of inspiration that I hope to emulate, and I look forward to continue working closely with them in the future.

I am also immensely grateful to my *"comrades at arms"* (including Mr. Jenson Goh, Mr. Derek Du, Mr. Wang Zheng, and Mr. Huang Peiying), fellow students (including Mr. Anand Ramchand, Mr. Sathish Sritharan, Mr Satish Krishnan, Ms. Elizabeth Koh, Ms. Yi Cheng, Ms. Ng Ee Hong, and Mr. Jerry Ping) and visiting colleagues (including Dr. Teoh Say Yen, Mr. Felix Tan, and Mr. Sun Yuan). Some of them have helped with my coursework, some of them have acted as a sounding board for my research ideas, all of them have commiserated and suffered along with me throughout this long and arduous journey. Their companionship, support and encouragement made life easier for me, and I am honored to have all of them as my co-workers and friends.

Last, but certainly not least, I would like to thank my wife Cola for supporting me in every possible way. This includes putting up with me when I get cranky over work, managing the household magnificently, making decisions, setting goals and scheduling activities on my behalf, and more importantly, always believing in me. I would like to thank my children Elijah and Paul for driving me to the edge of exhaustion and insanity but taking care never to tip me over. I also acknowledge my parents, sister and grandparents for supporting my academic aspirations. The love and support of my loved ones reminds me of what I am working for each day. I dedicate this thesis to them.

SUMMARY

Amidst the growing turbulence of the modern competitive landscape, enterprise agility has become an increasingly important determinant of business success. While the potential of Information Technology (IT) for enabling agility is unquestionable, the existing prescriptions for the attainment of IT-enabled enterprise agility generally lack empirical validation and tend to be overly abstract. More importantly, although enterprise agility is conceived as a composite capability consisting of customer agility, partnering agility, and operational agility, there is a lack of research on how each of these forms of agility may be achieved. More specifically, virtual communities (VCs), technology-enabled platforms, and the organizational capability for agile IT deployment have been suggested as the primary means of attaining the three forms of agility respectively. Yet, to the best of our knowledge, there are no studies to date on how each of these IT artifacts or capabilities can be developed and enacted for agility. With these gaps in the literature in mind and in seeking to answer the overarching question of how IT-enabled enterprise agility may be achieved, this thesis frames the following research questions: (1) *"How can a VC be developed and leveraged for the attainment of customer agility?"* (2) *"How can a technology-enabled platform be developed and leveraged for partnering agility?"* and (3) *"How can the capability for agile IT deployment be nurtured and leveraged for operational agility?"*

To address the first research question, a theoretical lens is constructed by infusing a seminal framework on IT-enabled organizational value creation with key concepts and propositions from the existing VC literature. Applying this theoretical lens to analyze a case study of Hardwarezone, the most commercially successful VC in Singapore, a two-

dimensional process model is inductively derived that depicts the specific mechanisms for developing and leveraging a VC for customer agility and organizational value creation across the various stages of a typical VC development life cycle. With its findings, this case study represents one of the first in-depth studies of the association between VCs and customer agility, challenges the existing knowledge and assumptions of VC-enabled organizational value creation, and provides a comprehensive and empirically supported framework for VC managers and sponsors to analyze and optimize their investments in VCs.

Next, as Digital Business Ecosystems (DBEs) are technology-enabled platforms that may be crucial to partnering agility for organizations engaged in intense, inter-network competition, we apply the literature on business ecosystems to analyze the case of Alibaba.com, a B2B portal that organizes one of the largest DBEs worldwide, to address our second research question. In doing so, a process model of how a DBE may be developed and leveraged for partnering agility is inductively derived that sheds light on the antecedents, nature and agility-enabling mechanisms that arise as a result of DBE development. Specifically, our study reveals that an organization with the ability and motivation to be a core firm within a DBE may adopt specific combinations of organizational strategies and ecosystem roles to drive ecosystem development along three distinct stages for increasing levels of enterprise agility. With its findings, this study contributes to a networked perspective of IT-enabled enterprise agility, and provides practitioners with a holistic and systematic framework for the development and subsequent leverage of a DBE.

Finally, as improvisation may be an important mechanism for attaining agility in IT deployment, we apply the literature on organizational improvisation to analyze the case of Chang Chun Petrochemicals, one of the largest privately-owned petrochemical firms in Taiwan with a storied history for agile IT deployment, to address our third research question. In doing so, a process model is inductively derived that sheds light on how the organizational capability for improvisation in IT deployment can be developed, leveraged for operational agility, and routinized for repeated application. With its findings, this study contributes to the knowledge on agile IT deployment and the broader concept of IT-enabled enterprise agility, and provides a useful reference for practitioners who face resource constraints or time pressures in IT deployment.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: INTRODUCTION

For many years, sustainable competitive advantage has been viewed as the holy grail of strategic management (Collis 1994). Yet, amidst the turbulent strategic and operating conditions, increased time-to-market pressures, regulatory changes and rapidly evolving customer demands of the modern business landscape (McAfee and Brynjolfsson 2008; Overby et al. 2006), contemporary management scholars have grown increasingly skeptical about the possibility of sustaining competitive advantages over time (Sirmon et al. 2007). Consequently, a more recent school of thought; aligned with a set of strategic principles dubbed the logic of opportunity (see Eisenhardt and Sull 2001), has instead emphasized rapid and continuous innovation as the means for creating of a series of temporary competitive advantages to enable an organization to maintain its competitive edge in the long term (D'Aveni 1994; Eisenhardt and Martin 2000). The organizational capability that underpins a relentless, high-velocity stream of effective innovations is termed enterprise agility, which is defined as the ability to consistently detect and seize market opportunities with speed and surprise (Sambamurthy et al. 2003).

With important advances in the global Information Technology (IT) landscape over the last decade, the potential of IT in enabling enterprise agility has grown considerably (Sambamurthy et al. 2003). To illustrate, the real world success stories of organizations such as Cisco and Yahoo that derive from the leverage of IT to facilitate a chain of rapidly evolving strategies (See Eisenhardt and Sull 2001; Fryer and Stewart 2008) attests to the agility enabling potential of IT. Accordingly, the concept of IT-enabled enterprise agility has received a growing amount of attention from scholars and practitioners in recent years (van Oosterhout et al. 2006). Yet, notwithstanding the academic and

practical contributions of the growing research in this area, a number of gaps can be identified in the literature.

As will be elaborated on in the following chapter, although a number of scholars have provided insightful propositions about how IT-enabled enterprise agility can be attained (e.g. Overby et al. 2006; Seo and La Paz 2008), few have supported their propositions with empirical evidence (Tan et al. 2009). In addition, much of the existing prescriptions for achieving IT-enabled enterprise agility are overly abstract (e.g. Holmqvist and Pessi 2006; Zain et al. 2005) in that they employ a variety of broad IT-related constructs that *"precluded consistent, unambiguous, and readily comparable studies"* (Pavlou and El Sawy 2006, p. 198), and provide little indications for practical action. While gaps in the literature are certainly to be expected given the relative immaturity of the research area, collectively, these gaps are symptomatic of a lack of knowledge on how IT-enabled enterprise agility can be achieved. Without grasping the nature of this underlying process, it may be difficult, if not impossible to consistently unlock the potential of IT for enabling agility.

In particular, although enterprise agility may consist of customer agility, partnering agility, and operational agility (refer to Table 1), there is scant research on how IT and its related capabilities can facilitate the acquisition of these capabilities. More specifically, although nurturing and enhancing virtual communities (VCs) is one of the primary IT-enabled means for attaining customer agility (Nambisan 2002; Porter and Donthu 2008), there are no studies to date on the development and leverage of VCs for customer agility. Similarly, although the role of IT in enabling partnering agility lies in facilitating inter-firm collaboration (Sambamurthy et al. 2003), we did not find any studies in an extensive

literature review on how a technology-enabled platform may be nurtured and exploited for partnering agility. Finally, although the *"ability to quickly change the type and flow of information within an organization must underlie a rapid and graceful reorganization"* (Mathiassen and Pries-Heje 2006, p. 117), implying the importance of agility in IT deployment for the attainment of operational agility, there is little research on how this capability can be achieved as well (For a review, refer to Sambamurthy et al. 2003).

Table 1: Types of Agility

Type of Agility	Definition	Role of IT
Customer Agility	Ability to co-opt customers in the exploration and exploitation (March 1991; O'Reilly and Tushman 2004) of innovation opportunities: • as sources of innovation ideas • as co-creators of innovation • as users in testing ideas or helping other users learn about the idea	Technologies for building and enhancing **virtual customer communities** for product design, feedback, and testing
Partnering Agility	Ability to leverage assets, knowledge, and competencies of suppliers, distributors, contract manufacturers and logistics providers in the exploration and exploitation (March 1991; O'Reilly and Tushman 2004) of innovation opportunities	Technologies facilitating inter-firm collaboration, such as **collaborative platforms** and portals, supply-chain systems, etc.
Operational Agility	Ability to accomplish speed, accuracy, and cost economy in the exploitation of innovation opportunities	Technologies for **modularization, and integration** of business processes

Adapted from: Sambamurthy et al., 2003

With these gaps in the literature in mind and in seeking to answer the overarching question of how IT-enabled enterprise agility may be achieved, the purpose of this thesis is threefold. First, using a case study of Hardwarezone.com (HWZ), a humble e-commerce startup that leveraged its VC strategically to transform itself into the dominant market leader in Singapore's IT publications industry within a short span of seven years,

this thesis seeks to investigate how a VC can be nurtured and leveraged to bring about customer agility for the organization that sponsors them. In this thesis, we use the term *"sponsoring organization"* to refer to the firm that manages and provides the resources necessary to operate and sustain the VC. With its findings, this case study will represent one of the first in-depth studies of the association between VCs and customer agility, challenge the existing knowledge and assumptions of VC-enabled organizational value creation, and provide a comprehensive and empirically supported framework for VC managers and sponsors to analyze and optimize their investments in VCs.

Second, based on a case study of Alibaba.com, one of the world's largest online Business-to-Business (B2B) e-commerce portals that supports a technology-enabled platform of over 35 million members worldwide, this thesis will examine how partnering agility can be attained by an organization operating as a core firm within a business network. A core firm is defined as an organization serving as a richly-connected hub wielding significant influence in a business network (Iansiti and Levien 2004a). The scope of our inquiry into partnering agility is limited to the context of a core firm as the decisions and actions of the core firm has the widest ranging implications for the extent of collaboration and performance within a business network (Pierce 2009). With its findings, this study will contribute to a networked perspective of IT-enabled enterprise agility, and provide practitioners with a holistic and systematic framework for the development and subsequent leverage of a DBE.

Third, using a case study of Chang Chun Petrochemicals (CCP), one of the largest privately-owned petrochemical firms in Taiwan with a storied history for agile IT deployment, this thesis will provide an in-depth examination of the underlying process through which agility in IT deployment can be developed, and subsequently, enacted for the attainment of operational agility. In doing so, our aim is to generate prescriptions related to a specific mechanism for attaining

operational agility (i.e. agility in IT deployment) and open the "black box" of the relationship between the capability and operational agility. With its findings, this study will contribute to the knowledge on agile IT deployment and the broader concept of IT-enabled operational agility, and provide a useful reference for practitioners who face resource constraints or time pressures in IT deployment.

Beyond its academic significance, the utility of this thesis lies in tracing the three primary IT-enabled means of attaining enterprise agility (Mathiassen and Pries-Heje 2006; Sambamurthy et al. 2003) in their entirety (i.e. attaining customer agility through the development and leverage of a VC, attaining partnering agility through the development and leverage of a technology-enabled collaborative platform, attaining operational agility through the organizational capability for agile IT deployment). In doing so, this thesis can potentially serve as a useful reference for practitioners in the formulation of value-creating IS strategies, as well as a detailed blueprint for the implementation and strategic leverage of information systems in line with the opportunities and risks presented by the contemporary business environment. Corresponding to its purpose, the research questions that this thesis aims to answer are: (1) *"How can a VC be developed and leveraged for the attainment of customer agility?"* (2) *"How can a technology-enabled platform be developed and leveraged for partnering agility?"* and (3) *"How can the capability for agile IT deployment be nurtured and leveraged for operational agility?"*

This thesis is organized into 6 chapters. The first chapter has established our motivation and the research questions we intend to answer. In the following chapter, we review the relevant literatures to construct the foundation for our subsequent theoretical arguments. The research methodology is then presented in the third chapter, followed by a

description of the events that transpired at the three case organizations in the fourth chapter, so that the reader may follow the process of theory building (Klein and Myers 1999) and judge the validity of the developed theory based on the cogency and plausibility of the underlying logic (Walsham 1995). The fifth chapter of the paper presents the theoretical arguments inductively derived from the three case studies, before a discussion of the theoretical and practical implications of our findings in the concluding chapter of the paper.

CHAPTER 2: LITERATURE REVIEW

2.1 The Origins of the Notion of Agility

The notion of agility in the context of information systems (IS) has its roots in the concept of agile manufacturing (Desouza 2011) that was introduced in the field of operations management in the 1990s (in Nagel et al. 1991). Agile manufacturing was conceptualized as a means of responding to the growing turbulence in the global competitive landscape through the production of high-quality, tailored goods and services (Goldman et al. 1995). The production of these goods and services, in turn, stems from two organizational capabilities: The ability to sense both anticipated and unexpected changes in the environment in an effective and timely manner, and the ability to respond to these changes quickly to capitalize on emerging business opportunities (Sharifi and Zhang 1999; Sharifi and Zhang 2001).

More specifically, some researchers (see Sharifi and Zhang 1999; Sharifi and Zhang 2001) have suggested that an agile manufacturing system should consist of three elements: agility drivers, agility providers and agility capabilities (refer to Table 2). Agility drivers precipitate the need for an organization to become agile, which in turn, leads to the strategic intent to be agile and the formulation of an agile strategy. When coupled with the appropriate agility providers in the form of organizational resources such as technology, people, and innovation, agile practices, methods and tools are formed to enable agility capabilities. The four agility capabilities are responsiveness, competency, flexibility and quickness. The definition of these capabilities and their corresponding components are summarized in Table 3.

Table 2: Components of an Agile Manufacturing System

Component	Definition
Agility Drivers	Triggers in the organizational environment that necessitate new means of operations in order to maintain competitive advantage
Agility Capabilities	Key capabilities required by an organization to respond quickly and effectively to change
Agility Providers	Means of acquiring or developing agility capabilities

Adapted from Sharifi & Zhang, 2001

Table 3: Types and Components of Agility Capabilities

Capability	Definition	Components
Responsiveness	Ability to identify changes and quickly respond reactively or proactively to them, and recover from them	• Sensing and anticipating changes • React to change by immediately effecting them into system • Recovery from change
Competency	Full suite of abilities that provide productivity, efficiency, and effectiveness of activities towards the strategic objectives of the organization	• Strategic vision, • Appropriate technology (hard and soft)/ Sufficient technological ability • Products/services quality • Cost effectiveness • High rate of new products introduction • Change management • Knowledgeable, competent, and empowered people • Operations efficiency and electiveness (leanness) • Cooperation (internal and external) • Integration
Flexibility	Ability to achieve different objectives and process different products with the same resources	• Product volume flexibility • Product model/configuration flexibility • Organization and organizational issues flexibility • People flexibility
Quickness	Ability to perform operations and tasks in the shortest possible time	• Quick new products time to market • Products and services delivery quickness • Timeliness • Fast operations time

Adapted from Sharifi & Zhang, 1999

As a theoretical concept, agility is likely to have evolved from prior concepts in management that pertain to strategizing and competing in dynamic environments (Overby et al. 2006). However, what differentiates agility from concepts such as dynamic capabilities (Teece et al. 1997), strategic flexibility (Grewal and Tansuhaj 2001), and absorptive capacity (Zahra and George 2002) is that it augments the classic formula of flexibility and adaptability with scalability and speed (Baskerville et al. 2005). It is this unique combination of traits; traits that are recognized to be crucial to competing in turbulent conditions, that has captured the imagination and attention of academics and practitioners alike. Consequently, the notion of agility began to diffuse from the field of manufacturing to a range of management disciplines as the concept of agile manufacturing was extended into *'agile corporations'*. Agile corporations are firms capable of coping with the turbulent demands of contemporary business competition through the rapid reconfiguration of resource bundles in response to emerging market opportunities (Kidd 1995). The organizational capability that underpins agile corporations in turn, is termed enterprise agility (Sambamurthy et al. 2003).

Deriving from prior conceptualizations of agility (e.g. Sharifi and Zhang 1999), enterprise agility is typically conceptualized as a composite capability consisting of two components: the organizational ability to sense or anticipate changes in the external and internal organizational environment, and the ability to respond in a timely, cost efficient and effective manner (Seo and La Paz 2008). External environmental changes that trigger the need for enterprise agility may include economic fluctuations, technological advancements, changes in consumer demands, regulatory or legal changes, and the competitive actions from rival firms (Overby et al. 2006), while changes that stem from

the internal organizational environment may include the enactment of mergers and acquisitions, the deployment of new IT systems and the restructuring of the organizational IT function (van Oosterhout et al. 2006). In response to the changes, an agile organization would process the incoming signal and react accordingly. The response may take the form of a re-alignment of resources, the restructuring of business processes, or the formulation of new strategic objectives, depending on the scope and magnitude of change (Seo and La Paz 2008).

2.2 IT-Enabled Enterprise Agility

As IT possess the immense potential for enabling enterprise agility (Peppard and Ward 2004; Sambamurthy et al. 2003), the concept of IT-enabled enterprise agility has similarly garnered considerable research attention since it was mooted a number of years ago (Holmqvist and Pessi 2006). The interest in IT-enabled enterprise agility stems from the ability of IT to provide an organization with *"digital options"* (Sambamurthy et al. 2003). Digital options are a set of IT-enabled capabilities in the form of digitized business processes and knowledge systems that may be applied to capturing emergent opportunities, or remain unused depending on the focal firm's environment and strategy (Fichman 2004). Yet, despite the growing research in this area, a number of gaps remain in the literature.

2.2.1 Lack of Empirical Validation

First, of the existing prescriptions for how IT-enabled enterprise agility can be achieved in the literature, most of them are conceptual in nature and not supported by empirical evidence (Tan et al. 2009). For example, Weill et al. (2002) proposed ten IT capability clusters that are crucial to enabling enterprise agility for a number of electronic-based

business initiatives (refer to Figure 1). The ten consists of six capability clusters related to the physical IT infrastructure; including (1) channel management, (2) security and risk-management, (3) communications, (4) data management, (5) applications infrastructure, and (6) IT facilities management, as well as four clusters representing management-oriented IT capabilities; including (7) IT management, (8) IT architecture and standards, (9) IT education, and (10) IT research and development (For a review, refer to Weill et al. 2002).

In another study, Overby et al. (2006) described how IT-enabled enterprise agility may be achieved through the assimilation of knowledge and process-oriented information technologies (refer to Figure 2) that enable four types of digital options. The four types of digital options are related to the breath of resources (i.e. reach) and quality of information available (i.e. richness) in support of a firm's knowledge and business processes. They are (1) digitized process reach, (2) digitized process richness, (3) digitized knowledge reach, as well as (4) digitized knowledge richness (refer to Table 4), and the acquisition or enhancement of each of the four digital options is expected to facilitate a firm's ability to sense and respond to environmental change, thereby making it more agile (Overby et al. 2006).

Finally, Seo and La Paz (2008) identified twelve common problems related to the organizational assimilation of IS that may potentially inhibit enterprise agility. These include (1) data flooding, (2) lack of integration between perception systems and sources, (3) unstandardized perceived data, (4) limited scope of processing, (5) missing or undetected perception and processing signals, (6) low information accuracy, (7) information overload for decision makers, (8) time lag between information systems

implementation and organizational response, (9) systems inflexibility, (10) technology dependence, (11) greater propensity for errors, and (12) the need for greater management efforts due to the use of IT. In addition, to overcome these barriers to enterprise agility, the mechanisms of (1) standardization, (2) making an informed choice between buying, leasing and outsourcing, (3) developing management skills and individual agility, and (4) creating an organizational structure and culture conducive to enterprise agility were proposed (For a review, refer to Seo and La Paz 2008).

Table 4: Types of Digital Options

Digital Option	Definition	Examples of IT
Digitized Process Reach	Extent to which a firm deploys common, integrated, and connected IT-enabled processes. High reach is associated with processes that tie activity and information flows across departmental, functional, geographical, and inter-organizational units	Enterprise resource planning, Customer relationship management and supply chain management systems
Digitized Process Richness	Quality of information collected about transactions in the process, transparency of that information to other processes and systems that are linked to it, and the ability to use that information to reengineer the process (e.g. technologies related to decision support and data analytics)	Decision support, analytic, and tracking technologies
Digitized Knowledge Reach	Comprehensiveness and accessibility of codified knowledge in firm's knowledge base and interconnected networks and systems for enhancing interactions among individuals for knowledge transfer and sharing (e.g. Intranets and knowledge repositories)	Knowledge repositories, intranets, and databases
Digitized Knowledge Richness	Systems of interactions among organizational members to support sense-making, perspective sharing, and development of tacit knowledge (e.g. video-conferencing systems, collaborative systems)	Collaborative tools for knowledge sharing, video conferencing systems, advanced knowledge management systems

Adapted from Sambamurthy et al., 2003

Yet, while the discourse on agility-enabling IT capability clusters (Weill et al. 2002), the facilitating role of various forms of knowledge and process-oriented IT systems (Overby et al. 2006), and mechanisms for overcoming the barriers to enterprise agility (Seo and La Paz 2008) has been enriching and provides plenty of insights for IT researchers and managers, we did not identify any confirmatory studies that have empirically validated the propositions of these papers. Without empirical support, future research that build on these works can only remain in the realm of guesswork and assumptions, from which it is difficult to derive concrete theories and principles for the advancement of knowledge in this area.

2.2.2 Abstract Prescriptions for Attaining IT-Enabled Enterprise Agility

Second, most of the existing prescriptions for attaining enterprise agility through the use of IT also tend to be overly abstract in that they do not offer specific indications for practical action. For instance, Zain et al. (2005) posited that the use of IT in itself would invariably lead to enterprise agility (refer to Figure 3), and although results that strongly support this hypothesis were presented, the body of research in the area of IS alignment refutes this. To summarize, IS alignment research holds that it is not the uncritical use of IT that enables any form of strategic benefits, but the complex, multi-point alignment between business and IT strategies, business needs and systems development priorities, as well as business processes and the enabling IT infrastructure (For a review, refer to Chan and Reich 2007).

In a similar vein, although the concept of digital options was mooted as the antecedent of agility in the originating seminal paper on IT-enabled enterprise agility (see Sambamurthy et al. 2003), the critical issue of how digital options may be acquired or

developed is only touched upon briefly. In particular, it is suggested that digital options arise as a result of the interaction between an organization's IT competence and entrepreneurial alertness (refer to Figure 4). But while these constructs hints at the overarching categories of organizational factors crucial to the attainment of IT-enabled enterprise agility, at the intended level of an overview, they are unspecific, broadly defined, and difficult to act upon (refer to Table 5).

In another study, Holmqvist and Pessi (2006) used a case study of Volvo's global initiative to provide web services, a web portal, and a platform for selling spare parts over the Internet to underscore the potential application of scenario development and an incremental systems development methodology for the attainment of IT-enabled enterprise agility (refer to Figure 5). However, the generic process of how to go about developing scenarios and planning for contingencies, as well as the steps of the suggested incremental systems development methodology were never discussed beyond the singular instance (i.e. the case of Volvo) presented (For a review, refer to Holmqvist and Pessi 2006). As such, the argument for the significance of a flexible, continuous, and incremental systems development methodology for the attainment of IT-enabled enterprise agility was made convincingly; and this is corroborated by the literature on agile systems development (e.g. Mathiassen and Pries-Heje 2006), but the specifics of the methodology has not been explained.

The problem with these proposed antecedents of IT-enabled enterprise agility is that all of them (i.e. the use of IT, IT competence, entrepreneurial alertness, scenario development, and incremental systems development) can take on a boundless range of possible values and configurations. The sheer variety of possibilities embedded in the definition of these

constructs strips them of the ability to generate meaningful and actionable indications for practice, without which the utility and interpretability of these prescriptions are limited.

Table 5: Components of IT Competence and Entrepreneurial Alertness

IT Competence	
Investment Scale	Level of IT investments
IT Capabilities	Base of organizational resources and capabilities; such as the quality of the IT infrastructure (global connectivity and reliability), IT human capital (appropriate technical and business skills), and the nature of IS/business partnerships, that enable IT-based innovation
Entrepreneurial Alertness	
Strategic foresight	The ability to anticipate discontinuities in the competitive or technological landscape
Systemic insight	The ability to visualize possible linkages between agility, digital options and the emerging market opportunities

Adapted from Sambamurthy et al., 2003

2.2.3 Lack of Research on the Attainment of the Three Types of Agility

Third, as *"agility encompasses a firm's capabilities related to interactions with customers, orchestration of internal operations, and utilization of its ecosystem of external business partners"* (Sambamurthy et al. 2003), enterprise agility is typically conceived as a composite capability consisting of customer agility, partnering agility and operational agility. Customer agility refers to the co-opting of customers in the identification and exploitation of opportunities for innovation and competitive actions. In particular, customers may play three important roles in stimulating innovation and competitive actions. First, they may act as sources of ideas for innovation (Nambisan 2002). Second, they may be involved in the co-production of innovations (Lengnick-Hall 1996). Third, they may serve as product testers or power users that influence or help others learn about the new product or service (Sambamurthy et al. 2003). In other words, customer agility centers on leveraging the feedback and collective resources of customers

to detect and seize market opportunities (Raschke and David 2005), and the primary mechanism through which IT can facilitate this lies in the building and enhancement of VCs (Nambisan 2002; Sambamurthy et al. 2003).

Partnering agility is defined as a firm's capability to leverage the assets, knowledge, and competencies of entities within its business ecosystem (such as suppliers, distributors, logistics providers, and contract manufacturers) through partnerships, alliances and joint ventures (Venkatraman and Henderson 1998) for the joint exploration and exploitation (March 1991; O'Reilly and Tushman 2004) of opportunities for innovation and competitive actions (Sambamurthy et al. 2003). This may attained through the efficient sourcing and recombination of network assets and competencies when the requisite resources, knowledge and capabilities are available within the business network, or the adaptation and outward extension of the network that seeks their acquisition when they are not (Dyer and Singh 1998). Firms with extensive information networks are typically able to respond faster and perform better amidst uncertainty (Zaheer and Zaheer 1997). As such, the primary mechanism through which IT can facilitate partnering agility lies in the development and leverage of technology-enabled platforms such as *"portals, supply chain management and visibility technologies"* (Sambamurthy et al. 2003).

Operational agility refers to the internal capabilities of an organization that enables fast, accurate and cost efficient actions in sensing and responding to emerging market opportunities (Sambamurthy et al. 2003). It facilitates the rapid redesign of existing business processes in response to environmental stimuli (Malone et al. 1999) and enables firms to reduce information asymmetries between transaction partners through the rapid, timely and comprehensive sharing of business-critical information (Amit and Zott 2001).

IT facilitates operational agility by enabling the modularization of existing business processes, and subsequently, the rapid recombination of various modules to create new business processes in response to environmental demands (Sambamurthy et al. 2003). As such, the extent to which IT can facilitate operational agility is necessarily dependent on the speed and effectiveness of its deployment (Mathiassen and Pries-Heje 2006; Tiwana et al. 2003), and the organizational capability for agile IT deployment is generally seen as the primary mechanism for the attainment of operational agility (Goh et al. 2010; Hovorka and Larsen 2006).

Overall, the lack of empirical validation and the abstract nature of the existing prescriptions in the literature indicate a general lack of knowledge on how IT-enabled enterprise agility can be achieved. Moreover, although the three types of agility are posited to enhance an organization's ability to engage in competitive actions of greater variety, complexity and speed, there is a lack of research on how each of these forms of agility can be achieved. For instance, the literature review undertaken did not identify any studies that examine the association between VCs and customer agility although VCs are the primary IT-enabled means of attaining customer agility (Sambamurthy et al. 2003). Accordingly, to address our first research question and understand how VCs can be nurtured and leveraged for customer agility, we conduct a review of the literature on VCs. This is presented in Section 2.3 of this thesis.

Similarly, although the development and leverage of a technology-enabled platform is the primary IT-enabled means of attaining partnering agility (Sambamurthy et al. 2003), we did not find any studies related to this mechanism. Moreover, the overarching conceptual frameworks guiding research on IT-enabled enterprise agility are based on the precepts of

traditional strategic management, which views the organization as a focused, tightly-coupled system and emphasizes internal organizational strengths and weaknesses as the key to business competition (see Iansiti and Levien 2004a). Thus, the primary means advocated in the existing literature for the attainment of enterprise agility are the internal organizational processes of IT capability development (Weill et al. 2002), and organizational learning from prior competitive actions (Sambamurthy et al. 2003).

Yet, the reality is that significant changes in the managerial, legal and technological capabilities of organizations at the turn of the millennium have led to a new networked economy that is no longer driven by economies of scale, but the *"economics of networks"* (Shapiro and Varian 1999). As *"distributed business networks became the established way of doing business"* (Iansiti and Levien 2004a), the management of internal assets and competencies became less crucial to business success than managing the concurrent and paradoxical forces of stability and instability (Stacey 1995), cooperation and competition (Lengnick-Hall and Wolff 1999) that the focal organization is subjected to. Consequently, we contend that there is also a need for a different perspective of IT-enabled enterprise agility, one that accounts for the new dynamics of business competition in the present networked economy (Iansiti and Levien 2004a).

Therefore, to address the second of our research questions and to construct a networked perspective of IT-enabled enterprise agility, we conduct a review of the literature on business ecosystems, which is an appropriate starting point for our inquiry since the research stream is primarily concerned with mechanisms that promote partnering agility (See Adner 2006; Teece 2007) as the means to superior performance for organizations

operating in complex business networks. Our review of the literature on business ecosystems is presented in Section 2.4.

Finally, although the organizational capability for agile IT deployment is one of the key means of attaining operational agility (Mathiassen and Pries-Heje 2006; Tiwana et al. 2003), research on how this capability can be acquired is limited. More specifically, the existing research on agile IT deployment may be characterized into a number of perspectives (refer to Table 6).

The first perspective is the developmental perspective that views the effective adoption and adaptation of agile development methods as the key to agile IT deployment. Agile development methods may include the Agile Alliance Manifesto, Scrum, eXtreme Programming, DSDM and FDD (Lee and Xia 2010). Studies adopting this perspective have uncovered the influence of an array of factors such as individual knowledge, empowerment, project team management, team leadership, technological compatibility, nature and size of task, resource constraints, and method characteristics on the effective employment of agile development methods (Conboy and Fitzgerald 2010; Mangalaraj et al. 2009; McAvoy and Butler 2009). From a process-oriented standpoint, the mechanisms of Method for Method Configuration (Karlsson and Agerfalk 2009) and method appropriation (Cao et al. 2009) have also been proposed to be crucial in tailoring agile development methods to the focal organization.

A second perspective is rooted in the coordination theory. This perspective suggests that agile IT deployment is a result of effective collaboration between information systems development (ISD) teams and/ or business network partners, particularly in contexts

where ISD is enacted across geographical and organizational boundaries. In the context of geographically distributed ISD, studies aligned with the coordination perspective have suggested that agile IT deployment consists of three dimensions (i.e. resource, process, linkage) and eight sub-dimensions (Sarker and Sarker 2009). Moreover, of the eight sub-dimensions (i.e. people, technology, methodology, temporal, environmental awareness, cultural, communicative), communicative and cultural agilities are most important to effective collaboration (Sarker et al. 2009). In the context of inter-organizational ISD, studies aligned with the coordination perspective have revealed that the characteristics of network partners and communication processes that strengthen social influence and facilitate knowledge transfer are crucial to agile IT deployment (Hovorka and Larsen 2006).

Table 6: Perspectives on Agile IT Deployment

Perspective on Agile IT Deployment	Representative Works
Developmental	Cao et al. (2009) Karlsson & Agerfalk (2009) Mangalaraj et al. (2009) McAvoy & Butler (2009) Conboy & Fitzgerald (2010)
Coordination	Hovorka & Larsen (2006) Sarker & Sarker (2009) Sarker et al. (2009)
Organizational Learning	Lyytinen & Rose (2006) Vinekar et al. (2006) Vidgen & Wang (2009)
Contingency	Austin & Devin(2009) Harris et al. (2009) Maruping et al. (2009) Port & Bui (2009)

A third perspective is the organizational learning perspective, which emphasizes the mobilization and balance of the learning capabilities of exploration and exploitation (March 1991) for the attainment of agile IT deployment. Prior studies aligned with this

perspective suggest that organizations adopt different ISD approaches based on their needs and capabilities for exploration and exploitation (Lyytinen and Rose 2006). To leverage and strike a balance between both capabilities for agile IT deployment, some researchers have argued that there is a need to lay the groundwork for ambidexterity (O'Reilly and Tushman 2004) with the establishment of explorative and exploitative organizational subunits (Vinekar et al. 2006). Others have suggested that balance can be achieved through the workings of the capabilities for process adaptation and product innovation of the ISD team. These capabilities, in turn, are subject to the influence of a number of enablers and inhibitors (see Vidgen and Wang 2009).

A fourth and final perspective of agile IT deployment in the existing literature is the contingency perspective. Studies aligned with this perspective suggest that agility is inextricable from improvisation (Austin and Devin 2009; Port and Bui 2009) and the attainment of agile IT deployment via an improvisational approach is contingent on the environmental conditions surrounding ISD (Harris et al. 2009; Maruping et al. 2009). More specifically, some have suggested that improvisation should be a legitimate recourse only if there is environmental uncertainty (Harris et al. 2009) and if the benefits of innovation outweigh the costs of pursuing it (Austin and Devin 2009). Moreover, the outcome of adopting an improvisational approach is contingent on requirements volatility (Port and Bui 2009) and the judicious application of formal and informal controls (Maruping et al. 2009). Conversely, if environmental uncertainty is low and if the costs of innovation are greater than the benefits of pursuing it, then a planned or mixed approach might be more appropriate (Austin and Devin 2009; Port and Bui 2009).

More broadly, and often encompassing one or more of the aforementioned perspectives, there is also a significant number of studies centered on the identification of the critical success factors (CSFs) of agile IT deployment. These CSFs are the necessary conditions or key areas where *"things must go right"* (Rockart 1979) for the attainment of agile IT deployment. Among others, the more frequently cited CSFs of agile IT deployment in the literature include the autonomy, diversity, response extensiveness and response efficiency of the ISD project team (Lee and Xia 2010), as well as business-IT alignment, communication, modularized IT architecture, extent of conflict, technical skills, decentralized knowledge, top management support and flexibility (Bruque-Camara et al. 2004; Lee et al. 2006).

Overall, the four perspectives and research on CSFs have identified a number of mechanisms and enablers for the attainment of agile IT deployment. Yet, many organizations continue to face difficulties in achieving agile IT deployment in practice (Lee and Xia 2010) and reviews of the literature suggests that the existing body of work is lacking in clarity, a unified direction, parsimony, and a cumulative research tradition (see Conboy 2009; Dyba and Dingsøyr 2008). These limitations constrain its ability to provide indications to practice (Abrahamsson et al. 2009).

The organizational ability to improvise is seen to be complementary to the dynamic and operational capabilities of a firm (Pavlou and El Sawy 2010). An improvisational approach to systems implementation (see Orlikowski 1996) may hold the key to agility in IT deployment, particularly in a turbulent environment (Pavlou and El Sawy 2010) where agility is most needed (Sambamurthy et al. 2003). This is because improvisation can facilitate creativity (Crossan et al. 2005), enhance the speed of implementation by

eliminating the need for planning (Weick 1998), and increase the effectiveness of systems development (Ciborra 1996a; Orlikowski 2000). Accordingly, to understand how agility in IT deployment can be achieved and translated to operational agility, and to address our third research question, we conduct a review of the literature on organizational improvisation. The literature on organizational improvisation is particularly appropriate for guiding our inquiry since the research stream is primarily concerned with the mechanisms and constructs that underlie the organizational capability for improvisation (e.g. Crossan 1998; Moorman and Miner 1998). Our review of the literature on organizational improvisation is presented in Section 2.5.

2.3 Virtual Communities

The advent of Internet technologies facilitated the creation of the first VCs by enabling synchronous communications and interactions that transcend the physical limits of time and space (Sangwan 2005). Although VCs may be differentiated according to their purpose (Armstrong and Hagel 1996), social structure (Kozinets 2002), physical features (Preece 2001), and organization (Porter 2004), there are a number of characteristics that are common across most VCs (Porter and Donthu 2008). In particular, VCs are social aggregations based on common interest (Rheingold 1993; Sangwan 2005), and comprises of members that engage in frequent interactions (Balasubramanian and Mahajan 2001), generate communal information and resources (Gu et al. 2007), demonstrate reciprocity (Preece 2001), and share cultural norms, moral standards and governing policies (Kozinets 2002). The earliest VCs were self-organizing and socially-oriented, centered on the personal, non-professional relationships between VC members (Kannan et al. 2000). It was not until the mid 1990s when the idea was first raised that VCs can be used as a

powerful business tool to tap into the collective intelligence of employees and customers; transforming the basis of competition to create competitive advantage and organizational value for the organizations that sponsor them (Armstrong and Hagel 1996). As this notion permeated the collective consciousness of e-commerce practitioners worldwide, it paved the way for the emergence of the first commercial VCs (Kannan et al. 2000).

Commercial VCs are typically sponsored by two groups of organizations (Porter 2004). The first group comprises of product manufacturers and service providers seeking to market their offerings and build direct relationships with their customers (Kannan et al. 2000). The second group of sponsoring organizations consists of third parties that are unaligned with specific product manufacturers or service providers, seeking to play the role of an objective intermediary that caters to the needs of a community of consumers with common interests (Brown et al. 2002; Kannan et al. 2000).

According to the existing literature, VCs present numerous benefits for both groups of sponsoring organizations. For example, studies have shown that VC members are twice more likely to purchase online, nine times more likely to make repeat purchases (Sangwan 2005), and make purchases that are 57% larger than non-VC members (Cothrel 2000). Other studies suggest that VC members are more likely to generate positive word-of-mouth (Dellarocas 2003), refer other customers, and moreover, they are more likely to refer in volume (Cothrel 2000). But more pertinent to the topic of this thesis, beyond these transactional and reputational benefits, VCs also confer the strategic advantage of customer agility (Nambisan 2002; Sambamurthy et al. 2003)

2.3.1 Nurturing and Leveraging a VC for Customer Agility

Building on strategic management, entrepreneurship and IT management literatures, Sambamurthy et al.'s framework (2003) on IT-enabled enterprise agility identifies two organizational capabilities (IT competence, digital options) and two strategic processes (capability-building and entrepreneurial action) as the key antecedents and mechanisms of customer agility. According to the framework, the process of attaining agility through the leverage of IT begins with the strategic process of capability-building in which IT competence is translated to digital options through new investments in IT and an intricate blend of IT, organizational knowledge and business processes (Barua and Mukhopadhay 2000).

Of the four digital options identified in Sambamurthy et al.'s framework (refer to Table 4), the two options related to digitized knowledge are more salient in the context of VCs. This is because the ability of VCs to enhance interactions between organizational stakeholders (i.e. digitized knowledge richness) (Butler 2001; Gu et al. 2007), and serve as the basis of a knowledge repository (i.e. digitized knowledge reach) (Bieber et al. 2002; Srinivasan et al. 2002; Wasko and Faraj 2005) is well-documented. On the other hand, VCs, being customer-centered (Armstrong and Hagel 1996; Rothaermel and Sugiyama 2001), are conceivably less relevant to the core business processes and backend information flows (i.e. digitized process reach and richness) of the sponsoring organization.

The existing literature on VCs is replete with prescriptions on how these VC-enabled digital options (i.e. digitized knowledge reach and richness) may be effectively developed. Yet, despite the unbridled diversity and the lack of a cumulative tradition

(Ginsburg and Weisband 2006) in existing VC research, the essence of the majority of these prescriptions centers on three distinct competencies (Porter and Donthu 2008; Preece 2001) (refer to Table 7). First, the sponsoring organization can facilitate the development of VC-enabled digital options by managing content, as content that is perceived to be interesting and unbiased may motivate VC members to participate and contribute knowledge (Brown et al. 2002; Ridings et al. 2002).

Second, the sponsoring organization can develop VC-enabled digital options by fostering embeddedness. Embeddedness refers to the process through which economic actions are ingrained within wider social structures (Dacin et al. 1999) and in the organizational context, the state of being "embedded" refers to the centrality of the customer within the focal organization's social network (Bhattacharya and Sen 2003). Embeddedness is particularly important to the development of VC-enabled digital options as it is a significant determinant of the extent to which the customer identifies with both the VC and the sponsoring organization (Bhattacharya and Sen 2003). This in turn, translates to increased participation, trust, exchange of socio-emotional support, and willingness to contribute knowledge within a VC (Blanchard and Markus 2004; Ma and Agarwal 2007).

Finally, the sponsoring organization can develop VC-enabled digital options by enhancing interactivity. Interactivity can be enhanced through deliberate measures such as promoting special topics (Mohammed et al. 2004), hosting moderated discussions (Porter and Donthu 2008) or improving the ease, efficiency and effectiveness of communications that decreases the cost of participation within a VC (Preece 2001). Interactivity is important because a vibrant community works in a virtuous cycle to facilitate the attraction and retention of VC members, which in turn, drives further

interaction and knowledge contribution (Dholakia et al. 2004; Preece 2001). These three competencies, in tandem with the enabling technological infrastructure (see, e.g. Preece 2001) that underlies the VC, constitute the fundamental building blocks of the two VC-enabled digital options.

Table 7: Existing Perspectives on the Development of VC-Enabled Digital Options

Key Competencies in the Development of VC-Enabled Options	Related Concepts in VC Literature
Managing content	Information quality (Lin 2008; Lin et al. 2007) Value of collectively held knowledge (Rothaermel and Sugiyama 2001) Functional needs (Sangwan 2005) Support for personalization (Schubert and Ginsburg 2000) Site content (Rothaermel and Sugiyama 2001)
Fostering embeddedness	Sense of virtual community (Blanchard and Markus 2004; Koh and Kim 2003) Economic on social grafting (Balasubramanian and Mahajan 2001) Involvement (Shang et al. 2006) Relationship development (Kozinets 2002) Commitment (Wasko and Faraj 2005) Trust (Leimeister et al. 2005; Lin 2008; Walden 2000) Emotional needs (Sangwan 2005) Pro-sharing norms (Lin et al. 2007) Perceived identity verification (Ma and Agarwal 2007) Sense of belonging (Lin 2008)
Enhancing interactivity	Sociability (Preece 2001) Usability (Preece 2001) Social usefulness (Lin 2008) Amount of Quality Postings (Gu et al. 2007) Participation (Rothaermel and Sugiyama 2001) Contextual needs (Sangwan 2005) System quality (Lin 2008; Lin et al. 2007) Social interaction possibilities (Lee et al. 2005) Convenience (Lee et al. 2005)

Following the development of VC-enabled digital options, Sambamurthy et al.'s framework (2003) describes how they, in turn, can be translated to customer agility in the next phase of capability-building. In particular, a VC can facilitate customer agility by serving as the basis of a platform that enables two forms of interactions. First, by

enabling interactions between VC members and the sponsoring organization, the sponsoring organization is able to obtain direct feedback and product configuration knowledge from its customers to gain an understanding of their current and expressed needs (Armstrong and Hagel 1996; Porter and Donthu 2008). Second, by enabling interactions between VC members, the sponsoring organization can monitor the interactions between its members to anticipate future and unexpressed needs (Kozinets 2002; Nambisan 2002).

In the context of generic IT-enabled organizational value creation, Sambamurthy et al.'s framework (2003) describes a process of entrepreneurial action that follows capability-building in which enterprise agility can be activated for organizational value. Although a myriad of strategies for creating organizational value have been prescribed in extant literature, the essence of the majority of these strategies can be distilled into three distinct logics (Eisenhardt and Sull 2001; Sambamurthy et al. 2003). These logics, dubbed the three logics of strategy, are summarized in the Table 8. In particular, given the dynamic and turbulent operating conditions of the contemporary business landscape (McAfee and Brynjolfsson 2008; Sull 2009), Sambamurthy et al. argue that the leverage of IT for organizational value creation *"must embrace the logic of opportunity and be targeted at seizing series of competitive advantages"* (Sambamurthy et al. 2003). Hence, the strategic process of entrepreneurial action is aligned with the logic of opportunity (see D'Aveni 1994; Eisenhardt and Sull 2001), and entails the leverage of enterprise agility to allow the focal organization to rapidly launch a wide variety of competitive actions (e.g. Eisenhardt and Sull 2001). This in turn, leads to the creation of organizational value as the organization is able to rapidly develop new value propositions, and establish an

unconventional basis of competing that disrupts the competitive equilibrium (Eisenhardt and Martin 2000; Lengnick-Hall and Wolff 1999).

In the context of VCs, customer agility can be leveraged for the launch of a variety of competitive actions through three distinct mechanisms. First, the competitive actions may be reactive responses to the current and expressed needs of VC members. For instance, there are numerous illustrative examples in the existing VC literature of how sponsoring organizations may launch new content (Rothaermel and Sugiyama 2001), features (Ginsburg and Weisband 2006), promotions (Armstrong and Hagel 1996), products (Kozinets 2002), and even revenue streams (Kannan et al. 2000) as a result of direct interactions between VC members and the sponsoring organization.

Second, the competitive actions may arise from proactive responses to the anticipated needs of the VC members. These responses may be attempts at catering to future and unexpressed needs that are extrapolated from the interactions between VC members (Hagel and Armstrong 1997; Rothaermel and Sugiyama 2001), or directed marketing efforts that cater to the perceived needs of different segments within a VC (Balasubramanian and Mahajan 2001; Kozinets 2002).

Table 8: The Three Logics of Strategy

	Logic of Positioning	Logic of Leverage	Logic of Opportunity
Representative Theories	◆ **Competitive Strategy** (Porter 1996)	◆ **Resource-Base View** (Barney 1991; Peteraf 1993)	◆ **Dynamic Capabilities** (Eisenhardt and Martin 2000; Teece et al. 1997) ◆ **Hypercompetition** (D'Aveni 1994; Eisenhardt and Sull 2001)
Core Tenets	• Systematic consideration of environmental forces • Identification of attractive market position • Occupy and defend position through a tightly integrated activity system	• Identification of strategic (Valuable, Rare, Inimitable and Non-substitutable) resources and capabilities • Develop and leverage strategic resources	• Use of dynamic capabilities that allow managers alter their resource base in dynamic environments to generate new value-creating resource configurations • Use of creative and unconventional means to deliberately disrupt the existing business paradigms in the competitive environment and foster radical transformations in the rules of competition over and over again
Source of Organizational Value Creation	• Avoiding environmental threats and exploiting opportunities associated with market position	• Unique value proposition as a result of firm-specific resources and capabilities. • Resultant competitive advantage is sustainable if the resources can be protected from imitation.	• Rapid sense-and-respond capabilities that allows an organization to recombine existing assets and competencies to form new value propositions to keep competitors off balance. Or • Adopt aggressive measures to cause fundamental instability and create a unique and unconventional basis for competing

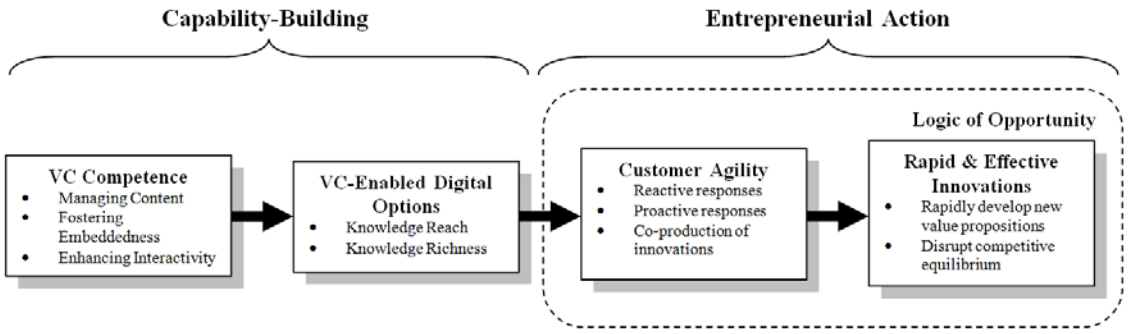
Third, competitive actions may stem from innovations developed in conjunction with VC members. More specifically, VC members may be engaged in the co-production of innovations (Nambisan 2002; Porter and Donthu 2008), which shortens the development cycle by eliminating the time lag between discerning and acting on the need for innovation, and provides the strongest assurances that the innovations pursued by the sponsoring organization are in accordance with the members' needs (Lengnick-Hall 1996).

To summarize, the development and leverage of a VC for customer agility begins with the strategic process of capability-building in which VC competence, consisting of three VC-enabling competencies (i.e. managing content, fostering embeddedness, and enhancing interactivity), is translated to customer agility through the development of two VC-enabled digital options (i.e. digitized knowledge reach and richness). Organizational value, in turn, is created through the strategic process of entrepreneurial action in which customer agility is leveraged to enable the community sponsor to detect windows of market opportunity (i.e. via enhanced means of accessing information on their members' needs), and launch a stream of rapid and effective innovations to seize them with speed and surprise.

By synthesizing Sambamurthy et al.'s framework (2003) on generic IT-enabled enterprise agility with pertinent concepts and propositions from the existing VC literature, we are able to construct a theoretical lens (refer to Figure 6) that is specific to the context of VCs, and can serve as *"sensitizing device"* (Klein and Myers 1999) to guide subsequent data collection and analysis (Eisenhardt and Graebner 2007; Walsham 2006). In their original article, Sambamurthy et al. (2003) also discussed a strategic process of co-

evolutionary adaptation through which the organizational value gained from the firm's competitive actions enhances enterprise agility, and subsequently, digital options in a mechanism of feedback. However, as the scope of our study is limited to the development and leverage of VCs for customer agility, we omitted the process of co-evolutionary adaptation; which deals with the reverse mechanisms of our phenomenon of interest, so as to preserve the simplicity and parsimony of our theoretical lens. Applying this theoretical lens to analyze the case of HWZ (refer to Section 4.1), a process model of the development and leverage of a VC for organizational value creation is inductively derived (refer to Section 5.1) to address the first research question set forth at the beginning of this thesis.

Figure 1: Theoretical Lens on VC-Enabled Customer Agility



2.4 Business Ecosystems

Business ecosystems research emerged as a response to the growing need for a new paradigm for strategizing, competing and innovating in the networked economy (Iansiti and Levien 2004a) and has its intellectual roots in theories of complexity (Stacey 1995) and organizational ecology (e.g. Hannan and Freeman 1977). Business ecosystems are networks of organizations that are held together through formal contracting and mutual dependency (Pierce 2009). The entities of a business ecosystem are structured around

core firms, whose centrality is established on the basis of control over the dominant technological architecture or brand that structures value in the ecosystem, or other factors such as product characteristics or geography (Teece 2007). These entities include suppliers, producers and retailers that work in tandem to create value, as well as customers (Moore 1996) and producers of complementary products and services termed "*complementors*" (Teece 2007). Collectively, these entities comprise niche markets within the ecosystem, which are specialized functions tied to the core firm (Pierce 2009).

The development and subsequent leverage of a business ecosystem by a core firm can bring about a number of important benefits for the focal organization. These benefits include enhanced procurement processes, an optimized product mix, operational efficiency and enhanced information sharing (Iansiti and Levien 2004b). More pertinently, business ecosystems may give rise to partnering agility by enhancing the organizational ability to sense and respond to market and technological opportunities (Teece 2007), and facilitating the co-creation of effective and timely innovations (Adner 2006). The process of ecosystem development in turn, is determined by two primary factors: The discrete organizational strategies of the core firm and the role it plays within the ecosystem (Iansiti and Levien 2004a).

2.4.1 Core Firm Strategies

Although a core firm is faced with a vast array of strategies to choose from, and the intricacies of each possible strategy is certainly beyond the scope of a single paper, the essence of the most prominent streams of contemporary strategic management thought can be distilled into three distinct logics (Lengnick-Hall and Wolff 1999). The three core logics of contemporary strategic management are summarized in the Table 9.

A core firm may pursue strategies aligned with the capability logic by leveraging firm-specific strategic resources and capabilities to create a unique value proposition (Barney 1991). This influences ecosystem development as the unique value proposition can serve to attract new entities; such as customers, suppliers and complementors, into the ecosystem, and the entities in the ecosystem in turn, can coordinate value creation around the seed proposition of the core firm (Moore 1993). In addition, by protecting the value proposition from imitation, the core firm delineates the boundary of the ecosystem by defining a distinct identity, which serves as an entry barrier that controls membership in the ecosystem.

Conversely, a core firm may pursue strategies aligned with the guerilla logic by developing the vision, capabilities and tactics for causing market disruptions that allow the firm to rapidly innovate (D'Aveni 1994) or recombine existing assets and competencies to create a series of temporary competitive advantages (Eisenhardt and Martin 2000). With the core firm acting as the lead innovator, its actions influence ecosystem development by introducing a continuous stream of fresh ideas that promotes self-renewal and staves off obsolescence (Moore 1996). Moreover, continuous innovation by the core firm coerces the other entities in the ecosystem to adapt to the changes or exit the ecosystem (Pierce 2009). With successive iterations, the surviving entities develop the capabilities to adapt efficiently and effectively, which results in the development of a robust business ecosystem.

Table 9: The Three Core Logics of Contemporary Strategic Management

	Capability Logic	Guerrilla Logic	Complexity Logic
Representative Research Streams	▪ The **Resource-Based View (RBV**) of the firm (Barney 1991)	▪ **Theory of Hypercompetition** (D'Aveni 1994) ▪ **Dynamic Capabilities Approach** (Teece et al. 1997)	▪ **Complexity Theory** (Stacey 1995) ▪ **Business Ecosystems** (Iansiti and Levien 2004a)
Core Principles	Postulates that superior performance is the result of leveraging firm-specific strategic resources and capabilities and protecting them from imitation.	Posits that superior performance is the result of rapid and relentless innovation that disrupts existing business paradigms to keep competitors off-balance	Suggests that superior performance is a result of maintaining the health of the business ecosystem, which leads to productivity, synergies from diversity and durability of the benefits derived.
Key Prescriptions	• Identify and exploit firm-specific strategic resources that are valuable, rare, inimitable and non-substitutable • Leverage complementary resources that enhance the value creating potential of strategic resources	• Develop dynamic capabilities that allow an organization to rapidly recombine existing assets and competencies to form new value propositions. • Adopt aggressive measures to cause fundamental instability and create a unique and unconventional basis for competing	• Understand and manipulate the underlying forces and attractors that create order in the business ecosystem • Develop ecosystem capabilities (as opposed to self-serving, internal organizational capabilities) through direct intervention or providing the means for capability development across the network

Adapted from: Lengnick-Hall & Wolff, 1999

Finally, a core firm may pursue strategies aligned with the complexity logic by attempting to manipulate the underlying forces and attractors that create order in the business ecosystem; such as shared values, the collective vision, mechanisms of control and platforms for interaction (Stacey 1995), maintaining the ecosystem at the *"edge of chaos"* (Brown and Eisenhardt 1997) so that the ecosystem is primed for innovation and continuous change (Stacey 1995). Alternatively, the core firm may focus on helping the other entities in the ecosystem develop their capabilities through direct intervention, or providing the tools and interfaces for capability development (Iansiti and Levien 2004a). The result of these community-oriented measures is the development of a healthy business ecosystem characterized by symbiotic relationships, collective strategies and orchestrated actions (Lengnick-Hall and Wolff 1999).

2.4.2 Ecosystem Roles

In addition to its organizational strategies, the role that the core firm plays within the ecosystem also has profound implications for ecosystem development. Specifically, the core firm can choose to play the role of a keystone by providing benefits to the rest of the ecosystem so as to improve its own chances of survival (Iansiti and Levien 2004a; Iansiti and Levien 2004b). By taking on the role of a keystone, the core firm influences ecosystem development through three distinct mechanisms. First, the keystone may enhance ecosystem productivity by maintaining the population of the ecosystem within an optimum range, or connecting different nodes within the network, thereby decreasing the complexity of coordination and integration in value co-creation (Iansiti and Levien 2004a). Second, the keystone may facilitate ecosystem robustness by introducing a continuous stream of innovations and providing a reliable point of reference for other

entities in the ecosystem. This serves to buffer the ecosystem from environmental shocks and help ecosystem members adapt to new and uncertain conditions. Third, the keystone may encourage diversity within the ecosystem by offering new capabilities to an array of third-party organizations that enable them to participate meaningfully in the ecosystem (Iansiti and Levien 2004b).

Alternatively, the core firm can choose to play the role of a dominator by exploiting their centrality in the network to take control or extract value from the ecosystem. This influences ecosystem development in two possible ways. First, by expanding horizontally and vertically to control a large proportion of the business network, the dominator may become primarily responsible for value creation within the ecosystem, which stifles ecosystem development by leaving little room for diversity. Second, by draining the value created by other entities within the ecosystem from the network, the dominator may leave behind *"a starved and unstable ecosystem"*(Iansiti and Levien 2004a) that is unable to sustain itself, which may ultimately collapse and lead to the demise of these entities (Iansiti and Levien 2004b).

It is important to note that the ecosystem role of the core firm is distinct from the organizational strategies that it chooses to employ, which are primarily influenced by its independent business objectives. For example, although the role of a keystone is more commonly associated with the complexity logic (e.g. Lengnick-Hall and Wolff 1999), a keystone may use (1) the capability logic to control the population of the ecosystem for optimum productivity, (2) the guerilla logic to introduce a continuous stream of innovations that promotes ecosystem robustness, and (3) the complexity logic to promote capability development across the network that promotes meaningful diversity in the

ecosystem. Likewise, a dominator may use (1) the capability logic to establish ownership and control over the ecosystem, (2) the guerilla logic to expand horizontally and vertically in the network, and (3) the complexity logic to manipulate the underlying forces and attractors to facilitate domination and value extraction (Iansiti and Levien 2004b; Moore 1996). This conceptual distinction is important to studying ecosystem development as the precise nature of the process can only be understood by examining both factors in tandem.

Overall, the literature on business ecosystems suggests that the development and leverage of a digital business ecosystem (DBE); a specific type of business ecosystem defined as an IT-enabled business network of entities with differing interests bound together in a collective whole (Iansiti and Levien 2004a), may be the key to attaining partnering agility for organizations operating in the networked economy. This is because business ecosystems can be leveraged to enhance the ability to sense and respond to market and technological opportunities (Adner 2006; Teece 2007), and the extent of coordination and integration required for entities engaged in intense networked competition can only be achieved using IT (Riggins and Rhee 1998). The process of DBE development is in turn, determined by the strategies of the focal organization and the role it plays within the ecosystem. Applying this body of knowledge as a theoretical lens to analyze the case of Alibaba (refer to Section 4.2), a process model of the development and leverage of a DBE is inductively derived (refer to Section 5.2) to address our second research question.

2.5 Organizational Improvisation

Organizational improvisation theory draws from insights obtained from a kaleidoscopic array of contexts (Moorman and Miner 1998) ranging from music (e.g. Barrett 1998) and

theater (e.g. Crossan 1998) to sports (e.g. Bjurwill 1993), and even firefighting management (e.g. Weick 1996). Like the concept of enterprise agility, the present fascination with organizational improvisation stems from the need to manage the unprecedented turbulence and complexity of the modern competitive landscape (Kamoche et al. 2003). Improvisation is seen as one of the key enablers of innovativeness and spontaneity; traits that are crucial for dealing with the complex, unpredictable, and time-critical issues that are frequently confronted by organizations today (Crossan 1998).

Although a great many definitions of organizational improvisation exist in the literature, most of the definitions agree on a number of distinguishing characteristics (Bergh and Lim 2008). First, organizational improvisation entails an overlap of the planning and execution of a specific action (Pavlou and El Sawy 2010), and the greater the extent of overlap, the more improvisational the action is deemed to be (Cunha et al. 1999; Moorman and Miner 1998). As opposed to the activation of a pre-mediated or standardized routine (Bergh and Lim 2008), improvisation is depicted as an activity that is spontaneous, free-form and enacted in the moment (Crossan et al. 2005) for the purpose of seizing an unexpected opportunity or resolving an emergent problem (Weick 1996).

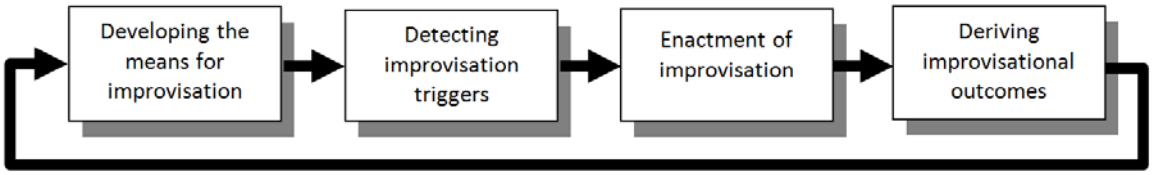
Second, organizational improvisation relates to acting or making quick decisions under uncertainty (Brown and Eisenhardt 1995; Vera and Crossan 2005), requiring managers to draw from organizational memory, experience or intuition (Crossan 1998; Moorman and Miner 1998) to recombine and apply organizational routines and knowledge in creative ways (Miner et al. 2001). Third, improvisation tends to involve actions and decisions that are rarely replicated, deviate from standard practices, and are tailored to a specific context

(Baker and Nelson 2005). Taking into account these characteristics, organizational improvisation is defined in our study as the material and temporal convergence of design and execution (Miner et al. 2001),*"drawing on available cognitive, affective, social and material resources"* (Kamoche et al. 2003) to address context-specific problems or seizing emergent opportunities (Baker and Nelson 2005; Weick 1996).

2.5.1 The Process of Organizational Improvisation

Although we did not find a process theory of organizational improvisation in our literature review, from the cumulative body of research, the process of organizational improvisation can be inferred to consist of four major steps (refer to Figure 7). More specifically, to improvise at the organizational level, a firm must (1) develop the means to improvise (e.g. Kamoche et al. 2003), (2) detect and interpret triggers of improvisation (e.g. Crossan 1998), (3) enact the process of improvisation (e.g. Moorman and Miner 1998), and finally, (4) reap the outcome (e.g. Vera and Crossan 2004). We discuss each of these steps in turn.

Figure 2: Generic Process of Organizational Improvisation



In the first step of the process, the focal firm must already possess or develop the means for organizational improvisation. It is a well-known adage that improvisation must derive from *'something'*, and does not simply *"materialize out of thin air"* (Weick 1998). The *'something'* from which improvisation derives, in turn, consists of 2 components: the ability to improvise and the motivation to do so (Kamoche et al. 2003). The ability to

improvise comes from what is conceived as a *'minimal structure'* (see Eisenberg 1990), defined as the shared knowledge within a collective that enables members to depart from conventional practices when acting in concert (Brown and Duguid 1991). The minimal structure represents the fundamental conditions that must be satisfied for improvisation to occur and can be further decomposed into (1) a social structure pertaining to behavioral norms, communications, and teamwork skills, and (2) a technical structure that relates to the task-related expertise, creativity and knowledge required for effective improvisation (Crossan et al. 2005; Kamoche et al. 2003). However, the ability to improvise is insufficient to ensure improvisation; the motivation to do so must also be present, which stems from the *"deliberate choice of improvisation as an action strategy and a culture that rewards experimentation and treats mistakes as learning opportunities"* (Kamoche et al. 2003).

After an organization has developed the means for improvisation, the next step in the process entails sensing and extracting cues from the external and internal organizational environment that trigger the need for improvising (Crossan 1998). This implies two things: the manifestation of an improvisation trigger in the environment, and the ability to detect it. Although triggers of organizational improvisation can take a wide variety of different forms (e.g. Weick et al. 2005), they can generally be classified as a *"surprising problem"* (i.e. a negative trigger) or an *"unexpected opportunity"* (i.e. a positive trigger) (Miner et al. 2001). The detection of these triggers however, depends on intuition (Crossan 1998), the alertness of the organization (Sambamurthy et al. 2003), and its interactions with key stakeholders within the organization and in the external environment (Baker et al. 2003; Vera and Crossan 2005), all conditioned by the ability

and motivation to improvise that were developed previously (Moorman and Miner 1998; Weick 1998).

Following the detection of a trigger for improvisation, the next step of the process is the execution of the actual act of improvising (Crossan 1998). In general, this step can be enacted through two different means: (1) Bricolage, defined as the act of making do by applying combinations of the resources at hand to new problems and opportunities (Ciborra 1996b), and (2) capability development (also known as resource seeking), which refers to the attempt to acquire externally the appropriate levels and types of resources that are required for improvisation (Baker and Nelson 2005). The two means can be conceptualized as opposing ends on a continuum and in reality, organizational improvisation usually involves a combination of both (Miner et al. 2001; Moorman and Miner 1998). However, an overdependence on bricolage as the means of improvisation tends to result in a mutually reinforcing pattern which, although it enables a firm to survive and function with minimal level of resources, isolates the firm from new environmental opportunities and inhibits learning, as well as the development of objectives and routines that may lead to greater growth and profitability (Baker and Nelson 2005; Miner et al. 2001). Conversely, the selective use of bricolage is advocated as the firm will be able create unique value and develop the capabilities that enable growth and the seizing of new opportunities, while being able to avoid *"becoming constrained by the demands of embedded ties and an organizational identity defined by bricolage"* (Baker and Nelson 2005).

The final step of organizational improvisation is the derivation of improvisational outcomes. Organizational improvisation can be a powerful enabler of operational agility

through two distinct mechanisms. First, improvisation facilitates innovation as creativity is an inherent attribute of any process that may be considered improvisational (Crossan et al. 2005). Second, improvisation enhances the responsiveness and adaptability of a firm as the process is spontaneous by definition, and *"if time is a competitive advantage, then people gain speed if they do more things spontaneously without lengthy prior planning exercises"* (Weick 1998). However, recent studies have shown that improvisation may give rise to a number of negative outcomes as well. To avoid potential negative outcomes such as inconsistency and coordination problems in a tightly-coupled system, as well as the inhibition of long-term learning, adaptability and growth, prior research suggests the need to be mindful of the nature of improvisation, the context in which improvisation is enacted, and the alignment of improvisation with the broader strategic objectives of the firm (Baker and Nelson 2005; Miner et al. 2001). Finally, the organization's ability and motivation to improvise tends to grow iteratively with each successive enactment of improvisation (as denoted by the feedback loop in Figure 7). This is because the ability to improvise improves with practice (Vera and Crossan 2005), and each successive iteration enhances the organizational memory, expertise, coordination skills and communication capabilities that form the fundamental building blocks of improvisation (Crossan et al. 2005; Moorman and Miner 1998). Moreover, improvisation creates flexibility, learning and a *"feeling of transcendence"* (Kamoche et al. 2003) that enhances the motivation to improvise.

Overall, the literature on organizational improvisation suggests that improvisation may be a possible mechanism for attaining agility in IT deployment, and consequently, operational agility due to its ability to facilitate innovations and enhance the adaptability

and responsiveness of the firm (Crossan et al. 2005; Pavlou and El Sawy 2010). The process of improvisation in IT deployment, in turn, may unfold in a similar sequence of steps (e.g. Adrot and Robey 2008), which, according to prior research on organizational improvisation, include (1) developing the means to improvise, (2) detecting and interpreting triggers of improvisation, (3) enacting improvisation, and finally, (4) deriving the outcome. Applying this body of knowledge as a theoretical lens to analyze the case of CCP (refer to Section 4.3), a process model depicting how the organizational capability for improvisation in IT deployment can be developed, leveraged for operational agility and routinized for repeated application is inductively derived (refer to Section 5.3) to address the third research question set forth at the beginning of this thesis.

CHAPTER 3: RESEARCH METHOD

3.1 Research Method Selection

The research for this thesis was conducted using the case research method. As compared to quantitative research, which emphasizes the measurement and analysis of variables and focuses on establishing causal relationships among theoretical constructs (Denzin and Lincoln 2000), case research is a form of qualitative research that emphasizes language (as opposed to numbers), subjective interpretations, and the contextual setting of a phenomenon of interest (Maxwell 1996). Over the years, the prevalence of case research in the IS discipline has grown (Mingers 2003) to the point where its validity as a research method is now rarely, if ever, questioned (Lee and Hubona 2009). Although case research can be descriptive, exploratory or explanatory in nature (Dube and Pare 2003; Yin 2003), the research conducted as part of this thesis fall into the category of exploratory case research. In general, exploratory case research that seeks the inductive derivation of theories is the most common and widely-accepted form of case research (Eisenhardt and Graebner 2007) because it plays to the inherent richness of case data (Miles and Huberman 1994).

Case research is particularly appropriate for this study as its strengths are well aligned with our research objectives (refer to Table 10). First, case research is particularly useful for examining processes (Gephart 2004; Orlikowski and Baroudi 1991), and our study seeks to understand the processes of developing and leveraging VCs, DBEs and the capability for agile IT deployment for the attainment of enterprise agility. Second, case research is well-suited for studying emerging phenomena and as pointed out in our literature review, IT-enabled enterprise agility is a relatively new research area in the IS

discipline (Overby et al. 2006) and there is currently little research on how the three types of agility that constitute enterprise agility may be achieved through the use of IT. Third, case research is particularly appropriate where an objective approach to research is difficult (Klein and Myers 1999), and we note that in light of the complex, multi-faceted nature of our phenomena of interest, this is indeed the case in the context of our study. Finally, case research is particularly appropriate for addressing *"how"* and *"why"* research questions (Walsham 1995; Yin 2003), and we note that all of our research questions are *"how"* research questions.

3.2 Philosophical Underpinnings

Before delving into the specifics of our research method, we would like to clarify the underlying philosophy of science that underpins our approach. Our epistemological and ontological beliefs are neither aligned with orthodox positivism (e.g. Yin 2003) nor mainstream interpretivism (e.g. Walsham 1995). Instead, they are aligned with the realist position (For a review, see Tsang and Kwan 1999) that straddles the middle ground between the two polar extremes (Mingers 2004). At this point in time, we will not distinguish between the different forms (i.e. naïve, scientific, and critical) of realism (see Madill et al. 2000) because resolving the undue controversy that such an act will inevitably invite is beyond the scope of the present thesis. But in any case, all variants of realism are unified in their ontological stand, which assumes the existence of an ordered, mind-independent reality (Fay 1996) consisting of separate domains that may or may not be observed and experienced (Mingers 2004). We would also like to point out here that many case researchers share our philosophical position whether they are aware of it or otherwise (van Maanen et al. 2007). Kirsch (2004), for example, noted that the explicitly

positivist Eisenhardt (1989) draws heavily from interpretive approaches, while it is equally apparent that a number of interpretivist researchers have strayed from the pure constructivist position of classic interpretivism (e.g. Strauss and Corbin 1998; Walsham 1995).

Table 10: Fit Between Case Research Method and the Purpose of Our Study

Our Study…	Strengths of Case Research
Seeks to understand the **process** of developing and leveraging a VC for customer agility Seeks to understand the **process** of developing and leveraging a DBE for partnering agility Seeks to understand the **process** of developing and leveraging the capability for agile IT deployment for operational agility	• Well-suited for investigating phenomena from a **process** perspective (Gephart 2004) • Particularly useful for examining **processes** (Orlikowski and Baroudi 1991)
Seeks to contribute to the **emerging research area** on IT-enabled enterprise agility (Overby et al. 2006) by examining how customer, partnering and operational agility may be achieved through the use of IT	• Provides richer analysis and enables the identification of **new issues** (Myers 1997; Walsham 1995) • Well-suited for **exploring** organizational aspects that have not yet been systematized and brought under the control of rationalized logic (Schultze and Leidner 2002)
Centers on the three forms of enterprise agility, VCs, DBEs, and agility in IT deployment; all **complex, multi-faceted phenomena** that are **inextricable from their organizational context** that are **difficult to quantify**	• Particularly useful **when an objective approach to research is difficult** as case research enables researchers to examine the phenomenon by interpreting the shared understanding of the relevant stakeholders (Klein and Myers 1999).
Seeks to address ***"how"*** **research questions**	• Well suited for addressing ***"how"*** and ***"why"*** research questions (Walsham 1995; Yin 2003)

More importantly, because realism differentiates between the domains of reality that can be observed (i.e. the empirical) and those that cannot (i.e. the actual) (Blaikie 1991), it implies that positivist methods can be used to access the observable (Madill et al. 2000), while interpretivist methods can be used to gain insights into the unobservable (Walsham 2006). What this ultimately means is that although our philosophical position is motivated by our ontological beliefs, it does confer the benefit of being able to pick and choose from positivist and interpretivist case research methodologies to create a trans-paradigmatic, best-of-breed approach to case research (Mingers 2004). In turn, we contend that our best-of-breed approach can potentially combine the strengths and mitigate the weaknesses of conventional positivist and interpretivist approaches to create advantages along four distinct dimensions (refer to Table 11).

First, our approach combines the interpretivist emphasis on creativity with the positivist emphasis on knowledge accumulation to enable Accumulated Innovation by constraining creativity within a theoretical *"scaffold"* (Orlikowski 2006). Second, our research approach combines the focus of positivist approaches with the interpretivist emphasis on the contextual settings to generate Rich Points: Pointed conclusions that are substantiated with rich contextual evidence. Third, our approach marries the structure of positivist case research approaches with the pragmatism of interpretivist case research approaches to create a Pragmatic Structure that will enable a flexible but systematic approach to case research. Finally, our approach combines the interpretivist emphasis on unique circumstances and subjective meanings (Klein and Myers 1999) with the positivist emphasis on external validity (Yin 2003) for Theoretical Replicability (Tsang and Kwan 1999), by seeking to generalize to, and extend theory with context-specific findings

(Baskerville et al. 2005). The description of our approach in the following sections will clarify how these advantages are realized.

Table 11: Comparing our Research Approach with Conventional Positivist and Interpretivist Approaches

Dimension	Positivist/ Empiricist	Our Research Approach	Interpretivist/ Constructivist
Knowledge Creation	Emphasizes the accumulation of knowledge but reliance on prior theories (see Dube and Pare 2003) may inhibit conceptual innovations (Kirsch 2004)	**Accumulated Innovation:** Aims at creativity within a theoretical *"scaffold"* (Orlikowski 2006)	Emphasizes creativity but emphasis on beginning with a clean theoretical slate (Glaser 1992) discourages knowledge accumulation[1]
Nature of Conclusions	Focused conclusions (e.g. propositions) but the lack of attention on the contextual settings stifles the inherent richness of case research (e.g. Broadbent and Weill 1993)	**Rich Points:** Seeks pointed conclusions substantiated with rich contextual evidence	Rich conclusions that account for the complexity of contextual settings but conclusions drawn tend to be less focused (e.g. Walsham and Sahay 1999)
Level of Abstraction	Specific and systematic approach but emphasis on reliability and validity (Yin 2003) creates prescriptions that may be overly idealized	**Pragmatic Structure:** Emphasize pragmatism within a structured research approach	Practical but abstract nature of approach results in prescriptions that are difficult to evaluate or reproduce (Walsham 2006)[2]
Generalizability	Findings aim at external validity (Yin 2003) but tend to be constrained by existing theories (e.g. Sambamurthy and Zmud 1999)	**Theoretical Replicability:** Seeks theoretical generalization (Lee and Baskerville 2003) while seeking to extend theories (Tsang and Kwan 1999)	Emphasis on documenting unique circumstances and subjective meanings (Klein and Myers 1999) tends to result in findings that are idiosyncratic and non-generalizable

[1]Like a number of scholars before us (e.g. Suddaby 2006), we view Glaserian grounded theory as an interpretive process

[2]For example, Walsham (2006) stated that "I believe that the researcher's best tool for analysis is his or her own mind…"

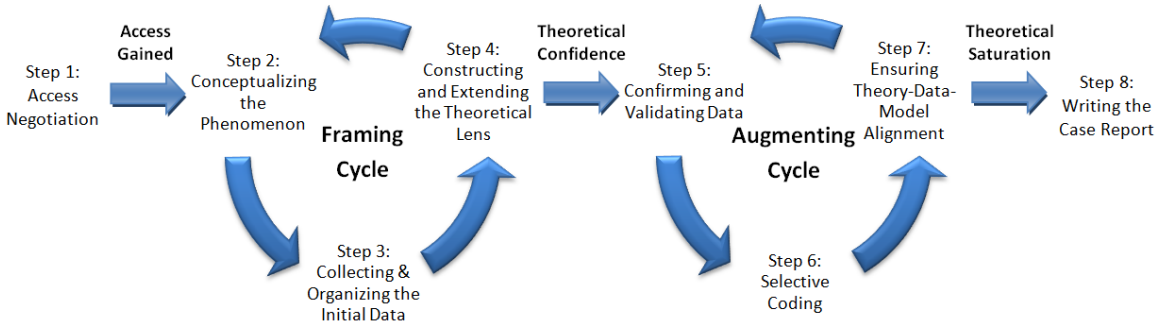
3.3 Overview of Research Method

The best-of-breed case research method adopted for this thesis is termed the Structured-Pragmatic-Situational (SPS) approach. This is for a number of reasons. First, the approach is structured in that it conceptually divides the process of conducting case research into a number of systematic steps that are specific, detailed and can be easily replicated. Second, the approach is pragmatic in that it is infused with techniques and workarounds to simplify and ensure the viability of its prescriptions that does not sacrifice the rigor required of an academic study. Third, the approach is situational in that it facilitates flexibility and adaptiveness by incorporating techniques that enable researchers to detect and respond to contingencies and the emergence of surprising case data.

The SPS approach to case research consists of eight steps (refer to Figure 8) and begins with access negotiation. After access to an appropriate case organization is gained, the process enters what we term the 'Framing Cycle'. The Framing Cycle begins with the gathering of background information on the case organization and the phenomenon of interest (Strauss and Corbin 1998), as well as a review of potentially relevant theories (Walsham 2006) so as to construct a mental concept of the phenomenon before the commencement of data collection. Based on this mental concept, an overview interview (e.g. Hallen and Eisenhardt 2008) is conducted to validate the researcher's perspective of the phenomenon under study, and the initial data are organized and structured to facilitate a preliminary stage of theorizing. The result of this preliminary stage of theorizing is the construction of a theoretical lens using the constructs and propositions from an appropriate theory that is meant as a *"sensitizing device"* (Klein and Myers 1999) to

guide subsequent data collection and analysis. Based on the theoretical lens, the mental concept of the phenomenon is refined and more data are collected. The additional data are then iteratively used to extend the theoretical lens into a more extensive theoretical scaffold (Orlikowski 2006); which represents the initial, skeletal form of the eventual theoretical model, as the Framing Cycle continues until the state of what we term theoretical confidence is reached. Theoretical confidence is defined as the stage where the researcher is sufficiently confident that the theoretical scaffold, when fleshed out with the subsequent case data, is both an accurate representation of the empirical reality, and can make an adequate contribution to both theory and practice.

Figure 3: A Structured-Pragmatic-Situational Approach to Conducting Case Research



Following the Framing Cycle, the process enters what we term the 'Augmenting Cycle'. The Augmenting Cycle begins with the collection of additional data with the aim of obtaining corroborating evidence that transforms the previously constructed theoretical scaffold into a full-fledged theoretical model. The earlier data, as well as each piece of additional data, are then systematically coded, organized and examined using a number of strategies for qualitative data analysis (Langley 1999). The emergent model is then validated by ensuring that it is congruent with both the empirical data and the existing literature (Klein and Myers 1999). Following this, the emergent model is validated with

the informants (Neuman 2005) and additional data are collected and coded. This process of iterating between the emergent model, existing theories and data (Eisenhardt 1989) continues until the point of theoretical saturation (Glaser and Strauss 1967) is reached, where the inductively derived model can comprehensively account for the case data and no additional data can be collected and included to improve the derived model. Finally, following the Augmenting Cycle, the SPS approach concludes with the writing of the case report. The following stream of reporting will now discuss each step of the SPS approach in greater detail.

3.3.1 Step 1: Access Negotiation

The predominant school of thought with regards to the initiation of case research is that the researcher should begin by formulating a comprehensive research design (Yin 2003), or at the very least, decide on the research questions (Eisenhardt 1989). This is because by asking the questions of import to a specific literature, the chances of making a significant contribution to both theory and practice is usually higher (Walsham 2006). In our case, we had arrived at our research questions based on a comprehensive review of the literature on IT-enabled enterprise agility. The research questions, in turn, formed the basis for selecting our case organizations (Yin 2003).

Based on our research questions, the case selection criteria for each of our case studies took the form of 2 general conditions. First, the case organization selected in each of the studies must have, of course, successfully developed the IT artifact (i.e. VC or DBE) or capability (i.e. Agility in IT Deployment) in question. Second, the IT artifact or capability should ideally have been effectively developed and leveraged for the respective forms of enterprise agility (i.e. customer, partnering and operational agility) repeatedly, or in a

variety of ways as this allows us to identify a wider range of possibilities for nurturing and leveraging the artifact or capability. In addition, an important benefit of studying how the focal IT artifact or capability is nurtured and leveraged in a number of different ways within a single organization is that the many contextual variables are kept constant, which helps to rule out possible alternative interpretations of the data.

However, instead of screening and selecting out of *"a score or so (20-30) of possible candidates"* (Yin 2003) to find a case organization that best matches our case selection criteria, in the interest of pragmatism, our research began instead with an approach that is best characterized as *"planned opportunism"*(Pettigrew 1990). Planned opportunism means letting research interests, funding strategies and explicit opportunities for network building shape the long-term plan for case selection (i.e. delimiting a set of potential case types out of an infinite array of possibilities). But the decision to approach a specific organization is to be governed by shorter-term parameters that may include *"forethought and intention, chance, opportunism, and environmental preparedness"* (Pettigrew 1990) so that the selection of a specific site becomes an informed choice (with a higher likelihood of being granted access) based on resource and opportunity considerations.

For all of our case studies, we began with a search for interesting cases that would satisfice by meeting our selection criteria. An interesting case could be that of an internationally-renowned organization (e.g. Tan et al. 2009), an extreme case (For a classic example, see Weick 1993), or a difficult to access phenomenon (e.g. Pan et al. 2005). Searching for an interesting case is a more viable starting point because the means of gaining access to an organization that matches a predetermined research criteria perfectly almost always takes the form of unsolicited contact (Yin 2003), which carries a

high probability of rejection. In addition, another advantage of having an interesting case is that it is easier to generate interest. Siggelkow's (2007) analogy of a talking pig supports this view. A talking pig may have little theoretical or practical relevance but if there was a case study of a talking pig, imagine the interest it will stir! He argues further that *"it is much harder to make a paper interesting whose findings or conclusions only address theory. A paper should allow a reader to see the world, and not just the literature, in a new way"* (Siggelkow 2007, p.23). As such, we believe that a case that is highly interesting (e.g. a case study of Google.com) tends to be more attractive to potential readers as compared to one that is not (e.g. a case study of XYZ.com – a pseudonym).

After creating a shortlist of potential interesting cases, we examined the possibility of gaining access to each of the organizations. Based on our experience, the most effective means of gaining access is to seek the endorsement of an influential benefactor, who could be a friend, a family member, an alumnus, an executive student, or an invited speaker. In the case of HWZ, we were granted access by its founder and General Manager, who was an alumnus of the National University of Singapore. In the context of the second and third case studies where both case organizations were based outside of Singapore, we were helped by local collaborators with ready access. The case of HWZ; an e-business in the IT publications industry that sponsors the largest VC in Singapore, is particularly appropriate for addressing our first research question as its VC was used to facilitate a variety of business strategies that transformed HWZ from a humble e-commerce startup to the dominant market leader within a short span of six years. On the other hand, the case of Alibaba.com, a B2B e-commerce portal that hosts one of the

largest, most diverse and vibrant DBEs in the world is well-suited for addressing our second research question as a variety of different means were used to facilitate the growth of its ecosystem and consequently, the attainment of partnering agility. Finally, the case of CCP, a large petrochemical firm in Taiwan with a storied history for agile IT deployment, is particularly appropriate for addressing our third research question as a variety of means were adopted to develop, renew and leverage its IT deployment capability for operational agility over time.

The process of access negotiation, in itself, was relatively straightforward. Good social skills were important (Walsham 2006), but beyond that, we sought to define clearly the objectives of the case study, the resources required (in terms of the number of interviews and possible secondary sources of data), and to introduce the investigators that will be participating in data collection (Yin 2003) during the first access meeting. Although access was granted based on goodwill, we found it useful to offer to share our findings with all the case organizations as the act of reciprocity encourages them to grant us access to a wider range of informants and corporate materials. More importantly, we sought to identify an influential gatekeeper to assist with making the relevant introductions, refer informants that possess the required information, and scheduling the interviews. At HWZ, Alibaba and CCP the gatekeepers were the General Manager, the Vice-President of Research and Training, and the manager of the IT department respectively. Whenever possible, we also tried to schedule the interviews at the convenience of the informants so as to minimize disruptions to the informants' routines.

3.3.2 Step 2: Conceptualizing the Phenomenon

Once access has been gained, we began to turn our attention to preparing for data collection by developing a mental concept of the phenomenon. This was done at two levels. First, we turned to *"non-technical literature"* (Strauss and Corbin 1998) such as mass-market books, biographies, letters, newspapers, electronic articles, or even the oft-vilified Wikipedia, to gather important background information about both the focal organization and the phenomenon under study. The information gleaned from these sources helped to enhance our sensitivity towards the unique aspects and pertinent issues of the phenomenon or organization under study, provided us with an idea of what to expect during data collection, and served as the basis for formulating the questions for the initial interviews (Darke et al. 1998). Our efforts at gathering background information about the organization and the phenomenon were fairly extensive prior to data collection. This is because the information provided us with an early opportunity to verify or modify our preconceptions of both the case and the phenomenon. Moreover, as case researchers may often find while in the field that the phenomenon of interest is not what they imagined it to be (Meyer 2001), the information would enable us to switch to a new research topic immediately if contingencies arise (Eisenhardt 1989) so that the opportunity for access will not be put to waste.

Second, based on the insights gained on the organizational context and the phenomenon of interest, we began to *"read widely on different theories"* (Walsham 2006) so as to identify a number of candidate theories whose constructs and propositions are pertinent to the issues and aspects of the phenomenon under study. While there is some controversy with regards to the conduct of a review of prior theories before data collection (Halaweh

et al. 2008), like a number of other qualitative researchers, we are of the view that the ideal of a clean theoretical slate (Glaser and Strauss 1967) is impossible (Eisenhardt 1989). We believe that the human mind is flexible and independent enough to read about theories without being trapped in them (Walsham 1995), and more importantly, familiarity with theories can enhance the researcher's *"sensitivity towards subtle nuances in data"* (Strauss and Corbin 1998) and serve as *"a complicated sensing device to register a complicated set of events"* (Weick 2007) that a case study invariably is. Nevertheless, over the course of the study, we were constantly reflecting and evaluating if our theoretical preconceptions were leading us to conjure (Strauss and Corbin 1998), or inhibit the acceptance of emergent data (Walsham 1995). A rule of thumb that we adhered strictly to is that if the emergent theoretical model feels detached from reality, or if the process of theory building feels *'forced'* at any time, we would take pause from theory development and validate the emergent theoretical model with our gatekeeper and the relevant informants (Klein and Myers 1999).

In all of our case studies, after access was negotiated, we began preparing for data collection by gathering secondary data that would provide us with background information on each organization. The sources of secondary data include a number of Internet and newspaper articles, as well as internal publications provided by our gatekeepers. At both Alibaba and CCP, the secondary materials also included a number of teaching cases that were predominantly written in Chinese, and books documenting the strategies and IT initiatives of the organizations. There were plenty of these books available on the mass market for Alibaba in particular as the organization is one of the largest and most successful B2B portals in the world, as well as the source of much

national pride. Based on the secondary data, we were able to construct a chronological timeline of the key business initiatives launched by the case organizations over the years, which led to a number of key insights.

At HWZ, we realized that its VC was leveraged for organizational value creation in an increasing variety of ways over time. Before the dotcom crisis (1998-1999), its VC was instrumental in helping HWZ identify and occupy an attractive competitive position despite market saturation. During and in the immediate aftermath of the dotcom crisis (2000-2004), its VC enabled HWZ to defend its competitive position from imitation and rapidly develop a series of innovations that were in line with its members' needs. After the dotcom crisis (2005-2008), its VC was not only crucial to helping the organization identify and capture attractive competitive positions in a number of new markets, and shaping the content and features of its new offerings, but the VC was leveraged as a strategic resource to generate awareness and demand for their new offerings as well. Accordingly, we began to review the literatures on competitive strategy (e.g. Porter 1980), the resource-based theory (e.g. Helfat 2003), social capital (e.g. Nahapiet and Ghoshal 1998), and organizational innovation (e.g. Damanpour and Gopalakrishnan 1998).

At Alibaba, we realized that the strategic objectives of the organization were distinct across three temporal phases. In the first phase (1999-2004), its strategies appeared to be centered on leveraging firm-specific capabilities and its intimate knowledge of the Chinese Small and Medium Enterprise (SME) market. In the second phase (2005-2006), its strategies appeared to be focused on relentless innovation and capability development.

Finally, in the third phase (2007-2009), its strategies appeared to be centered on developing the capabilities of the members of its trading platform.

This insight, in turn, led to the review of a number of different literatures. As the strategies of the first phase appeared to echo the prescriptions of the Resource-Based View (RBV) of the firm (Barney 1991) and the Dynamic Capabilities Approach (Teece et al. 1997), we reviewed the literature on those theories. Similarly, we found traces of the prescriptions of the theories on Hypercompetition (D'Aveni 1994) and IT-enabled enterprise agility (Sambamurthy et al. 2003) in phase 2, and those of the Complexity theory (Brown and Eisenhardt 1997) and the literature on Business Ecosystems (Iansiti and Levien 2004a) in phase 3. Consequently, our attention was directed to the relevant literatures accordingly.

At CCP, we realized that the organization's agility in IT deployment stemmed from its ability to recombine its existing resources and capabilities rapidly with resources and capabilities acquired from the external environment. This ability in turn, was manifested repeatedly across three major phases of systems implementation over a nine year timeframe. Accordingly, we began to review the literatures on resource management (e.g. Sirmon et al. 2007), absorptive capacity (e.g. Zahra and George 2002), combinative capabilities (e.g. van den Bosch et al. 1999), and organizational improvisation (e.g. Miner et al. 2001).

While not all of the reviewed theories were useful in the end, by the end of this step, we had a clear mental concept of the phenomenon under study at each organization, we were

keenly aware of the potential theoretical constructs and propositions of interest, and we were ready to begin data collection.

3.3.3 Step 3: Collecting and Organizing the Initial Data

Interviews typically form the primary source of data for case research because they provide the case researcher, who is external to the organization, with access to the views and interpretations of the informants (Walsham 1995). However, in each of the case studies conducted as part of this thesis, the focus of the initial interviews and that of the latter interviews were very different. The first interview, in particular, was conducted with an informant who could provide an overview of the phenomenon under study. This allowed us to validate and, if necessary, modify our mental concept of the phenomenon at the earliest available opportunity.

While the first informant did not need to have detailed knowledge of all aspects of the phenomenon under study, we sought an informant with a good idea of who we could interview subsequently to obtain the required pieces of information. Subsequent informants were then identified through this form of *"snowball"* or *"chain referral"* sampling (Biernacki and Waldorf 1981). We would like to make the point here that snowball sampling is probably the only feasible means of identifying informants in case research because a case researcher rarely has enough inside information to identify the right informants independently. However, as the informants were not selected objectively, we had to be sensitive to *"possible 'biases' and systematic 'distortions'"* (Klein and Myers 1999) in the accounts provided by the informants.

Immediately after the initial interview, we would turn our attention to organizing the data so as to prepare for subsequent analyses and theory building in each of the case studies. Our strategy for organizing our data was dependent on the 'general shape' of the data collected. At HWZ and Alibaba, the data appeared to be anchored on a process that was evolutionary in nature (i.e. the transformation of the means of nurturing and leveraging a VC or a DBE over time). As such, we adopted a temporal bracketing strategy to conceptually distinguish between the various phases of evolution, and a visual mapping strategy (For a review, refer to Langley 1999) to construct a chronological timeline of the key events, activities and decisions that transpired at the focal organization with regards to the phenomenon of interest (For an illustration of the visual mapping strategy, see Pan et al. 2009). The timeline served to clarify the delineation between the different evolutionary phases and provide a clear overall picture of the evolutionary process under study. This was especially useful in the case of Alibaba where multiple investigators were involved, and made it easier for us to clarify our interpretation of what happened with the study's informants (Klein and Myers 1999).

On the other hand, the data appeared to be centered on the repeated enactment of the same organizational capability over time at CCP. Consequently, we organized the data from this case study through *"open coding"* (Strauss and Corbin 1998) in which the data were broken down into conceptual categories (Walsham 2006). The pieces of categorized data were then examined, compared for similarities and differences, and organized into the themes (For a review, refer to Strauss and Corbin 1998).

3.3.4 Step 4: Constructing and Extending the Theoretical Lens

Following the initial collection and organization of data in each of the case studies, we were ready to embark on a preliminary stage of theory building. Although we could have waited to collect more data so that we would have more empirical materials to work with, commencing the process of theory building at this early stage was a conscious decision as we wanted to take full advantage of the flexibility that the case research method affords (Eisenhardt 1989).

Theory building begins with the selection of an appropriate guiding theory (Walsham 1995). While the choice of theory is a subjective one, we tried to choose one that is at the appropriate level of analysis (Yin 2003), insightful (Walsham 2006), and whose concepts and propositions represent a close fit with the empirical reality (Eisenhardt 1989). From a pragmatic standpoint, we also tried to avoid theories that are (1) dated, as it may be perceived to be no longer relevant, (2) immature, as the theory will not provide a strong theoretical foundation for building new theories, (3) overused, as it makes it difficult to justify a contribution, or (4) overly practitioner-oriented, as it may be difficult to translate to the academic vernacular.

After a guiding theory was selected, the next step consisted of breaking down the selected theory into its component constructs and propositions to create a set of categories. This set of categories formed the theoretical lens, which would subsequently be used to guide latter iterations of data collection and analysis (Klein and Myers 1999). A theoretical lens may be thought of as an incomplete data table. To illustrate using a simplified example, if we select the RBV (Barney 1991) as our guiding theory, then based on its fundamental proposition that firm-specific resources and capabilities lead to the attainment of

competitive advantage, the proposition itself, as well as the component constructs 'firm-specific capabilities' and 'competitive advantage', will form the categories of our theoretical lens (refer to Table 12). The constructed theoretical lens can then be used to guide the next iteration of the Framing Cycle: The identified categories can be used to indicate theoretical constructs and propositions of interest to refine our mental concept of the phenomenon (Step 2), and used as the basis for formulating the questions for subsequent interviews (Strauss and Corbin 1998). It could also be used to organize our data (Step 3), which, to reuse our earlier example, is akin to filling out the incomplete table with empirical evidence that substantiates the conceptual categories (refer to Table 12).

Table 12: Example of a Theoretical Lens Constructed from the RBV

Category	Corroborating Evidence
1. Firm-specific capabilities	
2. Competitive advantage	
3. Firm-specific capabilities lead to the attainment of competitive advantage	

However, it is insufficient to simply complete the table or the study will be reduced to an explanatory case study that validates the original propositions of the selected theory (Yin 2003). Instead, when surprising data that cannot easily fit within the existing schema emerge as they invariably do (Weick 2007), we would extend the theoretical lens by including new categories in the form of new constructs, propositions, or contingent conditions. When this happens, the set of categories is no longer a static, theory-bound 'lens' through which a phenomenon is viewed, but a dynamic, generative *"scaffold"* (Orlikowski 2006) that can be used to support the construction of new theories.

In the HWZ case study, our initial theoretical lens was constructed by infusing Sambamurthy et al.'s framework on IT-enabled enterprise agility (Sambamurthy et al. 2003) with key concepts and propositions from the existing VC literature (refer to Figure 6). Accordingly, we identified an initial set of themes (i.e. VC competence, VC-enabled digital options, customer agility, rapid and effective innovations) and subthemes (e.g. managing content, fostering embeddedness and enhancing interactivity for the VC competence theme) that were potentially significant to the development and leverage of VCs for customer agility. The data obtained from each interview was then organized and coded according to the set of themes (e.g. refer to Tables 14, 15 and 16). More specifically, we focused our attention on data related to the measures undertaken by HWZ to nurture its VC (i.e. VC competence), the state of HWZ's VC and the VC-enabled capabilities developed after the measures have been implemented (i.e. VC-enabled digital options), as well as how HWZ's VC was leveraged in support of its strategic objectives (i.e. customer agility, rapid and effective innovations). However, as findings that challenged the existing schema emerged, we began to modify the initial set of themes incrementally. More specifically, our findings suggested that different VC competencies may drive the development of various VC-enabled digital options along different stages of VC maturity. And as the VC becomes increasingly mature, the number of ways in which it can be leveraged for organizational value creation increases. Consequently, we began to incorporate themes based on the different strategic logics (refer to Table 8) into our emergent process model accordingly (refer to Figure 9).

In the Alibaba case study, our initial theoretical lens was developed based on the literature on business ecosystems (e.g. Pierce 2009). Accordingly, an initial set of themes

(i.e. core firm strategies, ecosystem role, nature of ecosystem development, consequences of ecosystem development) and subthemes (e.g. capability logic, guerrilla logic and complexity logic for the core firm strategies theme) that were potentially pertinent to the development and leverage of DBEs for partnering agility were identified, and the data obtained from each interview was once again organized and coded according to the set of themes (e.g. refer to Tables 17, 18 and 19). However, as findings emerged to suggest that different combinations of core firm strategies and ecosystem roles were producing different developmental outcomes for the focal DBE in three distinct temporal phases, our themes were gradually reorganized according to the different phases accordingly (refer to Figure 10).

In the CCP case study, our initial theoretical lens was constructed based on the literature on organizational improvisation (e.g. Vera and Crossan 2005), which consisted of a number of themes (i.e. developing the means for improvisation, detecting improvisational triggers, iterative cycles of planning and execution, deriving improvisational outcomes) and subthemes (i.e. social structure, technical structure, and motivation to improvise for the developing minimal infrastructures theme) that were potentially important to the development and leverage of the capability for agile IT deployment for operational agility. Once again, we organized and coded the data obtained from each interview according to the schema provided by our theoretical lens (e.g. refer to Tables 20, 21, and 22), and as novel subthemes began to emerge, they were incorporated into the emergent process model accordingly (refer to Figure 11).

In all of our case studies, with successive iterations of the Framing Cycle, each theoretical scaffold was incrementally extended until the point of theoretical confidence

is reached. Theoretical confidence means that the theoretical scaffold has adequately captured the essence of the phenomenon under study (i.e. the included constructs and propositions provide an adequate depiction of the empirical reality). This was ascertained by sketching the constructs and propositions of the theoretical scaffold diagrammatically, and validating the diagram with the relevant informants within each case organization (Neuman 2005). More importantly, we also had to be confident of the contributions of our eventual theoretical model when the scaffold is fully fleshed out. While it is difficult to specify a set of objective evaluation criteria for the contributions of a study, we evaluated the potential contributions of each study on the basis of three questions. First, 'What is my contribution to the literature on the phenomenon?' Second, 'What is my contribution to the literature from which I derived my theoretical lens?' And finally, 'How can a practitioner benefit from the reading of my work?' When we were able to find satisfactory answers to each of these questions, we were ready to enter the Augmenting Cycle of our SPS approach.

3.3.5 Step 5: Confirming and Validating Data

With a structure provided by a validated theoretical scaffold in place, the first step of the Augmenting Cycle of our SPS approach is a relatively straightforward one. At this point, if the conditions of theoretical confidence have been aptly met, it would be reasonable to expect no further radical changes to the set of categories that comprise the theoretical scaffold, and the focus of data collection can turn to (1) gathering the evidence to transform the theoretical scaffold into a full-fledged model, and (2) ensuring the validity of the data collected.

For the first objective, we had to ensure that there is sufficient data. Although sufficiency is most commonly associated with the point of theoretical saturation in many accounts of the case research method (e.g. Eisenhardt 1989; Glaser and Strauss 1967), we would like to add two important caveats. First, although there are no fixed prescriptions for the number of interviews to be conducted for a case study (Patton 2003), it is generally difficult to claim that the state of theoretical saturation has been reached when the number of interviews conducted is very small. The same can be said for the number of unique informants. Although the appropriate number of interviews or unique informants for a case study depends on a number of factors; such as the size of the organization, the phenomenon of interest, as well as the scope and timeframe of the study, we aimed for a minimum of 15 interviews, with minimal repeat informants, in each of our case studies to ensure the representation of *"a variety of voices"* (Myers and Newman 2007). Second, besides having an adequate number of interviews or unique informants, we also tried to ensure that the interview data to be included in the eventual case report does not come from only a small subset of the informants. This is because while certain informants may be particularly informative or effusive, having 'dominant voices' in a case report may expose a case study to criticisms of biased reporting. Accordingly, the number of interviews conducted at the HWZ, Alibaba, and CCP were 24, 28 and 32 respectively (refer to Appendices A-C).

For the second objective, we tried to ensure the completeness and accuracy of our data by adopting a mirroring technique (refer to Myers and Newman 2007) to elicit the informant's *"story"* in their own language. This involves inviting informants to explain the daily aspects of their work before getting them to provide a retrospective account of

the events (relevant to our topic of interest) that have unfolded. The questions asked were open-ended, exploratory in nature, and tailored to the role of the person interviewed (For a sample, refer to Appendices A-C). Each question was designed to be non-leading, yet at the same time non-passive to maintain a balance that allows for both control of the interview and spontaneity (Walsham 1995). All of our face-to-face interviews, which took an average of 90 minutes, were digitally recorded and later transcribed for data analysis. Where face-to-face interviews were not possible due to the geographical distribution of our informants, interviews were conducted via electronic means (e.g. email or instant messaging). Of the interviews conducted at HWZ and Alibaba, 6 and 10 of the interviews were electronically conducted respectively. The email responses and instant messaging logs would be collated after the interview, then coded and textually analyzed in the same way as the transcripts produced from the face-to-face interviews.

In addition, we applied the principles of suspicion and multiple interpretations (see Klein and Myers 1999) to ensure the validity of the data collected. For instance, we tried to ensure that every piece of evidence that we intend to use in the construction of the case study is triangulated by at least two sources of data (Yin 2003). However, if the conflicting interpretations of the same phenomenon can all be corroborated by additional sources, we had to look for an additional data source that can objectively mediate between the conflicting accounts. For example, during our interviews in the HWZ case study, the informants from within the organization and those from its competitors provided two conflicting pictures of HWZ's strategies and performance. Naturally, the first group was inclined towards a more positive view while the second group was inclined towards a more negative view. To resolve the conflict, we conducted interviews

with an informant who was working for an advertising firm and were familiar with the happenings within the IT publications industry. We perceived the information from this to be objective as it stemmed from a neutral source external to the industry in question with no vested interests in supporting either of the conflicting views. This enabled us to make an informed choice about the data we wanted to include (Klein and Myers 1999).

3.3.6 Step 6: Selective Coding

A theoretical scaffold is transformed into a qualified theoretical model when all of its conceptual categories are corroborated and integrated with the case data in a process that some term *"selective coding"* (Strauss and Corbin 1998). In simpler terms, if one was to imagine a theoretical scaffold as an extended, but still incomplete data table (e.g. an extended Table 12 with new constructs and propositions as additional categories), then selective coding can be understood as the process of filling in the table with at least two sources of data (Yin 2003) for every category. While the existing prescriptions for selective coding and the inductive derivation of theories in the literature may range from the scientific (e.g. Miles and Huberman 1994) to the artistic (e.g. Walsham 2006), in our case studies, we adopted a *"middle-of-the-road"* approach that combines the structure of the scientific approaches with the elegant simplicity of the artistic ones.

To begin the process of selective coding, we would first adopt a narrative strategy (Langley 1999). Typically, at this point in time, a sizeable amount of data would have already been collected, and the purpose of the narrative strategy is to condense the voluminous amount of primary and secondary data to a more manageable form so as to avoid *"death by data asphyxiation"* (Pettigrew 1990). The essence of the strategy is to summarize the data collected in the form of a story, but a notable difference between our

approach and the approach advocated by Langley (1999) is that our approach involves a progressive form of story development, with new pieces of information incorporated into the narrative incrementally with each iteration of the Augmenting Cycle. The purpose of the narrative strategy is to help the researcher visualize the order of events that unfolded, as well as to clarify the association between decisions made, activities carried out, and their consequences. Moreover, assuming that the narrative is written well, the entire narrative can be efficiently ported to the eventual case report (as 'case description') with minor changes.

Next, we would also supplement the narrative with plenty of data summary devices like tables and diagrams that are filled with quotes from the interviews conducted (e.g. refer to Tables 14-22). These data summary devices bring about a number of important advantages. First, by capturing the key constructs and propositions of the theoretical scaffold of the study, the devices can serve as a means of organizing thought, even if they are not included in the eventual case report (Pratt 2009). Second, by providing indications on which sections of the scaffold require more data (e.g. with empty data columns), the devices can provide a guide for subsequent data collection. Finally, as compared to the conventional method of presenting interview data in a separate, indented paragraph (e.g. Pan and Leidner 2003), these summary devices provide the means of displaying the supporting evidence concisely, which allows us to present more empirical data within a limited space. With each iteration of selective coding (Strauss and Corbin 1998), the scaffolds move one step closer to becoming full-fledged theoretical models. But with each step of theoretical development, there is a need to ensure theory-data-model alignment (Klein and Myers 1999), which forms the next step of our SPS approach.

3.3.7 Step 7: Ensuring Theory-Data-Model Alignment

After selective coding, we checked the new developments in the emergent models of our case studies for theory-data-model alignment before embarking on the next iteration of the Augmenting Cycle so that we could adapt our subsequent data collection strategy accordingly. As its name suggests, the process of ensuring theory-data-model alignment involves recursively iterating between existing theories, data, and the emergent model (Eisenhardt and Graebner 2007) to ensure that the three dimensions are aligned. In other words, theory-data-model alignment can be conceived to consist of three types of alignment; (1) theory-data alignment, (2) data-model alignment, and (3) theory-model alignment. Ensuring each of the three types of alignment confers the attributes of simplicity, accuracy and generality to the emergent model respectively. These are attributes that characterize an ideal theory (Sutton and Staw 1995; Weick 1979), and we will explain how each of the three types of alignment brings about the corresponding attribute in turn.

The essence of theory-data alignment is best captured by the question 'Can the case data be explained by existing theories?' Given that any theory is inevitably a simplification of a complex reality (Pettigrew 1990; Weick 2007), the purpose of ensuring theory-data alignment is to find a succinct and elegant theoretical explanation for the case data that helps in *"preventing the observer from being dazzled by the full-blown complexity of natural or concrete events."* (Hall et al. 1998). To achieve this, we sought to constantly compare the emergent data with the competing explanations for the data that are proffered by alternative theories (Eisenhardt and Graebner 2007) and, assuming equivalent validity, pick the most pointed explanation. This is important because

constructing a model with parsimonious theoretical arguments has positive implications for its overall comprehensibility (Bacharach 1989) and, from a practical perspective, enhance the probability that it will be picked up, used and cited in future research.

On the other hand, data-model alignment is best represented by the question 'Does the data support the emergent model?' Since an inductively derived model is invariably a product of the researcher's mind (Walsham 2006), the objective of data-model alignment is to ensure that the constructed model is an accurate depiction of empirical reality, which is of course, the basic aim of theory building (Eisenhardt 1989). To check for data-model alignment, we used the data summary devices described in the Step 6 to conduct a 'test of inclusion'; by ensuring that the interview data to be included in the case study corroborate the constructs and propositions of the emergent model. In addition, we re-examined the data that have been left out from the case study in a 'test of exclusion'; by ensuring that the data that have been excluded does not contradict or extend the fundamental arguments of the emergent model.

Finally, the concept of theory-model alignment may be rendered as the question 'Do existing theories support the emergent model?' Given that a theory must be generalizable in order to be useful, and that statistical generalization is impossible from case studies, the alignment between the emergent model and the existing theories in the literature is crucial as it provides a different means of establishing generality (Lee and Baskerville 2003). In particular, if the emergent model, which is essentially a stylized representation of the empirical reality, resonates with previously developed theories, then generality may be claimed on the basis of the logic of replication (see Yin 2003). To ensure theory-model alignment, we sought to systematically decompose the emergent model into a set

of propositions and tried to explain each of the propositions based on the theoretical arguments of prior theories. In order to claim to have generalized from the emergent model to theory (Walsham 1995), we tried to ensure that there were theoretical explanations for all of the propositions of the emergent model, even for the most surprising findings.

After the developments in the emergent model for the present iteration of the Augmenting Cycle have been validated for theory-data-model alignment, we had to decide if the point of theoretical saturation (Eisenhardt 1989) and data sufficiency (refer to Step 5) had been reached. Theoretical saturation and data sufficiency is indicated by significant overlaps in the data collected and difficulties in extending the emergent model in a meaningful way (Strauss and Corbin 1998). When these indications arise in the course of our case studies, we would exit the Augmenting Cycle and move on to the final step of conducting case research: the writing of the case report.

3.3.8 Step 8: Writing the Case Report

In the writing of this thesis, our objective was to present our theoretical arguments in the most coherent and convincing way possible. This of course, necessitated the demonstration of a clear chain of logic (Klein and Myers 1999), and the ability to express oneself clearly.

To establish a clear chain of logic, we adopted a highly structured approach to reporting our research. This is because a structured approach to writing helps to (1) ensure that nothing important is left out, (2) strengthen the linkages between the various sections of the thesis, and (3) enhance the efficiency of writing. Although a number of structures for

writing case research has been described in the literature (For a review, see van de Blonk 2003), we adopted the *"linear-analytic"* (Yin 2003) structure. This is because the linear-analytic structure is not only appropriate for our research purpose, but it is also the most commonly used. Hence, it represents the least controversial option, and there are also plenty of examples in the literature that can serve as references for us. The linear analytic structure consists of six standard sections (Yin 2003): (1) Introduction, (2) Literature Review, (3) Research Methodology, (4) Case Description, (5) Discussion, and (6) Conclusion. Although minor variations exist, a number of components are generally expected in each of the standard sections and we have included them accordingly in this thesis. These components are listed in the following table (refer to Table 13).

While the ability for expressing oneself clearly is often associated with language proficiency, we also tried to enhance our clarity of expression through the liberal use of organizing tables and diagrams. Organizing tables and diagrams may be used in all the sections of a case research paper and can serve to depict methodological procedures, display a chain of evidence, illustrate complex analyses, summarize findings, or explain the process of inductive derivation (Pratt 2009). More importantly, the use of these devices carries two additional advantages. First, it reduces the burden of language as there is no need for elegant and flowing prose. Second, it captures the essential information succinctly, such that potential readers do not have to pore over every line and every word in order to grasp our intention.

Table 13: The Six Standard Sections of a Typical Case Report

Section	Key Components
1. Introduction	• Background of phenomenon • Gaps in the literature (i.e. what has not been studied) • Explanation for why studying the gaps is important (e.g. benefits of addressing gaps, risks of not addressing gaps) • Description of the purpose of the study (e.g. addressing the aforementioned gaps) • Formal statement of research questions (The research questions should correspond to the purpose of the study)
2. Literature Review	• Review of the literature on the phenomenon (This section should begin with a broad overview (e.g. definition of key terms) before gradually narrowing the focus to the specific phenomenon of interest) • Review of the literature on the adopted theoretical lens (i.e. we begin by explaining how our theoretical lenses can help us understand our phenomenon of interest before describing the key propositions of each lens)
3. Research Method	• Justification for using case research method (e.g. especially appropriate for examining complex phenomena (Klein and Myers 1999) and addressing 'how' and 'why' questions (Walsham 1995)) • Case selection criteria (i.e. theoretical justification for choosing the focal case organization) • Details of data collection (e.g. sources of data, number of interviews, format of interviews etc.) • Details of data analysis (e.g. Organization of data, procedures adopted in the inductive derivation of the model etc.)
4. Case Description	• Organizational Background • Account of the key events, decisions and activities that transpired at the focal case organization (This may be arranged in temporal phases if the phenomenon of interest involves the dimension of temporality) • Presentation of primary and secondary data (Data summary devices such as tables and diagrams may be especially useful for presenting large amounts of data within a limited space (Pratt 2009))
5. Discussion	• Description of how the developed model(s) was inductively derived from the data • Explanation of how existing theories corroborate the derived model(s) • Explanation of how the derived model(s) extends or differs from the adopted theoretical lens
6. Conclusion	• Limitations of the study (e.g. Generalizing from case data, use of retrospective data) and suggestions for future research (that addresses the identified limitations) • Theoretical and practical contributions of the study (Describe the contributions of the study to (1) the literature on the phenomenon, (2) the literature on the theoretical lens, and (3) practice)

CHAPTER 4: DESCRIPTION OF CASES

4.1 Hardwarezone.com

4.1.1 Organizational Background

According to a Nielsens/Netratings survey conducted in 2006, HWZ is the most popular technology website in Singapore with an average of 330,000 unique browsers per month (refer to Appendix D). Although the business of HWZ is primarily centered on providing news and information about the latest IT products, HWZ also provides numerous member-centric services such as consolidated price lists of the major IT vendors in Singapore, a classified ads directory to facilitate the trading of IT products online, and an online discussion forum that serves as the basis for its VC. Incidentally, the online classifieds directory and the VC organized by HWZ were also ranked top of their respective categories in the same survey, attracting approximately 165,000 and 200,000 unique visitors per month respectively.

HWZ began as a mere hobby for its founders on a US$650 budget. Yet, within six years of its inception, HWZ attained market leadership in the Singaporean IT publications industry, capturing 29.7 % of the market share in 2004. In comparison, HWZ's closest competitor in the industry only had a 9.9% market share. Since then, HWZ has maintained its firm grip of the industry, winning 17 awards from online traffic tracking agency Hitwise as the top website in the *"Computers and Internet – Hardware"*, *"News and Media – IT media"* and *"Computers and Internet - Social Networking and Forums"* categories to date. More recently, HWZ was named the third most popular website in Singapore and the sixth most popular online media site in Asia, outperforming immensely popular sites such as MSN, Friendster, CNET, Bloomberg and Yahoo. HWZ's

achievements are considerable given that Singapore; with its small domestic market, presents an environment where e-commerce success tends to be the exception rather than norm. The unprecedented success of HWZ prompted the most widely circulated business newspaper in Singapore to compare its two founders with the two founders of Google, heralding HWZ's founders as *"Singapore's very own Google Guys"*.

The initial manifestation of HWZ was a virtual community of interest (COI) hosted under the umbrella of SingaporeOne, a public initiative aimed at promoting e-commerce in Singapore. The COI catered primarily to the needs of a niche community of CPU overclockers, allowing members to post their hardware configurations and overclocking results in an online discussion forum. Although the CPU overclockers community was relatively small, the COI generated such heavy web traffic that it overwhelmed SingaporeOne by taking up 90% of the parent site's total bandwidth within a month of its inception. Unable to cope with the traffic that the COI was generating, the management of SingaporeOne had no choice but to dissolve the community.

Endorsed by the management of SingaporeOne, the founders of HWZ applied for and were eventually awarded a US$13,000 grant by the Infocomm Development Authority of Singapore; a public agency whose mission is to promote and develop the IT industry in Singapore. With this grant, HWZ was founded on August 9, 1998 in a small factory space measuring four by six meters, running on office equipment contributed by friends and family members. At this point in time, HWZ was running on empty; the initial capital was only sufficient for one web server and six months of bandwidth charges.

4.1.2 Developing a Unique Value Proposition (Late 1998 – Late 1999)

In the initial phase, HWZ's efforts in nurturing its VC were centered on generating proprietary content to make up for the lack of breadth and depth in member-contributed content, and enhancing the responsiveness and extent of interactions in their discussion forum by responding to new posts in the timeliest fashion possible. These measures led to the attraction and retention of a core group of members that consisted of the IT enthusiasts from the previous COI that they organized. Yet, although the VC was limited in size at this stage, the VC was able to serve as a platform for HWZ to interact with its members. For HWZ, this platform provided the means for organizational value creation that was crucial for their fledgling business.

At the point of HWZ's market entry, the Singapore IT publications industry was in a state of market saturation. Yet, feedback from members of its nascent VC made the founders of HWZ realize that there was an unmet need in the IT publications industry for a comprehensive and credible provider of free, localized IT content. Based on this revelation, HWZ moved quickly to exploit the opportunity by catering to the unmet need. A positioning strategy; with an emphasis on establishing a unique value proposition, was employed by HWZ during this period. An overview of the measures undertaken by HWZ to nurture its VC, the state of HWZ's VC, the VC-enabled capabilities developed, and the way in which HWZ's VC was leveraged to support its strategic objectives at the point of HWZ's entry into the Singapore IT publications industry is provided in Table 14.

Table 14: The Development and Leverage of HWZ's VC from Late 1998 to Late 1999

Measures undertaken by HWZ to nurture its VC	
Managing content	*"When (HWZs VC) first started, the quality of the (member contributed) content was a problem…There was not much (content) to begin with… and (the content) was lacking in depth and breadth… I would say that most of the product reviews, news and articles came from (HWZ's founders) at the time"* –Pioneering HWZ member A
Enhancing interactivity	*"We were trying to make our forum very responsive… and increase the amount of interactions going on… so we were on the forum all the time… you could see that whenever someone posted something, within 20 minutes, one of us (HWZ's founders) would reply"* – HWZ Co-Founder
State of HWZ's VC	
Nascent stage of development	*"In the beginning, we didn't have many members… it was mainly them (HWZ's founders) and the group of hardcore "techies" who came over from the previous (COI)"* – Pioneering HWZ member A
VC-enabled capabilities developed	
Digitized Knowledge Richness - Medium for interactions and feedback	*" I joined (HWZ's VC) because I can chat with people there who shared the same interests as me…"* – Pioneering HWZ Member B *"The community was an important source of feedback for us… By looking at what they (VC members) were talking about, we were able to get a feel of what they wanted"* – HWZ Senior Executive
How HWZ's VC was leveraged in support of its strategic objectives	
Helped HWZ identify an attractive market position despite the conditions of market saturation	*"The market was very stable… (and) saturated at the time of (HWZ's) entry… There were your traditional offline (printed) magazines (e.g. Chip, PC World, PC Magazine)… there were some local printed (magazines) like Singapore Computer Magazine and Tech… In terms of online (publications), there were foreign IT websites like Tom's Hardware and SharkyExtreme… there was also a local website called Hardwareone"* – IT Publications Industry Insider *"Based on the feedback we were getting (from the VC members), we realized that the foreign publications do not meet their needs because the content is not meant for the local audience. For example, the products reviewed in these publications are often unavailable locally, the prices may be outdated or listed in US dollars. And the main problem with the local IT publications is that although their contents are localized, they are usually not comprehensive because they lacked funding, which comes with credibility and market reach."* – HWZ Co-Founder *"By not charging a subscription fee for our content, we had a cost advantage as compared to printed IT magazines (which can cost up to US$11.00 in Singapore)… We tried to provide a comprehensive coverage of the local IT scene…we established our own labs to generate proprietary content… We wanted to be perceived to be more credible*

	than the local IT websites, and produce high quality content that are comparable to our foreign counterparts... (Yet,) we used local lingoes… we only covered the IT products available in the local market… this made us more relevant and attuned to the taste of the local market as compared to the foreign IT publications…" - HWZ Senior Executive

The unique value proposition established by HWZ allowed the organization to transform itself into an immensely popular technology website that provided the latest reviews, pricing and availability information of IT products in Singapore. By the end of 1999, HWZ was attracting a webpage impression count of over 16 million per month while online advertising revenue had reached US$200,000 per annum. Yet, although HWZ had been a resounding success up to this point in time, new challenges were about to emerge.

4.1.3 Creating New Revenue Streams (Early 2000 – Late 2004)

As HWZ's VC began to grow (official membership for their VC had exceeded 40,000 by early 2000), the management of HWZ began to realize the importance of strengthening and maintaining relationships within the rapidly growing community to enhance the *"stickiness"* of its VC. Consequently, HWZ began to undertake measures aimed at cultivating a sense of belonging and developing a complementary offline presence. Through these measures, HWZ was able to increase participation in the VC and enhance its relationship with its VC members. The increased participation led to the accumulation of information assets within its VC, while the enhanced relationship with its members increased the members' willingness to commit resources, abilities and ideas towards HWZ's cause. Collectively, these factors provided the means for organizational value creation that proved crucial to the survival of HWZ when the conditions in the IT publications industry took a dramatic turn.

The advent of the dotcom crisis in 2000 created an adverse economic climate that plunged the Singapore IT publications industry into a period of great turmoil and uncertainty. As HWZ was a "pure play" dotcom that depended solely on online advertising for revenue, the effects of the dotcom crisis on HWZ were particularly severe. In addition, with the phenomenal success of HWZ, new competitors that sought to imitate HWZ's e-business model were emerging in the industry. Particularly troubling to the HWZ management was the news that several local IT vendors, some of whom used to be HWZ's partners in the past, were now eying its lucrative business.

Faced with new challenges, the management of HWZ realized that the rules of competition in the Singaporean IT publications industry had fundamentally changed, and that HWZ's dependency on online advertising as its sole revenue stream made the organization susceptible to any form of turbulence that affected that particular source of income. Based on these insights, HWZ leveraged the accumulation of information assets within its VC to defend its market position from competitive imitation, and mobilized its members in the development of a series of innovations that include (1) a printed IT magazine, (2) a PC gaming website, (3) a digital photography magazine, and (4) country-specific versions of its website, with the aim of creating new streams of revenue to bring about financial stability to the organization. Table 15 provides a summary of the measures undertaken by HWZ to nurture its VC, the state of HWZ's VC, the VC-enabled capabilities developed, and the different mechanisms through which HWZ's VC facilitated the attainment of its strategic objectives during the dotcom crisis and the immediate years after.

Table 15: The Development and Leverage of HWZ's VC from Early 2000 to Late 2004

Measures undertaken by HWZ to nurture its VC	
Fostering embeddedness	*"We (HWZ's top management)… organized outings and barbecues to get to know our members better… We invited key forum contributors and opinion leaders down to the office for tea and we gave them freebies such as T-shirts… If they (VC members) feel a sense of belonging, they will keep coming back."* HWZ Co-Founder *"They opened a bubble tea outlet (located at one of Singapore's largest IT mall)… to allow (VC members) to gather and chill out before they do their shopping…"* HWZ Member D
State of HWZ's VC	
Formative stage of development	*"The community grew very quickly… although most of the topics were still centered on IT, people started talking about things like (PC) gaming, (gaming) consoles… and mobile phones…"* – HWZ Member B
VC-enabled capabilities developed	
Digitized Knowledge Reach	*"The discussion forum was where I went to get the information I need (sic)… there were reviews of a wide array of IT products…For example, (there were reviews) of the latest graphics cards, motherboards, CPUs… and (articles that made comparisons) between products…"* Pioneering HWZ Member B
Collective Community Action	*"Since this is an IT community, some of our members are really tech experts… (and) they have a lot of interesting ideas… Because we made them feel like they belong, many of them were willing to contribute their ideas and put in the effort to help (HWZ) move forward…"* – HWZ Senior Executive
How HWZ's VC was leveraged in support of its strategic objectives	
Helped HWZ defend its market position	*"As the community grew, the knowledge base accumulates… (which) makes it very hard for our competitors to go after our market (demand for local IT content)… Because we are in the business of providing information, to be able to compete with us, their content will at least have to be as good as ours… and that takes time…"* - HWZ Product Manager
Helped HWZ develop a series of innovations that include (1) a printed magazine, (2) a PC gaming website, (3) a digital photography magazine, and	*"Our members were very receptive when we floated the idea of the (printed) magazine … they (VC members) gave us many ideas on the type of content that would appeal to them…"* HWZ Editor-in-Chief *"A group of us (VC members), we came together and developed the entire (PC gaming) website from scratch without the management's knowledge… We only presented the website to the management when we were done. Luckily, the CEO liked our idea and gave us the go ahead…"* – Pioneering HWZ Member A *"(The digital photography magazine) started as a special interest group on our discussion forum... they were very active and there was a lot of*

(4) country-specific versions of its website	*interest… so we thought: 'can we create something for them?'"* – HWZ Managing Director *"We didn't just translate our existing website into the language spoken in the country (for the country-specific websites). We tailored the features and content of the website according to the local needs… we gathered feedback from the (new regional) members and delivered what they wanted accordingly"* – HWZ Senior Executive

By defending its market position, HWZ managed to safeguard its existing revenue stream from competitors that were emerging in the IT publications industry. In addition, through the innovations developed, new revenue streams were created that brought about increased profitability and financial stability for HWZ. Moreover, the development of country-specific versions of its website and magazines led to a dramatic influx of new VC members from regional countries, which made HWZ more attractive to the advertisers that were crucial to sustaining its business model. By 2004, annual advertising revenue for HWZ from both online and offline channels had surged to an estimated US$2.6million. These factors facilitated HWZ's survival during and in the immediate aftermath of the dotcom crisis.

4.1.4 Diversifying into New Industries (Early 2005 – Present)

By early 2005, official membership figures of HWZ's VC had breached the 200,000 mark. With the growing realization that it was becoming both unfeasible and unnecessary to manage and control the VC directly, the management of HWZ began to adopt measures aimed at formalizing leadership roles and enabling community-directed rules, norms and dialogue within the VC. The aim of these measures was to promote self-governance and community control, which enhanced the ease of management and scalability of HWZ's VC that enabled the attainment of self-sustaining critical mass. For HWZ, the attainment of critical mass transformed its VC into a strategic resource that

they could leverage for new forms of competitive advantage as the Singapore IT publications industry returned to a state of normalcy.

By 2005, the recovery of key industry parameters such as the rates of organizational mortality and the levels of online advertising signaled the end of the dotcom crisis. Following the shakeup in the industry, HWZ had emerged as the dominant market leader, but with the realization that further investments in developing the present market would likely lead to diminishing returns, the management of HWZ began looking to diversify into other industries that offered opportunities for replicating its successful business model. Based on an analysis of the profiles of its members, HWZ identified attractive market positions in a number of diverse industries that led to the launch of (1) an online-offline motoring publication, (2) an online-offline golf publication, and (3) a printed travel magazine. Moreover, in addition to working with its VC to shape the content and features of these innovations, HWZ leveraged its mature VC as a strategic resource to generate awareness and demand for its new offerings An overview of the measures undertaken by HWZ to nurture its VC, the state of HWZ's VC, the VC-enabled capabilities developed, and the ways in which HWZ's VC was leveraged to support the strategic objective of diversification after the dotcom crisis is provided in Table 16.

From the latest financial and performance data obtained, HWZ's strategy of diversifying into radically different industries is shaping up to be the latest in a line of successful strategies that continues to propel the organization forward. By 2007, official membership for HWZ's VC had increased to over 300,000 while HWZ's revenue was estimated at over US$4 million per annum. The strong financial and market performance of HWZ attracted the attention of a number of potential investors, and HWZ was

eventually acquired by Singapore Press Holdings Limited; the leading media organization in Singapore, for US$4.6 million on September 29th 2006.

Table 16: The Development and Leverage of HWZ's VC from Early 2005 to Present

Measures undertaken by HWZ to nurture its VC	
Granting Autonomy	*"I think at this stage (of VC development), the VC has become too big for the management to control (directly)… (In the end,) many of (the opinion leaders) in the forums were given administrative rights… users who contribute to the forum a lot were granted moderator privileges… members were allowed to vote on new sections and topics that they would like to see on the forum… we were empowered to establish our own rules and etiquette…"* – HWZ Forum Moderator
State of HWZ's VC	
Maturity stage of development	*"At this point in time, the community was more or less self-organizing… (and) self-sustaining in that we (HWZ's management) don't have to actively tend to the growth of the community… The topics that they were discussing on the forum grew more and more diverse… our most active section is (the lifestyle section) where people can talk about anything under the sun… we also have sections for… fitness… music, food… education…we even have a section for pets"* – HWZ Chief Content Officer
VC-enabled capabilities developed	
Critical mass	*"The community became an important marketing tool for us… we can use (the VC) to communicate with our target audience directly… Obviously, the bigger (the VC), the more effective it is (as a marketing channel)… (the current VC) size is an advantage because the amount of people that we can reach is a lot more…"* – HWZ Senior Executive
How HWZ's VC was leveraged in support of its strategic objectives	
Helped HWZ identify and occupy attractive market positions in the motoring, golf and travel publications industry	*"We looked at our (membership) database and who did we have? We had (mainly) guys, who are IT professionals, engineers… slightly 'richer' people who can afford to travel, own cars… and are starting to pick up golf… So to cater to their (the primary customer segment's) needs, we launched (an online-offline motoring publication), (an online-offline golf publication)… and (an offline travel magazine)"* – HWZ Managing Director
Helped to shape the content and features included in the new publications	*"We took the suggestions of our members very seriously… (For example,) many of the features on (HWZ's motoring website) like the consolidated price lists, COE (certificate of entitlement) bidding results for each month… (and the) classified ads directory… came about from the feedback that we received from our community members"* – HWZ General Manager
Helped to	*"When they launched their new products, they marketed the products*

generate awareness and demand for their new publications	*aggressively on the (HWZ) forum… There were announcements… hyperlinks… and advertisements… they packaged the subscription for their new products with the existing IT magazine… As someone who is interested in IT as well as cars, I joined (HWZ's motoring website) as well… I think about 60% of existing (HWZ's motoring website) members came from the original HWZ forum"*- HWZ Member C

4.2 Alibaba.com

4.2.1 Organizational Background

According to the latest statistics from the web traffic tracking agency Compete, Alibaba (refer to Appendix E) is one of the world's largest B2B e-commerce portals with over 2.6 million unique visitors per month. Alibaba's business centers on providing a trading platform that connects international buyers to millions of small-medium enterprises (SMEs) in China that supply a kaleidoscopic array of products, ranging from agricultural products to aircraft parts. But since its inception, Alibaba has diversified into a wide range of businesses ranging from a consumer-to-consumer (C2C) online auction website (Taobao), an Internet portal (Yahoo China), an online review website for lifestyle products and services (Koubei), and an online advertising trading platform (Alimama). Incidentally, according to the web traffic tracking agency Alexa, these spin-offs, together with Alibaba, are all among the top 100 most popular websites in China, a considerable achievement that belies Alibaba's humble origins.

The initial manifestation of Alibaba was ChinaPages.com. Launched in April 1995, ChinaPages was a small e-business that provided website development and indexing services to local enterprises. At the time, there were no commercial Internet service providers in China and the general population was unaware of the existence of the Internet. Yet, led by Jack Ma, the iconic founder of ChinaPages and later Alibaba,

ChinaPages was able to convince many Chinese firms of the business potential of the Internet and subsequently, to engage its services. For approximately US$3,000, ChinaPages would translate the corporate and product information of their clients into English and send the translation to collaborators in the US who would develop and launch websites based on the information. And as commercial internet access became available over time, ChinaPages developed the technical capabilities required for website development and eventually, took over the role from their US collaborators as well.

In 1997, ChinaPages was merged with a local competitor but due to differences in strategic vision, Jack Ma and eight members of the core development team left the organization. Because of their experience in e-commerce, they were eventually roped in by the Chinese government to develop ChinaMarket, an e-government portal for global firms to locate products, services and business opportunities in China. It was the experience of managing both ChinaPages and ChinaMarket that led to the realization that China's enormous SME market would benefit immensely from the global exposure afforded by the Internet and back then, there were no B2B platforms that catered exclusively to Chinese SMEs as the costs of joining a B2B platform were prohibitive. With this critical insight, Jack Ma and his core team left ChinaMarket and returned to Hangzhou with the dream of establishing a B2B e-commerce portal that connected the hundreds of thousands of Chinese SMEs to the world. This led to the founding of Alibaba in March 1999 and at the time, Alibaba was operating out of Jack Ma's apartment and the entire development team drew a salary of only US$73 a month. Yet, within a short span of 9 years, Alibaba would become a publicly listed multi-national corporation with over 10,000 employees worldwide and an annual revenue of US$207 million. Alibaba's

vibrant and populous DBE was cited by numerous informants as the primary driver of partnering agility, which in turn, was crucial to its phenomenal success. To illustrate, a senior executive at Alibaba attested to the integral role of its DBE:

"Our ecosystem is the key to our success… We have a close relationship with our (ecosystem) members … we know their needs and we are able to meet their needs quickly and effectively… this strengthens our members and enables them to contribute to the collective good… It is a virtuous cycle. When the ecosystem prospers, everyone (within the ecosystem) prospers…"

Informed by our review of the literature on business ecosystems, we narrowed the focus of our inquiry to three pertinent themes: (1) the antecedents of ecosystem development – manifested in the strategies and ecosystem role of Alibaba (Iansiti and Levien 2004a), (2) the nature of ecosystem development, and (3) the consequences of ecosystem development – centered on the enablement of partnering agility. From the emergent data, it became readily apparent that Alibaba underwent three distinct phases; adopting different strategies and ecosystem roles in each phase that resulted in the attainment of different stages of ecosystem development, with correspondingly distinct implications for partnering agility. Accordingly, we organize the presentation of our data according to the temporal sequence of the phases in the subsections that follow.

4.2.2 Leveraging Firm-Specific Resources and Capabilities (1999-2004)

In the first phase from 1999 to 2004, Alibaba's business objectives were centered on establishing itself as the de facto platform for B2B e-commerce in China. Competitive imitation was rampant in the rapidly developing Chinese e-commerce industry then, and

Alibaba had to act quickly to preempt potential competitors from imitating its business model. Accordingly, Alibaba enacted a number of strategies that were broadly aligned with three strategic thrusts. First, Alibaba took advantage of its unique insight of the unmet needs of Chinese SMEs and structured value creation towards meeting those needs. Second, Alibaba exploited its superior technical capabilities, developed from its experience in operating ChinaPages and ChinaMarket, to differentiate itself from the existing B2B portals in China (e.g. HC360, EasyTrade). Third, Alibaba leveraged its intimate knowledge of local SMEs and incorporated the nuances of Chinese business practices into its transactional processes to differentiate itself from the global B2B portals (e.g. allactiontrade, eceurope, MFGTrade). The collective consequence of these strategic thrusts is a unique value proposition targeted at fulfilling the needs of the immense SME market, which served to attract many Chinese SMEs to join Alibaba's business ecosystem.

In addition, as many of the SMEs lacked the technical capabilities to go online, Alibaba took on the role of a service provider within the ecosystem, helping to collate, organize, publish and promote the corporate and product information of their members on their website. This enabled the SMEs to participate meaningfully in the ecosystem and consequently, benefit from the ubiquitous exposure afforded by the Internet. By providing a unique value proposition and lowering the barriers of participation, Alibaba was able to attract a myriad of SMEs to attain self-sustaining critical mass, and entrench itself at the center of value creation within the DBE. Its centrality in the network, in turn, enhanced Alibaba's ability to sense its members' needs as Alibaba was able to collect feedback directly from the other entities within the ecosystem. Moreover, as Alibaba's

organizational actions were enacted at the center of the network, its actions impacted the entire business ecosystem concurrently, which enabled a quicker response to its members' needs. The key organizational strategies and ecosystem role adopted by Alibaba, the nature of ecosystem development, and the underlying mechanism though ecosystem development facilitated partnering agility in Phase 1 are summarized in Table 17.

Table 17: How Alibaba's Ecosystem was Developed and Leveraged in Phase 1 (1999-2004)

Key Organizational Strategies	
Leverage unique insight of unmet needs in Chinese SME Market	*"We were the first to cater exclusively to the needs of SMEs. As a result, our networking platform, the trust supporting mechanisms we used, and our payment systems were all geared towards meeting the needs of this particular segment. This was what differentiated us from the other B2B platforms in the beginning"* – Vice-President (VP) of Customer Relations
Exploit superior technical capabilities developed from prior experience	*"The experience from managing ChinaPages (and later ChinaMarket) was instrumental to Alibaba's (initial) success. It was here that they picked up the technical skills of website development and learnt what it took to run a B2B e-commerce portal… In terms of technical capabilities, Alibaba's platform was clearly superior to its competitors"* – Industry Analyst
Took advantage of its intimate knowledge of Chinese business practices	*"There were three factors that differentiated us from our foreign competitors. First, we provided tools like 'Wangwang' (an instant messenger system that allowed transacting parties to haggle over prices) and 'Alipay' (an escrow service that helped mitigate the greater mistrust of online transactions among Chinese firms). Second, we provided our services free of charge. Third, our websites were designed to suit to our Chinese culture."* – Senior Manager (Strategic Planning)
Ecosystem Role	
Service Provider	*"Many of our members did not know much about e-commerce. But they had posted their corporate and product information on trade-oriented electronic Bulletin Board Systems (BBS)… We helped to collate, organize and publish the relevant information on our website… we organized the information by product category and provided search functionality to lower the cost of finding the information. Lastly, we helped to create awareness for our members… we went to different websites to promote Alibaba, telling people that business opportunities and all kinds of products from all over the globe can be found on our*

	website…" - General Manager (GM) of Alibaba B2B
Nature of Ecosystem Development	
Development of a self-sustaining DBE with Alibaba at the core	*"We attracted many SMEs as well as individual users. As the number of our ecosystem members increased, so did the variety of products on our website… We were positioned at the center of the ecosystem… the ecosystem was dependent on us for survival for we were the infrastructure providers, and the possibility of sustaining our growth was very good* – Senior Scientist
Consequences of Ecosystem Development	
Enhanced sense-and-response capabilities	*"Our position (at the center of the ecosystem) helps us to effectively sense and respond to the needs of our members. We can obtain feedback directly from our members, and this gives us a good feel of what is happening on the ground… By responding to the feedback and acting at our end, the rest of the ecosystem benefits from our actions as well…"* – GM of Alibaba

4.2.3 Acquiring New Organizational Capabilities (2005-2006)

Having established a firm dominance over the Chinese B2B e-commerce market, Alibaba began to realize that the biggest threat to its business came not from the existing B2B e-commerce portals, but rather from massive Internet portals such as Baidu and Google. This is because global firms looking for products, services and business opportunities from Chinese partners; and vice versa, can potentially find them by searching on these Internet portals, disintermediating Alibaba from the process of transaction. Consequently, Alibaba began to move in a new strategic direction in 2005. The new strategic direction was characterized by the aggressive acquisition of new organizational capabilities in preparation for the inevitable conflict with the Internet portals in the near future.

First, Alibaba acquired search engine capabilities with the acquisition of Yahoo China in October 2005. The strategic intent behind the acquisition is to create a business-oriented search engine and isolate the members of its DBE from Internet portals such as Google or Baidu. To date, most of the information published on the Alibaba network can no longer be accessed by third-party search engines. Second, in October 2006, Alibaba acquired

Koubei.com, one of the most popular online portals for the review of lifestyle products and services, such as restaurants, hair salons, and hotels. Alibaba's management felt that the acquisition of Koubei would strengthen the sense of community within the ecosystem by enabling its members to *"work, spend and play"* on Alibaba, and facilitate greater interaction between ecosystem members by encouraging them to spend more time on the Alibaba network.

In addition, with exponential increases in the size of the ecosystem each year – Alibaba had over 10 million registered members by 2005, and as ecosystem members became more experienced and savvy in the use of Internet technologies, it became neither feasible nor necessary for Alibaba to continue providing "hands-on" services for its ecosystem members. Relinquishing its "hands-on" approach was potentially problematic as Alibaba could run the risk of disintermediation. To mitigate this risk, Alibaba's role in the ecosystem evolved into that of a platform provider, maintaining its value to its ecosystem members by supplying the mechanisms that enable them to exchange information, interact and transact with each other, without having to involve itself directly in these activities.

By acquiring Yahoo China, Alibaba was able to demarcate the boundaries of the DBE and consolidate its position at the center of the ecosystem. In addition, by acquiring Koubei and taking on the backend role of a platform provider, thereby relinquishing direct control over its ecosystem members, Alibaba enabled richer and more frequent interactions between members, which facilitated the formation of informal, autonomous networks within the ecosystem. This in turn, enhanced partnering agility as Alibaba was able to move beyond simply sensing and responding to expressed member needs, to

monitoring and analyzing the interactions between its members to anticipate and predict future and unexpressed needs. The key strategies and ecosystem role of Alibaba, the nature of ecosystem development, and the underlying mechanism though ecosystem development enhanced partnering agility in Phase 2 are summarized in Table 18.

Table 18: How Alibaba's Ecosystem was Developed and Leveraged in Phase 2 (2005-2006)

Key Organizational Strategies	
Acquisition of search engine capabilities (Yahoo China)	*"With our acquisition of Yahoo China, we are priming ourselves for the inevitable conflict with search engines like Baidu...By integrating e-commerce (Alibaba) with the Internet portal(Yahoo China), search engine capabilities with synchronous communications (Wangwang Instant Messenger), we can increase the stickiness, breadth and depth of our business... Currently, most of the information published on our network have been sealed off from (third party search engines like) Baidu" – Communications Manager of Yahoo Koubei*
Acquisition of community building capabilities (Koubei)	*"Koubei represents the initiative to integrate lifestyle services with e-commerce… and represents a step towards the development of search and community building tools. Our investment in Koubei strings together all our disparate businesses, allowing our ecosystem members to work, spend and play on the Alibaba network." – Communications Manager of Yahoo Koubei*
Ecosystem Role	
Platform Provider	*"Alibaba became a platform provider; providing mechanisms for its members to interact and transact, and no longer had to be directly involved in the transactions. Alibaba served as a platform for exchanging information, communications and interactions, as well as transactions. With Yahoo and Koubei, Alibaba was also the platform for members to search for and review one another."* – VP of Research and Training
Nature of Ecosystem Development	
Formation of networks within the ecosystem as a result of enhanced interaction between ecosystem members	*"By integrating the largest and most vibrant lifestyle portal in China (Koubei) with the advanced Internet capabilities, large user base and global search capabilities of Yahoo (China), we are able to advance in terms of volume, convenience, trustworthiness and stickiness. In addition, both Yahoo (China) and Koubei encourage interactions and the formation of bonds between our members, helping the SMEs and individual users on our network to live, grow, develop and create leading-edge networks (between themselves)"* – Communications Manager of Yahoo Koubei
Consequences of Ecosystem Development	

Ability to predict and anticipate member needs	*"The development of Alibaba (acquisition of Yahoo China and Koubei) emerged spontaneously and was not the result of systematic planning… By allowing our members to interact with one another and form their own networks, we can collect data on their interactions and transactions, analyze the data to detect patterns or opportunities, and share our results with the entire organization."* – VP of Research and Training

4.2.4 Developing Ecosystem Capabilities (2007-Present)

The capability acquisition/ development strategies of Alibaba led to performance gains that outstripped all initial expectations. Between 2005 and 2006, Alibaba registered an 88.1% increase in revenue, an astounding 212% increase in net profits, and an 80.1% growth in terms of the number of registered members. The phenomenal success of the strategies of this phase made Alibaba's management more keenly aware of the advantages of an organic, self-organizing ecosystem. Soon after, an ecosystem-oriented mentality took hold within the collective organizational consciousness and provided the foundation for a new strategic direction that began in 2007.

The new strategic direction is manifested in the enactment of two key organizational strategies. First, at the start of 2007, Alibaba launched Aliloan, an initiative in partnership with the Industrial and Commercial Bank of China and the China Construction Bank to help SMEs with limited assets or credit history secure financing for business expansion based on their transaction histories and credibility ratings at Alibaba. Second, in November 2007, Alibaba launched Alimama, a trading platform for online advertising space to enhance the ecosystem capability for online marketing and generating online advertising revenue. The overarching objective of these strategies is to foster a healthy DBE by enhancing the organizational capabilities of the other entities in its ecosystem. In doing so, ecosystem members are able to contribute more to networked value creation,

which enhances the overall competitiveness of the ecosystem and benefits Alibaba in the long run.

Moreover, driven by the new ecosystem-oriented mentality, Alibaba's role within the ecosystem evolved into that of a utility computing service provider (see Carr 2008; Ross and Westerman 2004) with the launch of Alisoft in January 2007. Alisoft is an online software portal based on a Software-as-a-Service (SaaS) model. The purpose of Alisoft is to develop and provide its ecosystem members with a comprehensive suite of low cost, user-friendly web-based enterprise applications to meet their business IT needs. With its new strategies and ecosystem role, Alibaba was able to foster symbiotic relationships between entities; including itself, within the ecosystem, and channel the resources and actions of individual entities towards the shared objectives of the ecosystem. In this spirit of symbiotism, ecosystem members were engaged in the co-production of innovations, which gives rise to an advanced form of partnering agility as the innovations are developed and tailor-made for the members of Alibaba by the members themselves. The key organizational strategies and ecosystem role adopted by Alibaba, the nature of ecosystem development, and the underlying mechanism though ecosystem development facilitated partnering agility in Phase 3 are summarized in Table 19.

Table 19: How Alibaba's Ecosystem was Developed and Leveraged in Phase 3 (2007-Present)

Key Organizational Strategies	
Enhance ecosystem business expansion capabilities (Aliloan)	*"Alibaba has kept a comprehensive record of all our members' transactions for many years. We can use this to track how the money is used before, during, and after the loan to minimize the costs of filtering the credit-worthy enterprises for the banks… Aliloan is especially important in helping SMEs grow their business as it is difficult for them to obtain loans through conventional channels, and they cannot provide mortgages or guarantees"* – Alibaba Senior Executive

Enhance ecosystem capability for online marketing and generating online advertising revenue (Alimama)	*"After opening a web store, many of Alibaba's members, especially the larger establishments and the 'power sellers' on Taobao have two needs: To promote their store; which implies the need to buy advertisement space, and to sell advertisement space. (They will ask) 'Can I convert my web traffic into revenue?' Our existing services didn't cater to their needs… This led to the launch of Alimama (an online advertising trading platform)… Alimama is different from Google's or Baidu's advertising programs. It is based on a whole new model"* – Alimama Senior Manager
Ecosystem Role	
Utility Computing Service Provider	*"Alibaba provides everything an e-merchant needs to run a business. We provide the platform… (as well as) applications and online tools (on Alisoft), allowing them to start their business easily with minimal capital investment. It's like in a village… we have dug the well for everyone… Our business users can use our various platforms to gain access to the SaaS services they need, and they are charged according to usage…We hope to provide for all their needs, such that all anyone needs is a computer to become an e-merchant* – Alisoft Senior Manager
Nature of Ecosystem Development	
Formation of symbiotic relationships between ecosystem members	*"By providing services and opportunities to the 'bit players' in our ecosystem, they attract more 'bit players' into the ecosystem… With a very large volume of these small players working synergistically for the collective good of the ecosystem, Alibaba's profitability increases, and we have more resources to invest in enhancing our service platforms… This virtuous cycle results in a healthy ecosystem that is beneficial for all ecosystem members.* – VP of Operations
Consequences of Ecosystem Development	
Co-production of innovations	*"Many third-party application developers joined our ecosystem to develop software for Alisoft… Some of our B2B and C2C members used the open-source platform to develop their own applications. These applications include VOIP applications, video conferencing software, wireless telephony applications, website management systems, electronic ID services, and many others… The applications are all available on Alisoft. Alisoft is like a software supermarket and our users can pick and choose the applications they need."* – Alibaba Senior Executive

4.3 Chang Chun Petrochemicals

4.3.1 Organizational Background

CCP (refer to Appendix F) is the oldest petrochemical firm in Taiwan. It started as Chang Chun Plastics Co in 1949 for the purpose of manufacturing a form of engineering plastic known as the Phenolic Molding Compound. Over the years, CCP gradually increased the variety of its product offerings and expanded its production facilities to meet the increasing demands of the global market as its business grew exponentially through joint ventures and technology licensing. Today, CCP is an international company that provides a broad range of products from engineering plastics and electronic chemicals to molding materials. CCP owns more than 10 subsidies, with Chang Chun Petrochemical Co, Chang Chun Plastics Co and Dairen Corporate being the three major ones. By 2007, CCP had successfully built business relationships with more than 15,000 customers located in 111 countries and offered more than 100 categories of products. It currently has more than 4,500 employees worldwide and an annual revenue of about US$4.6 billion, making it the one of the largest privately-owned petrochemical firms in the country.

CCP's IT department was formed in 1984, marking the organization's first foray into the use of IT. Since its inception, the IT department has played an instrumental role in the IT deployment projects at CCP, providing the driving force that propelled the organization through three major phases of systems implementation since 2001. The phases are internally abbreviated as the *'E-Phase'* (E for Electronic), the *'M-Phase'* (M for Mobile), and the *'U-Phase'* (U for Ubiquitous) respectively. With just over 20 employees, the department has developed an internal reputation for its efficiency and ability to deliver

business-critical IT systems that support the operations of the entire firm despite limited resources. The department is led by the organization's Senior Executive Vice President, who personally initiated and managed many instances of IT innovations at CCP.

Informed by our review of the literature on organizational improvisation, we narrowed the focus of our inquiry to four pertinent themes: (1) The development of the means for improvisation, (2) detecting and interpreting triggers of organizational improvisation, (3) the enactment of improvisation, and (4) the outcomes of organizational improvisation – centered on the facilitation of agile IT adoption and operational agility. In addition, as CCP underwent three major phases of systems implementation, we organize the presentation of our data according to the temporal sequence of the phases in the subsections that follow.

4.3.2 E-Phase (2001-2004)

From the establishment of the IT department in 1984 and prior to 2001, CCP's operations were supported by a DOS-based legacy system that was developed internally. In 2001, when Microsoft announced the launch of Windows XP, the DOS-based system was rendered obsolete, triggering the need for the implementation of a new system. Yet, the management of CCP was unwilling to commit the funds for an off-the-shelf ERP package (which costs between NT$30-100 million). Faced with a pressing need for a new system and yet constrained by the limited resources they had, the IT department was forced to improvise to deliver a solution. An in-house ERP development project was eventually launched with two overarching objectives: (1) Developing an ERP system to meet the present needs of CCP that is, at the same time, scalable to support the future growth of

the firm, and (2) implementing it at a lower cost than commercial, 'off-the-shelf' packages.

Comprised of slightly over than 10 employees with limited knowledge about ERP systems and little prior experience in large-scale systems implementation, the IT department spent almost one year in implementing the system. During this period, the extensive business domain knowledge of the members of the IT department; accrued from the years of managing the DOS-based system, the unwavering support and the experimental environment encouraged by the top management, and a supportive culture marked by a fervent 'can-do' spirit were critical to the success of systems implementation. Moreover, to augment their software development capabilities, CCP also engaged Lian Quan, a small software company with formidable research and technical capabilities, as their technical partner. The CASE (Computer Assisted Software Engineering) tools provided by Lian Quan played a critical role in simplifying the coding process for the internally-developed system by enabling a consistent coding standard. The result was the successful implementation of an ERP system that was developed at a low cost (as compared to commercial ERP packages), within a short time frame (as compared to industry standards), and provided tailored support for the operations of the CCP. The means, triggers, process and outcomes of improvisation in IT deployment at CCP in the E-Phase are summarized in Table 20.

Table 20: Development and Leverage of the Capability for Improvisation in IT deployment in the E-Phase

Means for improvisation	
Extensive domain knowledge	*"A unique characteristic of our department is that staff turnover rate is very low. So many of our staff have extensive knowledge of the business processes because they have been supporting the*

	operations of the organization since the DOS days... Being familiar with all the business process flows, all we had to do is to write it into the new system" – Head of IT Department
Support from the top management, encouraging experimentation and tolerance for failure	*"The credit goes to our Senior Executive Vice President. He encourages and supports innovation without reservation. He is willing to let us try and experiment. Sometimes it is hard to justify an IT system's value if you purely look at the economic ROI. However, our boss is willing to invest in such 'high cost – low return' projects because he believes in the importance of giving employees the exposure to advanced technologies; technologies that he believes will be the trend of the future even though they are not yet widely adopted today. As a result, we, as IT staff, are less concerned about possibility of failure"* – Head of IT Department
Intrinsic motivation, supportive culture	*"We have a 'can do' spirit that originated from the time when we first started building our own ERP system. Throughout the entire process of starting from scratch to what we have achieved today, this spirit is continuously cultivated. Therefore, when we are faced with another IT challenge or opportunity today, we are much more confident (in handling the challenge or seizing the opportunity). It just does not seem to be that hard anymore."* – Deputy Head of IT Department
Triggers of improvisation	
Technology obsolescence	*"The new (Windows XP) will not support our DOS-based systems… It was a natural choice under the changing technological environment… We simply couldn't rely on simulating the DOS environment in Windows XP. It would cause a lot of trouble and big problems will emerge in the future."*- Sector Supervisor of IT department
Professional interactions	*"Even before Microsoft announced the details of (Windows XP)… (From our interactions with external IT communities-of-practice) we learnt that our DOS system will probably not be supported… We reacted to it quickly. We realized we couldn't continue relying on DOS, so we decided to switch to Windows. "* - IT Project Team Leader
Enactment of improvisation	
Bricolage of creativity and technical skills	*"We studied several ERP vendors' products, took their strong points and used that in the design of our own system. Based on what we saw, we made guesses on their underlying architecture design and discussed among ourselves how we could restructure and redesign them (to make them better)."*- Senior IT Executive A
Acquisition of technology/system development capabilities	*"Our information on the latest technologies is very limited. So we need to rely on these small companies (technology partners like Lian Quan) to gather such information and present them to us because they are out there in the field…"* – Senior Executive Vice President *"We used the CASE tools (provided by Lian Quan) extensively.*

	With the CASE tools, the process of software development is simplified. Technical skills became less important to software development. Understanding the process flows were more important" – Head of IT Department
Improvisational Outcomes	
Rapid, more cost efficient mode of systems implementation	*"The cost of off-the-shelf ERP packages (for a company of our scale) ranges from NT$30 million to more than NT$100 million. We spent NT$12 million in developing our own… In terms of time spent, one of our factories in Changshu adopted SAP's ERP system and took 3 years, while we only took 1 year for an organization-wide scale project"* – Head of IT Department
Effective support for business operations	*"Our IT systems are designed to cater to our users' needs and match their habits. Sometimes it is hard to change the users' habit, so we decided to design our system to match their requirements so as to lower their resistance. From the IT department's standpoint, a huge advantage is the flexibility in customizing the system based on user feedback. We don't have to engage external consultants again and again, and ask if they can make certain changes. We will just do it ourselves."* – Deputy Head of IT Department

4.3.3 M-Phase (2005-2006)

The M-Phase of CCP's systems implementation journey was triggered by a construction accident in 2005. Prior to the accident, CCP was reliant on phone lines and ADSL for data transmission. However, these lines were severed in the construction accident and consequently, access to CCP's ERP system was down for several hours. Critical operational information could not be transmitted in time, which resulted in losses of over tens of millions of dollars because of the accident. At the same time, internal organizational stakeholders began to demand for remote access to some of CCP's IT applications. These driving forces, coupled with the opportunity provided by the emerging mobile technologies (i.e. 3G and Wi-Fi) provided the impetus to enable CCP's IT applications on the mobile platform. Yet, as the organizational resources allocated for the implementation of the M-Phase was similarly limited, and because the mobile

applications market lacked the specific applications that CCP needed, the IT department was once again forced to improvise to develop the solution they needed.

In the implementation of the M-Phase, the IT infrastructure developed in the E-Phase, the capabilities for coordination and teamwork developed between the various business units and the IT department over time, and a powerful intrinsic motivation driven by a stoic, collective sense of mission, were prior resources that were crucial to the success of IT deployment. In addition, the IT department relied heavily on their existing technical expertise, developed from the experience of the E-Phase, and acquired complementary technological resources in the form of pre-written software modules to make improvisation possible. The result was the successful launch of a comprehensive suite of mobile applications; including a Push Mail, an M-ERP, an M-CRM, and a remote facility monitoring application, that was once again developed in a fast and cost efficient manner. In addition, as compared to existing off-the-shelf alternatives, the internally developed system had more functionality and represented a better fit with the business processes of CCP. Table 21 provides a summary of the means, triggers, process and outcomes of improvisation in IT deployment at CCP in the M-Phase.

Table 21: Development and Leverage of the Capability for Improvisation in IT deployment in the M-Phase

Means for improvisation	
Leveraging existing IT infrastructure	*"The underlying ERP system (developed in the E-Phase) provides the foundation for the M-Phase… Let's say that a manager wants to access an application on his mobile phone... the mobile phone is just the platform right? There has to be a backend system… that is our ERP. Without our ERP, all the applications that we wanted to develop would have been impossible. "* – IT Department Head
Collaboration and social relationships	*"During the E-Phase, we established a number of cross-functional steering committees consisting of the managers of the various departments to chart the direction of systems development. By the time*

	of the M-Phase, as we interact and become more familiar with one another over time, our coordination improved. We had a better understanding of each other's business processes and we had no qualms about raising our requirements to the IT department… Between the different departments, we also looked at the different ways in which we can collaborate to make the overall operations (of CCP) more efficient – Business Process Owner
Intrinsic motivation for improvisation	"*We didn't get any material rewards for our success in the previous phase but we are happy to do it… In spite of our limited resources, we see delivering solutions (to organizational problems) as part of our job scope, part of our responsibilities. I think the culture… a culture for innovation… really crystallized after the E-Phase. We were more confident of our abilities and we were given the freedom to be creative"* – Head of IT Department
Triggers of improvisation	
Business crisis	*"Our daily revenue is tens of millions of dollars. Even if our ERP is just down for an hour, the economic loss would be catastrophic. In Miao Li (one of CCP's production bases), after only a few minutes of systems breakdown, the line of trucks (waiting to be loaded) stretched all the way from the summit (where the facility was based) to the foot of the hill. There were 2 miles of trucks"* – Head of IT Department
Business needs	*"The managers of the various business units and the top management asked for (applications on the mobile platform)… Particularly for push mail because checking emails is really a very important part of their work… It was a good timing. At that time, 3G just came out. It solved a huge performance issue that previous mobile platforms couldn't solve. 3G made mERP (and other mobile applications) possible."* – Deputy Head of IT Department
Monitoring the technological landscape	*"We had been monitoring mobile technologies for some time… At our organization, a few staff members are dedicated to monitoring the developments in the technological landscape… One (staff member) is responsible for monitoring web application frameworks… we have another four looking at mobile platforms and applications."* – Head of IT Department
Enactment of improvisation	
Bricolage of technical expertise	*"Once you know how to do it, it (systems implementation) can be very fast. However, if you do not know how to do it, it will take you forever. I think by the time (of the M-phase), we have reached a certain level of technical competency, implementing the initiatives of this phase were much easier (as compared to the E-phase)* – Head of IT Department
Acquisition of technological resources	*"Although there were very few mobile apps that met our needs, we bought whatever (apps) that was compatible and modified them according to our needs. I think it is important to 'stand on the shoulder of giants'… as long as someone has written something that we need (and if it is priced reasonably), we would buy them… Given*

	the time and (resource constraints) that we had, we can't be writing all our apps by ourselves! – IT Project Team Leader
Improvisational Outcomes	
Faster, cost efficient systems implementation	*"At the time, it will cost a several hundred thousand (NT$) dollars just for a simple mobile scanning inventory output system that can run on a PDA. And with all the applications we wanted, it will take the vendor half a year to deploy. We did everything ourselves… It is much faster, cheaper and easier to control."* – Senior IT Executive B
Effective support for business operations	*"With the m-CRM, managers can access the information they need anywhere, anytime… With our inventory management applications on the mobile platform, the efficiency of inventory and logistics management is also greatly enhanced… (As compared to commercial, off-the-shelf solutions,) we found a company doing a software called 'mobile intelligence', but its functionality was very limited and incompatible with our existing processes. We have much better control (over the functionalities of our system) in this way"* – Head of IT Department

4.3.4 U-Phase (2007- Present)

The major systems implemented in the U-Phase were triggered by a number of changes in the external and internal organizational environment in 2007. In the case of the GPS vehicle tracking system, the impetus for systems implementation came about as a result of a legislative change in Taiwan that required all vehicles transporting hazardous materials to be outfitted with a tracking device for safety reasons. In the case of the QR-Code enabled inventory and logistics management system and the IP-PBX telephone system, they were implemented as a result of a directive from CCP's Senior Executive Vice President. By this phase, the IT department had become conditioned to working with resource constraints and an improvisational mode of IT deployment. Consequently, even when they were given the option to purchase an expensive 'off-the-shelf' solution in the case of the IP-PBX telephone system, they chose to improvise to "piece together" their own solution instead.

In the implementation of the three major systems of the U-Phase, the existing hardware, software and network infrastructure, the cohesion between the IT department and the various business units that crystallized over a long history of collaboration, and the creativity of the IT department, were previously developed capabilities that facilitated the success of IT deployment. Moreover, the IT department leveraged their technical proficiency to experiment with various alternative solutions concurrently in iterative cycles of planning and execution. Finally, similar to the earlier phases, the outcome of improvisation was cost savings and the successful launches of a number of IT systems that permeated, supported and enhanced many inter-related aspects of CCP's operations. A summary of the means, triggers, process and outcomes of improvisation in IT deployment at CCP in the U-Phase is provided in Table 22.

Table 22: Development and Leverage of the Capability for Improvisation in IT deployment in the U-Phase

Means for improvisation	
Foundational IT Infrastructure	*"To link all the various new systems and our existing ones, we relied on our existing network infrastructure… In terms of the hardware that supported our new applications, most of the infrastructure is already there… For the software of our new systems, the only difference was that we used a different development environment… We used Visual Studio to develop our new systems…"* – Senior IT Executive B
Collaboration with business units for domain knowledge	*"When we were implementing our QR-Code inventory management system, we were actively consulting with the various factories and business units. We told them what QR-Code could do… they would imagine how it can be applied to their business processes and tell us what kind of support they hope to receive using the technology… We would then implement the relevant modules based on their specifications"* – Senior IT Executive C
Creativity	*"I think over time, we have learnt how to be creative to deal with 'surprises' (like the directive to implement QR-Code)… Otherwise, we would not be able to come up with the solutions that the top management wants all the time. (The top management) would throw us an idea… an abstract concept… On one hand, it indicates that the top management has a lot of confidence in us…(On the other,) we have to carry it to fruition.*– Senior IT Executive A

Triggers of improvisation	
Legislative changes	*"A law was passed that required us to install GPS tracking in all our trucks in October 2008… This is because of the hazardous materials that we were transporting."* – Senior IT Executive A
Managerial alertness	*"Our Senior Executive Vice President used to study in Japan. He reads a lot of Japanese books (on technology). QR-Code was one of the technologies he found… He was very keen on QR-Code. He saw many applications of QR-Code in Japan, so he told us that we must think of an application that uses QR-Code in CCP."* – Head of IT Department
Enactment of improvisation	
Overlap of planning and execution	*"We had no idea what to do with QR-Code initially, so we did some study on it. We had to come up with some application. We thought of replacing our current one-dimensional code with QR which is two-dimensional. But we hesitated because there was not much value in doing so…We experimented quite a bit. For example, we tried to print out big pictures of QR-Code and paste them on the side of trucks, hoping the reading process can speed up in that way."*- Head of IT Department
Developing and experimenting with other alternatives	*"Instead of QR-Code, we thought about using RFID... we also thought of using this wireless platform called ETC, which is used by the government for cashless toll charges. We went as far as developing a number of trials using these technologies. But we quickly realized that they would not work… In the case of RFID, under certain frequencies, it will cause a static shock, which is a definite 'no-no' for us since a lot of our materials are flammable… The case of ETC was infuriating… we wanted to see their management with our plans but they kept avoiding us because they did not want to deal with a private sector firm"* - IT Manager
Improvisational Outcomes	
Cost savings from improvisation	*"Let's take for example the case of IP-PBX. We could have spent NT$5 million on a world-renowned brand like Avaya, or we can spend NT$1 million to piece together our own. Which would you choose? A NT$5 million solution or NT$ 1million solution? In the end, it is really up to you … as long as it works, the top management doesn't care how it is done… but of course, the savings are tangible"* – Senior IT Executive A
Effective support for business operations	*"For example, the time in UK is 8 hours behind Taipei. It does not make sense for a manager in Taipei to wait in the office after working hours for a early call from UK. Our IP phone solved the problem. The manager can be at home or outside. As long as there is internet, he can be reached by his UK counterpart…"* – Deputy Head of IT Department *"We know our system is used extensively by people in the factories because they would call us immediately whenever they experience any problems. It shows that our system has a huge impact on their daily work. We feel proud that our work has made good contributions to their work"* – Senior IT Executive B

CHAPTER 5: ANALYSIS AND DISCUSSION

5.1 The Attainment of Customer Agility

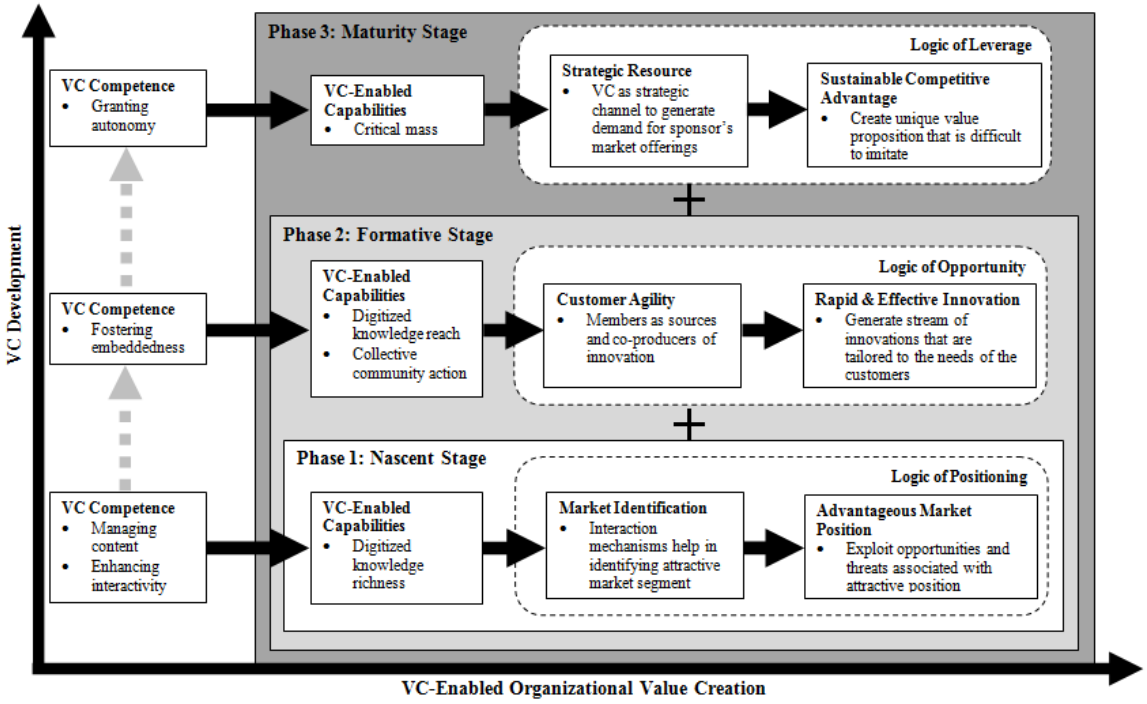
By integrating the distinct patterns in which HWZ's VC was developed and leveraged across the three temporal phases, and mapping the two discrete processes (i.e. development and leverage) along a horizontal axis and a vertical axis, a two-dimensional (2-D) process model of VC-enabled organizational value creation can be inductively derived that sheds light on how customer agility can be attained (refer to Figure 9). As opposed to our initial theoretical lens on VC-enabled customer agility (refers to Figure 6), our 2-D process model suggests that different competencies may drive the development of various VC-enabled capabilities along different stages of VC maturity, and the capability for customer agility is only developed when the VC is in the formative stage. Moreover, as the VC becomes increasingly mature, the number of ways in which it can be leveraged for organizational value creation increases. The following stream of reporting explains the 2-D process model, how the model was constructed from the case data, how it differs from our initial theoretical scaffold, and how the existing literature corroborates the model.

5.1.1 Phase 1: The Nascent Stage of VC Development

Grounded in the empirical data, our 2-D model of VC-enabled organizational value creation suggests that following the initial formation of a VC, a sponsoring organization's efforts in nurturing the VC should center on the VC competencies of managing content and enhancing interactivity (Porter and Donthu 2008; Preece 2001). To illustrate, in the case of HWZ, a pioneering member of its community alluded to the capability of managing content in noting that "*most of the product reviews, news and articles came*

from (HWZ's founders) at the time" to make up for the lack of breadth and depth in member-contributed content. In addition, one of HWZ's Co-Founders provided an indication of the capability of enhancing interactivity in describing the management's efforts in enhancing the responsiveness and extent of interactions in the discussion forum, saying *"we (HWZ's founders) were on the forum all the time… you could see that whenever someone posted something, within 20 minutes, one of us (HWZ's founders) would reply"* (refer to Table 14).

Figure 4: A 2-D Model of VC-Enabled Organizational Value Creation



Content management is particularly important in this phase as there tends to be is a dearth of member-contributed content in the early stages of VC development (Mohammed et al. 2004). Consequently, by ensuring a continuous influx of high-quality, administrator-generated content, the sponsoring organization can stimulate and maintain the members' interest in the VC (Balasubramanian and Mahajan 2001; Rothaermel and Sugiyama

2001). In addition, the perceived effort of a sponsoring organization to provide quality content tends to promotes beliefs about the congruence of the sponsor's values with, and respect for, the community. This in turn, creates a basic level of trust that stimulates participation and the initiation of relationships between members and the community sponsor (Porter and Donthu 2008; Ridings et al. 2002). Similarly, enhancing the interactivity of a fledgling VC is crucial for two key reasons. First, it lays the foundation for a step-shift increase in the quality and quantity of member-contributed content (e.g. reviews, opinions and advice) as interactivity works in a virtuous cycle to drive participation and knowledge contribution (Dholakia et al. 2004; Porter and Donthu 2008). Second, it facilitates the formation of subgroups that provide members with the opportunity to discuss a variety of topics related to the community's interest, which in turn, enhances the diversity and attractiveness of the community (Mohammed et al. 2004).

Conversely, as opposed to our initial theoretical lens, our model suggests that the VC competence of fostering embeddedness is less appropriate in the initial phase. The *"strength of weak ties"* hypothesis (Granovetter 1973) of the social network theory provides a possible explanation for this. Fostering embeddedness increases the strength of social ties (Blanchard and Markus 2004; Ma and Agarwal 2007) but inhibits the inflow of diverse information (i.e. member-contributed content) and access to disparate social networks (i.e. awareness among potential members) (Perry-Smith and Shalley 2003; Wellman et al. 2001). As such, fostering embeddedness is less crucial for a fledgling VC because diverse content and network access are resources that the VC will arguably

require more as they seek to create awareness and attract new members in its embryonic state (Mohammed et al. 2004; Porter and Donthu 2008).

The mechanisms of the two competencies, in tandem, facilitate the attraction and retention of community members, and enable the VC to arrive at a state typically defined as the nascent stage of the VC development lifecycle (e.g. Lee et al. 2005; Mohammed et al. 2004). At this stage, the VC is small, and dominated by the community founders and a core group of early adopters (Mohammed et al. 2004). The same pioneering member of HWZ's community, for example, stated *"In the beginning, we didn't have many members… it was mainly them (HWZ's founders) and the group of hardcore "techies" who came over from the previous (COI)"* (refer to Table 14). More importantly, the VC-enabled capability of digitized knowledge richness (Sambamurthy et al. 2003) is developed as the VC is now able to serve as a platform for interactions between members and the sponsoring organization, and it is this VC-enabled capability that serves as the basis of organizational value creation at this stage of VC development.

More specifically, the VC as a platform for interactions enables the sponsoring organization to obtain direct feedback on the existing and expressed needs of the core group of early adopters (Armstrong and Hagel 1996; Porter and Donthu 2008), or monitor the interactions between them to gain an understanding of their future or unexpressed needs (Kozinets 2002; Nambisan 2002). Based on the knowledge obtained, the community sponsor can then enact *"needs-based positioning"* (Porter 1996) by occupying a market position that serves the identified needs of their members. For example, in our case study (refer to Table 14), HWZ's Co-Founder explained how the HWZ's unique value proposition as a comprehensive, credible provider of free, localized

IT content was derived based on the feedback they received from the early adopters of HWZ, as the management "*realized that the foreign publications do not meet their needs because the content is not meant for the local audience,"* while local publications were *"usually not comprehensive because they lacked funding, which comes with credibility and market reach"* (refer to Table 14). In other words, through the VC-enabled capability of digitized knowledge richness, the VC can facilitate the logic of positioning by helping the sponsoring organization identify and occupy an attractive market position, which in turn, results in the creation of organizational value as the sponsoring organization is able to avoid competitive threats and capitalize on the market opportunities associated with its unique market position.

However, contrary to Sambamurthy et al.'s framework (2003), which suggests that IT-enabled organizational value creation in the digital age should be based primarily on a logic of opportunity, our model suggests that a VC is unlikely to facilitate organizational value creation through this mechanism in the nascent stage of development. This is because in the nascent stage, the VC is dominated by early adopters, and while the behavioral and subjective feedback from these members can provide indications on the general direction in which the community should be headed, the needs of early adopters tend to be different from the majority and may not provide a reliable basis for developing a continuous stream of innovations that are in line with the overall needs of the VC (Mohammed et al. 2004; Rogers 2003). Likewise, a nascent VC is unlikely to create value for its sponsoring organization through the logic of leverage as the VC, in its immaturity, is easily imitable (Hagel and Armstrong 1997), and may not be sufficiently

large (Rothaermel and Sugiyama 2001) or committed to the community sponsor (Porter and Donthu 2008) to be leveraged effectively.

5.1.2 Phase 2: The Formative Stage of VC Development

Following the attainment of the nascent stage of VC maturity (Lee et al. 2005), our process model suggests that to sustain the development of its VC, a sponsoring organization should focus its efforts on the VC competence of fostering embeddedness within the community (Porter and Donthu 2008; Preece 2001). For instance, HWZ's Co-Founder noted that one of the measures undertaken by HWZ to nurture its VC in the next phase of development was aimed at cultivating a sense of belonging (Lin 2008) among "*key forum contributors and opinion leaders*" by inviting them "*down to the office for tea*" to recognize them, and giving them incentives in the form of "*freebies such as T-shirts*". Another measure adopted by HWZ was to develop an offline presence (Lombard and Ditton 1997) by organizing "*outings and barbecues*", and, as noted by another of HWZ's members, establishing "*a bubble tea outlet (located at one of Singapore's largest IT mall)… to allow (VC members) to gather and chill out…*" (refer to Table 15). These measures foster embeddedness by "*facilitating contact between the sponsor and members*" (Porter and Donthu 2008) and imbuing the relationships between VC members and the sponsoring organization with an added physical dimension (Koh and Kim 2003; Mohammed et al. 2004) that enables intense, personalized and "*more socially embedded information exchanges*" (Rothaermel and Sugiyama 2001). In particular, measures aimed at fostering embeddedness (For a review of these measures, refer to Bhattacharya and Sen 2003; Porter and Donthu 2008) are especially appropriate in this stage of VC development for a number of key reasons.

First, as the community continues to grow, it becomes increasingly difficult for individual members to maintain the strength of their social ties to the other members of the VC (Rothaermel and Sugiyama 2001; Wellman et al. 1996). Therefore, measures that foster embeddedness are necessary to help members of the growing VC to better identify, understand, and trust each other (Koh and Kim 2003; Porter and Donthu 2008), which serves to broaden and reinforce their mutual ties (Koh and Kim 2003) and compensate for the low social presence inherent in online interactions (Lombard and Ditton 1997). Second, at this juncture of VC development, the social processes within the VC are beginning to mature (Mohammed et al. 2004; Palloff and Pratt 2007), and it is at this point when it becomes possible to embed the economic processes of the sponsoring organization within the underlying social processes to provide additional *"focus-related, consumption and approval-related utility"* (Balasubramanian and Mahajan 2001) for the members of the VC. Finally, a growing VC tends to attract a higher proportion of peripheral or non-contributing members (Kim 2000; Mohammed et al. 2004; Zhang and Storck 2001), while at the same time, negative network externalities may emerge that decrease the value of the VC to the core members (Asvanund et al. 2004; Gu et al. 2007), which include the regulars, leaders and elders (Kim 2000) of the community. Consequently, measures that promote embeddedness can mitigate the effects of these converging forces by enhancing the relationship between the community and the sponsoring organization (Bhattacharya and Sen 2003; Porter and Donthu 2008). This serves to maintain a significant portion of the VC members as *"community insiders"* (Kozinets 2002), which forms a particularly important segment of a commercial VC as insiders tend to be heavier users, more loyal, and amenable to that marketing overtures of

the sponsoring organization (Cothrel 2000; Kozinets 2002). On the other hand, in contrast with our theoretical lens, our model suggests that the VC competencies of managing content and enhancing interactivity are less salient in this stage of VC development. This is because as a VC grows, the variety and richness of user-generated content, as well as the extent of interactivity within the community increases (Mohammed et al. 2004), which reduces the burden on the part of the community sponsor to enact explicit measures to generate content or increase participation (Balasubramanian and Mahajan 2001; Porter and Donthu 2008).

By strengthening the social ties between members in the VC (Koh and Kim 2003) and grafting the economic processes of the sponsoring organization on the underlying social processes of the VC to create additional utility (Balasubramanian and Mahajan 2001), the VC is able to attract and retain an increasing number of participants, which enables the VC to attain the formative stage of the VC development lifecycle (see Lee et al. 2005; Mohammed et al. 2004). The formative stage is characterized by a growing number of participants, a disproportionate member-to-administrator ratio, and a marked increase in the diversity and richness of the community dialogue (Mohammed et al. 2004). In the case of HWZ, evidence of the attainment of these traits were revealed in our interview with one of its members, who noted that *"the community grew very quickly"* during this stage. The informant further alluded to an increase in diversity of the subtopics generated in the discussion forum by describing how the community dialogue moved beyond the mainstream topics of IT hardware (e.g. reviews of "*the latest graphics cards, motherboards, CPUs…"*), to technology-related topics such as *"(PC) gaming… (gaming) consoles… and mobile phones"* (refer to Table 15).

More importantly, our model suggests that the attainment of the formative stage of VC development precipitates the development of two VC-enabled capabilities. First, the VC-enabled capability of digitized knowledge reach (Sambamurthy et al. 2003) develops as the increased membership, participation and diversity of the community dialogue facilitate the accumulation of information assets in HWZ's VC (Ginsburg and Weisband 2006; Li 2004). Second, the VC-enabled capability for collective community action; defined as the extent to which VC members are willing to pool their resources, abilities and ideas towards the community sponsor's cause, materializes as the measures that foster embeddedness strengthen the ties between members and enhance their relationship with the community sponsor (Kim 2000; Mohammed et al. 2004). Collectively, the two VC-enabled capabilities form the basis of organizational value creation in this stage of VC development.

More specifically, while the mechanism for organizational value creation described in our initial theoretical lens is centered on the process of entrepreneurial action based on the logic of opportunity (Sambamurthy et al. 2003), our model reveals two possible mechanisms of organizational value creation in this stage of VC development. In particular, the VC-enabled capability of digitized knowledge reach (Sambamurthy et al. 2003) facilitates organizational value creation through the logic of positioning by raising the entry barriers for existing and potential competitors seeking to imitate the market position of the sponsoring organization (Porter 1996). This is because adopting a similar position would necessitate an equivalent knowledge base on the topic of interest, which is difficult to recreate as the accumulation of knowledge requires time and extensive resources (Bieber et al. 2002; Schubert and Ginsburg 2000). HWZ's product manager, for

example, attested to this in saying *"As the community grew, the knowledge base accumulates… (which) makes it very hard for our competitors to go after our market (demand for local IT content)… Because we are in the business of providing information, to be able to compete with us, their content will at least have to be as good as ours… and that takes time…"* (refer to Table 15). This is indicative of how HWZ's VC enabled the organization to consolidate its positioning strategy: By making it difficult for competitors to adopt a similar market position as the information assets of the VC accumulated over time.

In addition, through the VC-enabled capability of collective community action, the VC can facilitate organizational value creation through the logic of opportunity in two distinct ways. First, as opposed to the nascent stage of VC development when the VC was dominated by early adopters, a VC in the formative stage of maturity consists of a wide spectrum of members that can provide indications on the overall needs of the VC (Kim 2000; Mohammed et al. 2004). This can serve as the basis of customer agility (Sambamurthy et al. 2003), which can subsequently be leveraged in developing a stream of innovations for a series of temporary competitive advantages (Eisenhardt and Sull 2001), or launching competitive actions that create fundamental instability in the organizational environment to keep competitors off-balance (D'Aveni 1994). As noted earlier, these indications may be directly obtained in the form of feedback from the VC members (Armstrong and Hagel 1996; Ginsburg and Weisband 2006; Kannan et al. 2000), or be indirectly gleaned from unobtrusive means such as analyzing the profiles of the members (Balasubramanian and Mahajan 2001; Kozinets 2002) and monitoring the interactions between members in the VC (Hagel and Armstrong 1997; Rothaermel and

Sugiyama 2001). From the accounts provided by HWZ's Editor-in-Chief, Managing Director, and Senior Executive for example, we could see how the feedback and ideas contributed by the members of HWZ's VC facilitated the development of the printed IT magazine, the digital photography magazine and the country-specific versions of HWZ's website respectively (refer to Table 15).

Second, with an accumulation of members ready to commit their resources and abilities to helping the community sponsor, customer agility is enhanced as members can be engaged in the co-production of innovations (Nambisan 2002; Porter and Donthu 2008). Engaging customers in the co-production of innovations represents one of the fastest and most effective means of innovation development since the innovations are developed and tailor-made for the VC members by the members themselves (Fuller et al. 2006; Lengnick-Hall 1996). For instance, from the account of one of the pioneering members of HWZ's VC, we noted how a group of VC members "*came together and developed the entire (PC Gaming) website from scratch without the management's knowledge"* (refer to Table 15), which saves HWZ from having to commit the time and resources to develop an offering to meet the PC gaming needs of their VC members.

On the other hand, we did not find conclusive evidence of VC-enabled organizational value creation through the logic of leverage from the case data of this phase. A possible explanation is that despite a significant increase in the number of community members, a VC in the formative stage of development has yet to attain self-sustaining critical mass (Lee et al. 2005; Mohammed et al. 2004). Critical mass is crucial to the organizational ability to leverage the VC as a strategic resource for two reasons. First, the attainment of critical mass unlocks new possibilities for strategic leverage in the form of transaction,

marketing and advertising revenue opportunities (Armstrong and Hagel 1996; Kozinets 2002). Second, critical mass enables the sponsoring organization to emerge as the dominant community for a particular topic of interest (Armstrong and Hagel 1995), which imposes "*high switching costs"* (Mahadevan 2000) for the members of the VC that renders the strategic resource inimitable. In other words, without attaining critical mass, a VC may be unable to serve as a strategic resource for the sponsoring organization as the criteria of being sufficiently valuable or inimitable (Barney 1991; Hoopes et al. 2003) may be violated.

5.1.3 Phase 3: The Maturity Stage of VC Development

Finally, following the formative stage of VC development, our process model suggests that a sponsoring organization's efforts in nurturing its VC should be aligned with what can be termed the VC competence of *'Granting Autonomy'*, defined as the capability to enable self-governance and community control within the VC (Rothaermel and Sugiyama 2001; Walden 2000). This derives from the account provided by one of the forum moderators on HWZ, who noted that the measures undertaken by HWZ to nurture its VC in this phase of development were aimed at (1) formalizing leadership and community roles (Mohammed et al. 2004) by awarding "*administrative rights"* and "*moderator privileges"* to the opinion leaders and the key contributing members of the VC, and (2) enabling community-directed rules, norms and dialogue (Kozinets 2002) by allowing members to establish their "*own rules and etiquette"* and "*vote on the new sections and topics that they would like to see"* in the VC (refer to Table 16).

Compared to the VC competencies described in our initial theoretical lens, the VC-enabled capability of granting autonomy is arguably more important at this stage of VC

development because beyond the formative stage, a VC tends to be both resistant to direct management by the community sponsor (Mohammed et al. 2004; Walden 2000) and too large to be effectively managed (Rothaermel and Sugiyama 2001). Consequently, as the internal structures put in place by the sponsoring organization to manage content, enhance interactivity, and foster embeddedness since the formation of the VC become increasingly ineffective with VC development (Mohammed et al. 2004), a sponsoring organization can promote self-organization and empower members to develop their own language, protocols and policies within the VC (Kozinets 2002; Preece 2001). This serves to institute an alternative set of internal structures, which sustains the quality of community-generated content, the extent of interactions, and the strength of community relationships by reducing the cost of communications, the complexity of dialogue management, and incidences of negative behaviors such as free-riding and social loafing (Butler 2001). In addition, measures aimed at granting autonomy and promoting self-governance allow members to shape the community dialogue based on their needs (Walden 2000), and promote the perception of their importance and influence within the community (Blanchard and Markus 2004). This enables the sponsoring organization to satisfy the demand for more freedom and responsibility that tends to manifest in the older and more established VCs (Mohammed et al. 2004).

Enacting measures aligned with the VC competence of granting autonomy gives rise to three important outcomes. First, the VC increases in scalability as the installation of effective community control mechanisms makes the management of a large member population feasible (Rothaermel and Sugiyama 2001). Second, the trust that VC members have towards the community sponsor increases as relinquishing control over the VC to

the members removes the perception of and the potential for a favorable bias towards the community sponsor (Walden 2000). Third, the diversity, and hence the attractiveness, of the community increases as members are empowered to form their own subgroups, promulgate a variety of subtopics, and assume responsibility for the direction of the community dialogue (Mohammed et al. 2004). Collectively, these outcomes sustains the growth of the VC and enables the attainment of the maturity stage of the VC development lifecycle (see Lee et al. 2005; Mohammed et al. 2004).

The maturity stage is characterized by the attainment of self-sustaining critical mass (Hagel and Armstrong 1997; Wellman et al. 1996) and a further step-shift increase in the diversity of the community dialogue, which is reflected in the emergence of a number of member-initiated main topics that extends into a kaleidoscopic array of subtopics (Mohammed et al. 2004). Although the point of critical mass may be difficult to define due to the lack of a consistent measure in the literature (Bieber et al. 2002), we can nevertheless infer that HWZ's community had attained critical mass from the account of HWZ's Chief Content Officer, who noted that *"the community was more or less self-organizing… (and) self-sustaining"* and that the management no longer had *"to actively tend to the growth of the community."* Moreover, he further noted that the community dialogue had significantly increased in diversity with the initiation of a variety of topics; such as *"fitness… music, food… education…"* and even *"a section for pets"* that extends far beyond the earlier focus of the VC on IT (refer to Table 16).

But more pertinent to our interest, the full range of possibilities for organizational value creation becomes unlocked when a VC attains the maturity stage of the development lifecycle (Hagel and Armstrong 1997; Mohammed et al. 2004; Rothaermel and Sugiyama

2001). In particular, with critical mass, the VC becomes more valuable in that it can be used as an effective push marketing channel to generate awareness and demand for the sponsoring organization's market offerings (Balasubramanian and Mahajan 2001; Kozinets 2002). In addition, critical mass renders the value proposition of the community sponsor inimitable as it imposes high switching costs (Mahadevan 2000) that consolidates the VC's position as the de facto community for a particular market segment or topic of interest (Armstrong and Hagel 1995). By imbuing the VC with added value and inimitability (Barney 1991; Peteraf 1993), critical mass enables the creation of organizational value through the logic of leverage (Hoopes et al. 2003) in a mechanism that is distinct from the strategic process of entrepreneurial action described in Sambamurthy et al.'s framework (2003), and the positioning-based mechanisms developed in the earlier phases. Evidence from the case study corroborates this in that we were not only able to see how HWZ's VC facilitated organizational value creation through the logic of positioning; by helping HWZ identify and attain attractive market positions in the motoring, golf and travel publications industry, and the logic of opportunity; by providing inputs that shaped the generation of new content and features in the process of innovation, from the accounts of HWZ's Managing Director and General Manager respectively. But more importantly, the account proffered by one of HWZ's members reveals how by bundling "*the subscription for their new products with the existing IT magazine*" and placing "*announcements… hyperlinks… and advertisements*" within the community discussion forum, HWZ's VC facilitated organizational value creation through the logic of leverage by serving as the basis of a

strategic resource to generate awareness and demand for HWZ's new offerings (refer to Table 16).

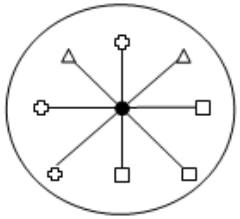
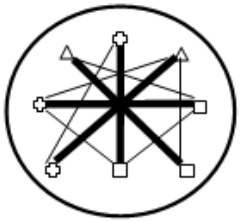
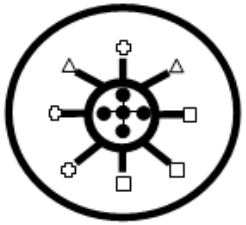
5.2 The Attainment of Partnering Agility

By integrating the different patterns in which Alibaba's DBE was developed and leveraged across the three distinct phases, a process model of how a DBE can be developed and leveraged for partnering agility (refer to Figure 10) can be inductively derived. As our model suggests, the development and subsequent leverage of a DBE for partnering agility is an evolutionary process that can be decomposed into three progressive stages. Given that our model is inductively derived from the Alibaba case study data, the following stream of reporting provides an explanation of how the existing literature corroborates our model and how the model enriches the existing perspectives of IT-enabled enterprise agility.

5.2.1 Phase 1: Establishing Centrality and Attaining Critical Mass

At the time of its inception, Alibaba's strategies were aligned with the capability logic in that it leveraged firm-specific resources and capabilities such as (1) its unique insight of the unmet needs of Chinese SMEs, (2) its superior technical capabilities, and (3) its intimate knowledge of Chinese business practices to create a unique value proposition (Barney 1991). Specifically, by catering to the needs of the large SME market, and differentiating itself from local and global B2B portals, Alibaba was able to attract a large number of ecosystem members, establish its identity as the de facto B2B platform for business opportunities in China, and structure ecosystem value creation around its vision of connecting global buyers to a vast supplier network of Chinese SMEs.

Figure 5: Process Model of the Development and Leverage of a DBE

Phase 1: Establishing Centrality and Attaining Critical Mass	Phase 2: Nurturing Internal Networks and Fortifying Ecosystem Boundaries	Phase 3: Fostering Symbiotism
Underlying Logic of Organizational Strategies		
Capability Logic: Leverage firm specific strategic resources and capabilities to create a seed value proposition	**Guerilla Logic:** Development of innovations and new capabilities that enhance internal interactions and minimize external interactions to disrupt the basis of competition for existing and potential competitors	**Complexity Logic:** Develop ecosystem capabilities to foster symbiotic relationships between entities in a healthy business ecosystem
Ecosysyem Role		
Keystone – Service Provider: Lower the barriers of membership by facilitating meaningful participation through direct services.	**Keystone – Platform Provider:** Create value at the backend by providing the platform for autonomous interactions and transactions	**Keystone – Utility Computing Service Provider:** Expand backend role by providing a comprehensive suite enterprise applications and online tools, and charging for them based on usage
Nature of Ecosystem Development		
Hub-and-Spoke Ecosystem 	**Networked Ecosystem** 	**Symbiotic Ecosystem** 
By creating a unique value proposition with its strategies and lowering the barriers of participation with its role as a keystone service provider, an organization can attract and retain ecosystem members to attain critical mass and establish itself in the center of ecosystem value creation.	Enhanced capabilities for internal interactions and role as keystone platform provider facilitates the formation of informal, loosely-coupled networks within the ecosystem. Minimizing external interactions fortifies the boundaries of the ecosystem.	By enhancing the capabilities of the ecosystem and functioning as a keystone utility computing service provider, the entire ecosystem functions as a single entity utilizing communal resources and capabilities, working towards the shared objectives of the ecosystem.
Implications of Ecosystem Development		
Sense-and-Respond Agility By establishing itself at the center of the ecosystem, ecosystem members can provide direct feedback to the organization on their needs. Responses to feedback from ecosystem members occur at the center of the business ecosystem and benefit all members simultaneously	**Predictive Agility** The organization can not only react to direct, expressed feedback from its members, but can monitor and analyze the interactions between members to anticipate or predict future and unexpressed needs as well	**Collective Agility** Ecosystem members may engage in the co-production of innovations, which ensures that organization is able to innovate quickly and effectively, since innovations are tailor-made for ecosystem members by the members themselves.

In addition, Alibaba was aware that many of the Chinese SMEs at the time lacked the technical capabilities to publish their trade-related information online. By taking on the ecosystem role of a keystone service provider and involving itself directly in collating the necessary information published on various electronic BBSs, publishing the relevant information on its website, facilitating access to the information by organizing the information and providing navigational tools, and promoting the information on other websites for international trade, Alibaba enabled many Chinese SMEs to overcome their technical limitations, participate in the ecosystem, and subsequently, benefit from the global exposure afforded by the Internet.

Based on these findings, our model suggests that the focal organization, with the ability and motivation to be a core firm, should (1) pursue strategies aligned with a capability logic and (2) adopt the ecosystem role of a keystone service provider in the initial phase of DBE development. By enacting strategies aligned with a capability logic, the organization is able to structure ecosystem value creation around its unique value proposition, attract new ecosystem members, and define a distinct identity that delineates the boundary of the ecosystem (Moore 1996). Moreover, by adopting the ecosystem role of a keystone service provider, the focal organization shares value (Iansiti and Levien 2004a) with the entire ecosystem by providing direct services that lower the barriers of ecosystem membership, which in turn, enables a larger pool of entities to participate in the ecosystem.

Through these mechanisms, the focal organization can establish itself at the center of ecosystem value creation. Centrality enables the organization to effectively influence the development of the DBE and subsequently, leverage the DBE for the attainment of

partnering agility (Koka and Prescott 2008; Pierce 2009). Moreover, by lowering the barriers of participation, and supporting the attraction of new ecosystem members, these mechanisms enable the DBE to attain self-sustaining critical mass. Critical mass is particularly important in the initial phase of DBE development as it (1) is the key enabler of effective collective action (Hargrave and van de Ven 2006; Oliver et al. 1985), and (2) facilitates the attraction and retention of ecosystem members (Moore 1996), which is important because in networked competition, network entities tend to be highly mobile unless barriers to switching have been instituted (Pierce 2009).

The attainment of network centrality and critical mass gives rise to the formation of a hub-and-spoke ecosystem and positions the focal organization as a core firm at the center of the network. The hub-and-spoke ecosystem in turn, can be leveraged for a basic *"sense-and respond"* type of partnering agility (Overby et al. 2006) through two distinct mechanisms. First, the hub-and-spoke network configuration enhances the sensing capabilities of the core firm as its immediate ties with the other entities in the ecosystem enable the firm to solicit direct feedback, providing it with critical information on the needs of these members (Koka and Prescott 2008). Second, the centrality of the core firm in the ecosystem enhances its ability to respond to detected needs as similar entities within the ecosystem tend to have similar needs, and organizational actions taken in response to the expressed needs of a small subset of members may effectively benefit all entities within the ecosystem concurrently (Blyler and Coff 2003).

5.2.2 Phase 2: Nurturing Internal Networks and Fortifying Ecosystem Boundaries

In the second phase of ecosystem development, Alibaba's strategies were aligned with the guerilla logic in that they were centered on the acquisition/development of search

engine (i.e. Yahoo China) and community building (i.e. Koubei) capabilities; self-serving, internal organizational capabilities meant to disrupt the basis of business competition for existing (i.e. B2B portals) and future (i.e. Internet portals/ search engines) competitors (D'Aveni 1994; Teece et al. 1997). By augmenting search engine capabilities to their organizational repertoire, Alibaba was able to enhance interactivity within the ecosystem by allowing members to search for and form relationships with one another, and restrict external access to the information of its ecosystem members. Similarly, with the acquisition of community building capabilities, Alibaba was able to strengthen the sense of community among its ecosystem members, which served to enhance interactivity by encouraging them to *"work, spend and play"* on the Alibaba network. Moreover, as a result of the rapid growth of its business ecosystem, Alibaba was forced to relinquish its role as a "hands-on" service provider and take on the role of a keystone platform provider, sharing value with the ecosystem by providing the backend platform for information-sharing, interactions and transactions. By relinquishing direct control over its ecosystem members, interactivity within the ecosystem was further enhanced as frequent, rich and autonomous interactions between ecosystem entities were made possible.

Grounded in the empirical data, our model suggests that following the attainment of network centrality and critical mass, in the next phase of ecosystem development, the core firm should (1) pursue strategies aligned with a guerilla logic, with a particular emphasis on acquiring/developing capabilities that enhance internal interactions within the ecosystem and minimize external interactions with entities outside the ecosystem, and (2) adopt the ecosystem role of a keystone platform provider. By acquiring/developing capabilities that enhance internal interactions and adopting the ecosystem role of a

keystone platform provider, the core firm can provide opportunities for ecosystem members to exchange diverse information and knowledge that enable the creation of unique value (Koka and Prescott 2008), enhance the coordination of their activities to strengthen ecosystem value creation, and increase the commitment of its members to the ecosystem (Holm et al. 1999). These mechanisms, in turn, facilitate the formation of informal, autonomous networks within the ecosystem, which can compete with one another for prominence in the ecosystem *"in an escalating game of dueling paradigms"* (Moore 1996), and result in continuous innovation and diversity in ecosystem value creation. In addition, with the acquisition/development of capabilities that minimizes external interactions with entities outside the ecosystem, the core firm is able fortify the boundaries of the ecosystem by establishing barriers that prevent its network resources from leaking into the external environment. This serves to protect the competitive advantage of the ecosystem from the competitive actions of rival business networks (Dyer and Singh 1998).

The formation of informal, autonomous networks between ecosystem entities and the fortification of ecosystem boundaries leads to the development of a networked ecosystem. The networked ecosystem in turn, can be leveraged for an advanced, *"predictive"* form of partnering agility. This is because the core firm, which manages the platform for internal interactions in its capacity as a keystone platform provider, is able to move beyond sensing and responding reactively to the existing and expressed needs of its members, to monitoring and analyzing the interactions between its members to anticipate future and unexpressed needs, and subsequently, respond proactively to those needs (Chandra and Kumar 2001).

5.2.3 Phase 3: Fostering Symbiotism

The phenomenal success that resulted from granting its members autonomy in forming informal networks provided Alibaba's management with an indication of the potential benefits of an organic, self-organizing ecosystem. Consequently, influenced by a new ecosystem-oriented mentality that was rapidly taking hold across the organization, the strategies enacted by Alibaba in the third phase of ecosystem development were centered on the development of ecosystem capabilities meant for the benefit of its members that conferred little or no direct benefits on Alibaba itself. These strategies, aligned with the complexity logic (Iansiti and Levien 2004a; Lengnick-Hall and Wolff 1999), include the development of capabilities for business expansion (i.e. Aliloan), online marketing and online advertising revenue generation (i.e. Alimama) for its ecosystem members. In addition, in line with the new ecosystem-oriented mentality, Alibaba's role within the ecosystem evolved from a backend platform provider into a utility computing service provider (Carr 2008; Ross and Westerman 2004) as it expanded its backend role to provide a comprehensive suite of applications and online tools that catered to its members' every need (i.e. Alisoft). The strategic intent underlying Alibaba's strategies and its new ecosystem role was to strengthen their members and enable them to contribute more to networked value creation. In doing so, Alibaba was able to foster symbiotic relationships between its members and itself, and channel the resources and actions of disparate ecosystem entities towards the collective good that enhanced the health and overall competitiveness of the business ecosystem.

Based on the case data, our model suggests that when ecosystem development is at an advanced stage, the core firm should (1) pursue strategies aligned with a complexity logic

and (2) adopt the ecosystem role of a keystone utility computing service provider. The enactment of strategies aligned with a complexity logic leads to a number of important consequences. First, by providing the means of capability development for the other entities in the ecosystem, there is increased mutual interdependence between the core firm and the other entities, which enhances ecosystem value creation (Holm et al. 1999) and serves as the foundation for stability, productivity and creativity in the ecosystem (Iansiti and Levien 2004a). Second, by strengthening the organizational capabilities of the other entities in the ecosystem, the core firm enhances its goodwill and social relations with the other entities in the ecosystem, which provide the opportunity, motivation and ability for solidarity and collective action (Adler and Kwon 2002). Third, by facilitating ecosystem capability development and becoming more valuable to the other entities, the core firm simultaneously gains power and control within the ecosystem, and enables greater diversity in ecosystem value creation. This results in conflicting forces that simultaneously pulls the ecosystem towards stability and instability, positioning the ecosystem at the *"edge of chaos"* (Brown and Eisenhardt 1997) that primes the ecosystem for innovation and continuous change (Stacey 1995). In addition, by adopting the role of a keystone utility computing service provider, the core firm lowers the costs of IT, provides on-demand IT capacity, and more importantly, enhance the strategic focus of their ecosystem members by enabling them to concentrate on their core competencies (Ross and Westerman 2004).

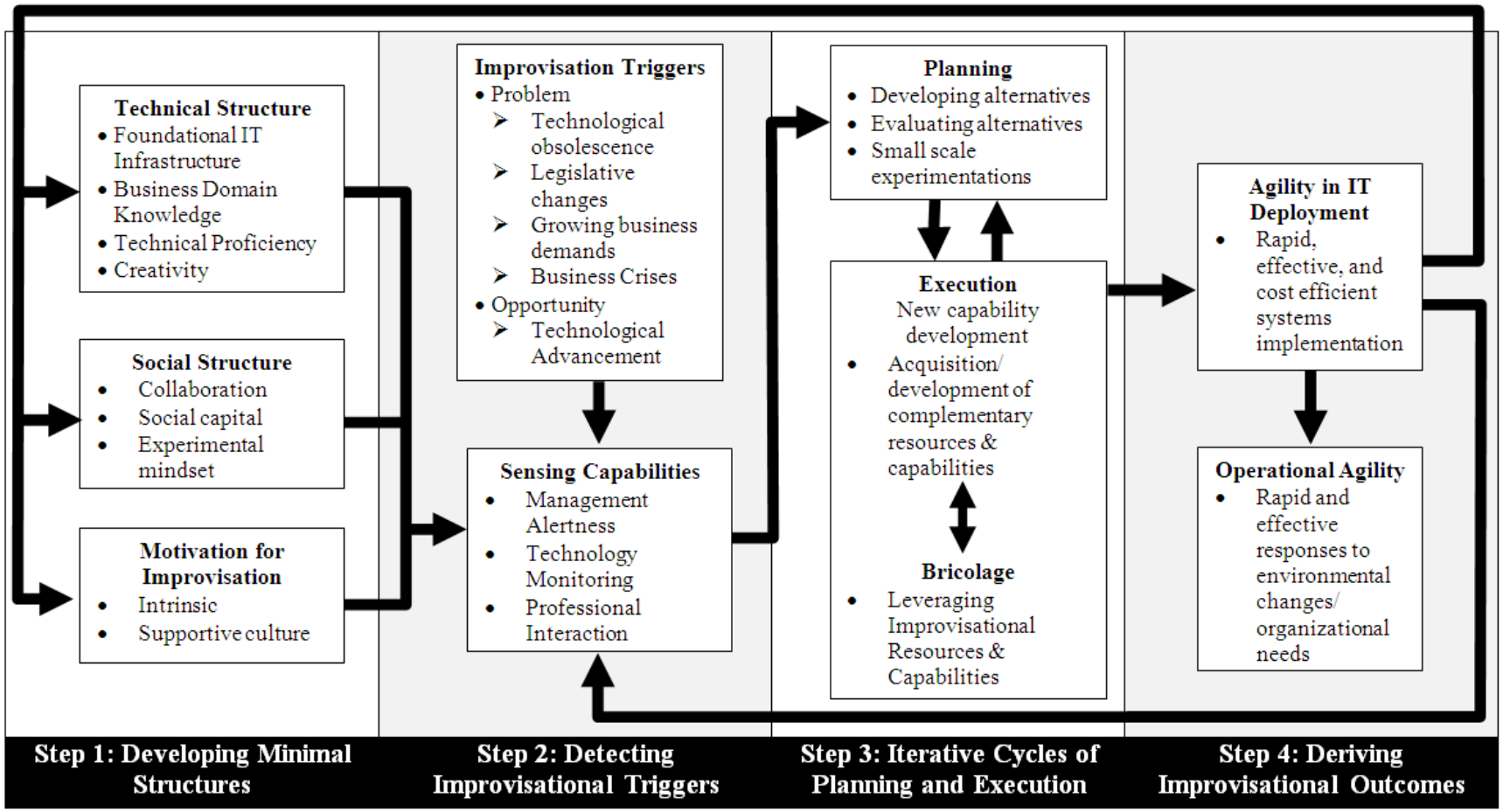
By increasing mutual interdependence, creating the conditions for solidarity and collective action, priming the ecosystem for innovation and continuous change, and enhancing the strategic focus of its ecosystem members, a *"co-evolving, symbiotic, self-*

reinforcing system of strategic contributions" is formed (Moore 1996) that gives rise to a symbiotic ecosystem. As the entire ecosystem functions as a single entity, utilizing communal resources and capabilities towards the shared objectives of the ecosystem, individual ecosystem entities may be engaged in the co-production of innovations (Lengnick-Hall 1996), which precipitates a *"collective"* form of partnering agility. Relative to the two previous forms of partnering agility, collective agility facilitates an even faster and more effective response to the needs of ecosystem members. This is because collective agility (1) invalidates the need to sense or anticipate those needs, (2) enables the concurrent development of a near-infinite range of personalized innovations, and (3) provides the strongest assurances that the innovations pursued are in line with its members needs (Tan et al. 2010), since the innovations are tailor-made for ecosystem members by the members themselves.

5.3 The Attainment of Operational Agility

By integrating the different patterns in which improvisation in IT deployment was enacted across the three distinct phases of systems implementation, a process model of routinized improvisation in IT deployment (refer to Figure 11) can be inductively derived. As our model suggests, the process of improvisation in IT deployment can be decomposed into 4 cyclical steps. Given that our model is inductively derived from the CCP case study data, the following stream of reporting provides an explanation of how the existing literature corroborates our model and how the model enriches the existing perspectives of agile IT deployment and IT-enabled enterprise agility.

Figure 6: Process Model of Routinized Improvisation in IT Deployment



5.3.1 Step 1: Developing the Means for Improvisation

Based on the empirical evidence across the three phases of IT deployment at CCP, our model suggests that improvisation is a viable alternative to conventional, pre-mediated systems development methodologies (e.g. Markus and Tanis 1999) for practitioners confronted with resource constraints or time pressures, and an effective means of achieving agility in IT deployment (Pavlou and El Sawy 2010). However, to enable improvisation, the first step an organization must take is to develop the means to do so, which comprises of the ability and motivation to improvise with IT (Kamoche et al. 2003). Similar to organizational improvisation, the ability to improvise in IT deployment consists of a composite '*minimal structure*' (see Eisenberg 1990) made up of a technical structure and a social structure (Kamoche et al. 2003).

In the context of improvisation in IT deployment, the technical structure refers to the knowledge, skills, and abilities related to the techno-structural aspects of deploying IT (Cunha et al. 2003). Based on the case data, the technical structure may consist of a foundational IT infrastructure, business domain knowledge, as well as the technical proficiency and the creativity of the personnel involved in IT deployment. On the other hand, since improvisation in IT deployment is necessarily a collective form of improvisation (e.g. Faia-Correia 2003), the social structure refers to the behavioral norms and communicative codes that regulate coordination and collective action in a given context (Cunha et al. 2003). From the case study, the social structure may comprise the capability for collaboration, the cumulative social capital, as well as an organizational mindset that is open to experimentation, risk taking, and the possibility of failure. In addition to the ability to improvise with IT, the motivation to do so is important as well

(Crossan et al. 1996; Kamoche et al. 2003). However, our case study reveals that this motivation tends to be intrinsic in nature and can take the form of a collective sense of responsibility, or a supportive culture characterized by a strong, collectively held sense of mission. Table 23 provides a summary of the constituent elements of the means of improvisation, the illustrative examples of each element from our case study, and the supporting theoretical arguments from the existing literature.

Table 23: Developing the Means of Improvisation

Element	Illustrative Examples from Case Data	Corroborating Arguments
Technical Structure		
Foundational IT Infrastructure	The systems implemented in the *U-Phase* built on the IT infrastructure developed in the *M-Phase*, which in turn, built on the ERP system developed in the *E-Phase*	Existing IT infrastructure can leveraged in novel ways to resolve unexpected problems and seize emergent opportunities (Orlikowski 2000)
Business Domain Knowledge	The business domain knowledge accrued from managing the DOS-based system and gained from interactions with the business units were crucial to CCP's ability to improvise in the *E-* and *U-Phases* respectively	Business domain knowledge encompasses the procedural and declarative memory of an organization's operations, both of which influence the quality of improvisation (Moorman and Miner 1998)
Technical Proficiency	Informants noted that they have reached a *"certain level of technical competency"* by the time of the M-Phase which makes the implementation of the initiatives of the phase faster and easier	Technical proficiency relates to the procedural memory of the organizational IT function, which has an effect on the quality of improvisation (Moorman and Miner 1998)
Creativity	Creativity was key to deriving the architecture of CCP's ERP system from existing commercial offerings in the *E-Phase*, and delivering IT solutions in response to the management's directives in the *U-Phase*	Improvisation requires the subconscious processing and creativity that characterizes intuition (Crossan 1998)
Social Structure		
Collaboration	Collaboration between the business units and the IT department led to the development of systems that were	Teamwork quality, related to collaboration and trust, has a positive influence on the

	tailored to CCP's business processes in the *M-* and *U-Phases*	quality of improvisation (Vera and Crossan 2005)
Social Capital	Prolonged interactions and growing familiarity led to mutual understanding and openness which enabled the clear specification of the business units' IT needs in the *M-* and *U-Phases*	The social experience of collective improvisation has a powerful influence on the process of improvisation (Kamoche et al. 2003)
Experimental Mindset	Cultivation of an experimental mindset led to the willingness to experiment, take risks and tolerate failure in the *E- and U-Phases*	An experimental mindset enhances the relationship between improvisation and innovation (Vera and Crossan 2005)
Motivation for Improvisation		
Intrinsic Motivation	Motivation for improvisation is intrinsic in nature, evidenced by the sustained drive for improvisation despite the lack of material rewards in the *M-Phase*	Intrinsic motivation is required for tasks that demand creativity (Osterloh and Frey 2000)
Supportive Culture	The "can-do spirit" and the "culture of innovation" at CCP created an organizational culture that was conducive to improvisation	Effective improvisation requires a supportive culture characterized by a common goal and shared responsibility (Vera and Crossan 2005)

5.3.2 Step 2: Detecting Improvisation Triggers

After an organization has developed the means for improvisation, the empirical evidence from our case study suggests that a trigger is necessary for the initiation of improvisation in IT deployment. This is in line with the notion that improvisation is typically a response to some form of stimulus (Crossan 1998). As in the case of organizational improvisation, the trigger of IT improvisation can take two forms: a problem (i.e. a negative trigger) or an opportunity (i.e. a positive trigger) (Miner et al. 2001). Moreover, our case study reveals that sometimes both types of triggers can manifest at the same time to influence the nature of IT improvisation. For example, in the *M-Phase,* the internal demand for mobile applications and the realization of the need of wireless connectivity as a result of the construction accident could only be resolved due to the availability of 3G and Wi-Fi technology.

Furthermore, our model suggests that the mere presence of a triggering factor in the external or internal organizational environment is insufficient. The trigger must also be sensed and interpreted in order to effect improvisation in IT deployment (Crossan 1998). The CCP case also reveals a number of interesting aspects about how improvisation triggers can be detected and acted upon. Sometimes, detection can be automatic as in the case of an announced legislative change. But more frequently, detection may require a number of sensing capabilities (Cunha et al. 2003) which can be in the form of managerial alertness, deliberate technology monitoring (for triggers that arise from the technological landscape), and professional interactions. These sensing capabilities are in turn, influenced by the ability and motivation for improvisation (Moorman and Miner 1998; Weick 1998). For example, in the *U-Phase* of our case study, the alertness displayed by the Senior Executive Vice President to the promise of IP-PBX and QR-Code technologies stems from his confidence in the IT department's capability to deliver a solution. A summary of the key elements of this step of the process, the illustrative examples of each element from our case study, and propositions from prior research that corroborate our argument is presented in Table 24.

Table 24: Detecting Improvisation Triggers

Element	Illustrative Examples from Case Data	Corroborating Arguments
Negative Improvisation Triggers		
Technology Obsolescence	Obsolescence of the DOS-based system provided the impetus for the implementation of their ERP system in the *E-Phase*	Technology obsolescence breaches the expectation of continuity and stimulates efforts towards restoring normalcy (Weick et al. 2005)
Legislative changes	The GPS vehicle tracking system of the *U-Phase* came about as a result of legislative changes that mandated the tracking of trucks transporting hazardous materials	Legislative changes are a form of coercive pressure (DiMaggio and Powell 1983) that induces change

Growing business demands	The Push Mail application of the *M-Phase was developed* at the request of CCP's managers	Triggers for improvisation may stem from internal demands *"as an organization may be unsatisfied with its present state and create a new vision for itself"* (Cunha et al. 2003)
Business crises	The construction accident in the *M-Phase* led to the realization of the need for wireless data transmission	The occurrence of crisis events tends to effect more radical forms of improvisation (Vera and Crossan 2005)
Positive Improvisation Triggers		
Technological Advancement	The emergence of 3G and Wi-Fi technologies facilitated the initiatives of the *M-Phase*	Technological advancement can give rise to new opportunities that induces improvisation (Miner et al. 2001)
Sensing capabilities		
Managerial Alertness	The Senior Executive Vice President was alert to the availability and business potential of IP-PBX and QR-Code technologies in the *U-Phase*	Managerial alertness enables a firm to sense product-market discontinuities and visualize how organizational resources can be orchestrated and exploited (Sambamurthy et al. 2003)
Technology monitoring	CCP delegated a number of staff members to monitoring the technological landscape to keep abreast of the latest developments	Technology monitoring enhances systemic insight which refers to the ability to visualize connections between IT capabilities and emerging market opportunities in architecting competitive actions (Sambamurthy et al. 2003).
Professional interactions	CCP was able to react to the changes to Microsoft's operating system before they were announced due to interactions with external IT communities-of-practice in the *E-Phase*	Professional interactions can enhance the organization's ability to sense environmental changes and emergent opportunities (Wenger and Snyder 2000)

5.3.3 Step 3: Iterative Cycles of Planning and Execution

After the detection of an improvisation trigger, our process model suggests that the actual act of improvisation can be initiated (Crossan 1998). Our case study reveals that the process of improvisation in IT deployment involves iterative cycles of planning and execution. For instance, in the *U-Phase* of the case study, we noted that CCP was trying to design an application that utilized QR-Code technology while developing prototype solutions at the same time (e.g. printing a huge QR-Code on the side of their trucks). This is in line with the conceptualization of improvisation as *"the conception of action as it unfolds"* (Kamoche et al. 2003)

Similar to organizational improvisation, the empirical evidence from our case study suggests that improvisation can be enacted through two different means: bricolage and capability development (Baker and Nelson 2005). However, the case of the CCP appears to suggest that in the context of improvisation in IT deployment, improvisation is a combination of some extent of bricolage and capability development, as opposed to either means exclusively (Miner et al. 2001; Moorman and Miner 1998). Moreover, the choice between bricolage and capability development appeared to be contingent on two factors: cost and the confidence of the IT department in delivering the solution. For example, in the *M-Phase,* although the IT department possessed the technical competencies and wrote most of the mobile apps of the phase themselves, they nevertheless bought a number of pre-written apps if they thought the apps would save them time and money. However, for the implementation of the IP-PBX telephone system in the *U-Phase,* although the IT department was provided with the resources to purchase an expensive 'off-the-shelf' package, they chose to improvise a solution as they were confident of their ability to

deliver. Table 25 summarizes the key elements of the process of improvisation, the illustrative examples of these elements from our case study, and the propositions from the existing literature that corroborates our argument.

Table 25: Iterative Cycles of Planning & Execution

Planning		
Element	**Illustrative Examples from Case Data**	**Corroborating Arguments**
Developing and evaluating alternatives	CCP conducted trials using RFID and ETC technologies as alternatives to QR-Code technology in the *U-Phase*	The creation and exploration of alternatives is a critical aspect of improvisation (Eisenhardt 1997)
Small scale experimentations	The IT department conducted a number of experiments using QR-Code technology (e.g. printing a large QR-Code on the side of a truck) during the *U-Phase*	Improvisation requires tolerance for errors (Crossan 1998), which can inform subsequent attempts at improvisation (Barrett 1998)
Execution		
Development of complementary resources & capabilities	The IT department entered a partnership with Lian Quan for their technology and systems development capabilities in the *E-Phase* and purchased pre-written mobile apps and customized them in the *M-Phase*	Improvisation can be enacted through the acquisition of the appropriate levels and types of resources that the existing challenges demand (Baker and Nelson 2005)
Bricolage of improvisational resources and capabilities	Bricolage of the creativity and technical skills of the IT department was evident in the *E-Phase* (in referencing and redesigning commercial ERP packages), and the *M-Phase* (in the efficient development of mobile apps)	Improvisation can be enacted through bricolage along 5 domains: physical inputs, labor, skills, customers, and the institutional environment (Baker and Nelson 2005).

5.3.4 Step 4: Deriving Improvisational Outcomes

The final step of improvisation in IT deployment involves the derivation of improvisational outcomes. Based on the data of our case study, our process model suggests that improvisation leads to agility in IT deployment as it enables a rapid, effective and cost efficient means of systems implementation. Given the resource

constraints reported at CCP, improvisation might also be seen as the means for the implementation of a solution that would otherwise have been impossible (Baker and Nelson 2005). Agility in IT deployment, in turn, facilitated operational agility as the implemented systems enabled rapid and effective responses to the triggers of improvisation across the three phases, which could be in the form of a business need, an emergent opportunity or an unexpected problem (Overby et al. 2006; Sambamurthy et al. 2003). In addition, the experience, skills, knowledge, and infrastructure that underlies improvisation in IT deployment are developed over the course of improvising, which serves to enhance the ability and motivation to improvise, and the organizational capability to detect triggers of improvisation in the external and internal organizational environment (Crossan et al. 2005; Moorman and Miner 1998). A summary of the key elements of this step of the process, the illustrative examples of each element from our case study, and the relevant excerpts from prior research that support the propositions of our process model is presented in Table 26.

Table 26: Elements of the Means of Improvisation

Agility in IT Deployment		
Element	**Illustrative Examples from Case Data**	**Corroborating Arguments**
Rapid, effective and cost efficient systems implementation	Across the three phases, CCP was consistently able to deploy IT effectively at a lower cost and within a shorter time frame	Improvisation eliminates the need for lengthy prior planning exercises (Weick 1998). Bricolage reduces the cost of resource acquisition(Baker and Nelson 2005).
Operational Agility		
Rapid, effective responses to environmental changes and organizational needs	The rapid and effective deployment of IT enabled decisive responses to the environmental triggers of improvisation and provided effective support for the operations of CCP	Improvisation attempts to create something new and useful to the situation, and with certain enabling factors (i.e. related to the means of improvisation) gives rise to effective innovation (Crossan et al. 2005)
Enhancement of improvisation capabilities		
Enhanced means of improvisation	Various aspects of the ability and motivation for improvisation are enhanced in each phase and leveraged in subsequent iterations of improvisation.	Improvisation capabilities improve with practice (Vera and Crossan 2005) and successful improvisation increases the motivation for improvising (Kamoche et al. 2003).
Enhanced sensing capabilities	Successful improvisation in the prior phases enhanced the confidence of the management in exploring IT related opportunities in the *U-Phase*	Experience enhances intuition (Crossan and Sorrenti 1997), which facilitates the ability to see the environment in its full richness and complexity (Crossan 1998)

CHAPTER 6: CONCLUSION

6.1 Limitations and Future Research

This thesis is not without its limitations. Although the single case research method used in addressing each of our research questions is a *"typical and legitimate endeavor"* in qualitative research (Lee and Baskerville 2003), a common criticism of the methodology is the problem of generalizability or external validity (Walsham 2006). However, while it must be readily acknowledged that the single case research method makes statistical generalization impossible, we nevertheless assert that the single case studies of our thesis are valid and generalizable beyond their singular contexts as the developed process models are not only grounded in the empirical reality of real world organizations, but also corroborated by the propositions of some of the most established works in management and IS literature. As such, this study invokes the principles of "analytic generalization" (Yin 2003) or what some researchers refer to as *"generalizing from description to theory"* (Lee and Baskerville 2003). Nevertheless, future research can be directed at statistically validating the propositions of our process models, so that the boundary conditions of the inductively derived theories that constitute this thesis can be better defined.

A second limitation of this study concerns the retrospective nature of the personal interviews that form our primary source of data. Given that our account of the events, decisions and activities that unfolded at HWZ, Alibaba and CCP spanned periods of almost 10, 11, and 9 years respectively, it must be acknowledged that a synchronous approach to data collection would be impossible. However, as retrospective responses are susceptible to errors of recall (Glick et al. 1990), we have tried to circumscribe the

problem by only having informants who were intimately involved in the events of the relevant periods of interest (Pan et al. 2007), and focus our interviews on only the major incidents that could be reliably recalled. In addition, a systematic data verification procedure was adopted to ensure that all the information used in this study were was verified by the organization (Neuman 2005), and triangulated by at least two sources of data (Klein and Myers 1999).

A third limitation is that despite our efforts to be as inclusive as possible, we must acknowledge that it is impossible to exhaustively describe all the possible mechanisms for achieving the various forms of enterprise agility within a single study. While we are bounded by feasibility concerns and the limits of the data collected, future research can certainly investigate mechanisms beyond those that have been examined in this study. Possible mechanisms for the attainment of customer, partnering and operational agility, for example, may include the development of online social networks (Kumar et al. 2010), the enactment of boundary spanning strategies and capabilities (Du and Pan 2010), and organizational control (Goh et al. 2010) respectively.

Finally, a fourth limitation related specifically to our second case study is that the agility-enabling mechanisms described are constrained to the context of a core firm operating within a DBE (i.e. Alibaba). However, it must be noted that a DBE consists of other peripheral entities that form niche markets within the ecosystem as well (Pierce 2009), and while the enhanced integration and collaboration afforded by DBEs (Riggins and Rhee 1998) may similarly result in partnering agility for these peripheral entities (Adner 2006; Teece 2007), the mechanisms for the attainment of partnering agility may conceivably be very different. Although it must be acknowledged that it is impossible to

exhaustively describe all the agility-enabling mechanisms of DBEs for all types of ecosystem members within a single study, examining the ways in which DBEs can be leveraged for partnering agility for these peripheral entities may certainly be a fruitful avenue for future inquiry, and will provide a more complete picture of the networked perspective of IT-enabled enterprise agility.

6.2 Theoretical Contributions

By addressing the research questions set forth at the beginning of this paper, this thesis makes several important theoretical contributions.

6.2.1 Overall Contributions of the Thesis

First, this thesis provides three empirically grounded frameworks that contribute towards addressing the lack of empirical studies in IT-enabled enterprise agility research (Tan et al. 2009). In doing so, it is hoped that this study can serve as a precedent for future research in the derivation of empirically supported models and propositions, so that in complementing the existing conceptual work (e.g. Overby et al. 2006; Seo and La Paz 2008), clarity and theoretical advancement can be achieved.

Second, in constructing detailed process models that depict the primary mechanisms for achieving customer, partnering, and operational agility, this thesis can serve as the basis for deriving concrete and testable propositions for the attainment of IT-enabled enterprise agility. In this way, we hope that this thesis can provide a foundation for future research aimed at validating, extending or establishing the boundary conditions of our theoretical arguments, and serve as the catalyst for more empirical work in this area, so that in reinforcing the studies that have examined the phenomenon from a more abstract level

(e.g. Holmqvist and Pessi 2006; Zain et al. 2005), a more holistic perspective of the phenomenon can emerge.

6.2.2 Specific Contributions of the First Case Study

Third, in relation to our first case study, although VCs have been suggested as one of the primary IT-enabled means for attaining customer agility (Nambisan 2002; Porter and Donthu 2008), there is scant research to date on the association between this specific IT artifact and customer agility. In addition to being one of the first in-depth studies of this association, this study also challenges the existing knowledge in this area (as represented by Figure 6). More specifically, the prevailing school of thought seems to be that the VC competencies of managing content, fostering embeddedness and enhancing interactivity, precipitate the development of the VC-enabled digital options of digitized knowledge reach and richness. The two VC-enabled digital options, in turn, give rise to the creation of organizational value through the logic of opportunity in which the resultant customer agility is leveraged for the launch of a series of rapid and effective innovations.

In contrast, our inductively derived process model reveals that the enactment of the various VC competencies should be sequenced according to the maturity of the VC (i.e. managing content and enhancing interactivity when the VC is in the nascent stage, fostering embeddedness when the VC is in the formative stage, and granting autonomy – a fourth VC competence – when the VC finally reaches maturity). Moreover, distinct VC-enabled capabilities (i.e. critical mass and collective community action, in addition to the two VC-enabled digital options) are developed when different VC competencies are applied in the various stages, and customer agility can only be attained in the formative

stage when the VC consists of a sufficiently diverse array of members that can provide indications on the overall needs of the VC (Kim 2000; Mohammed et al. 2004).

Fourth, the first case study also makes a contribution to the literature on IT-enabled organizational value creation. In particular, the contemporary thinking in this area is that any form of competitive advantage must be fleeting and unsustainable due to the unprecedented turbulence and unpredictability of the modern competitive landscape (McAfee and Brynjolfsson 2008; Sull 2009). Consequently, more recent studies have emphasized the role of IT in facilitating the logic of opportunity for a series of temporary competitive advantages as the primary means of IT-enabled organizational value creation (e.g. Overby et al. 2006; Sambamurthy et al. 2003). However, our study has demonstrated that despite a dynamic organizational environment; which transitioned from a state of stability, to a state of turbulence, and back again as a result of the emergence and subsidence of the dotcom crisis, the logics of positioning and leverage can also be salient to IT-enabled organizational value creation. As such, we contend the underlying mechanisms of IT-enabled organizational value creation are not solely determined by the state of the organizational environment, but the nature of and the organizational capabilities enabled by the focal IT artifact as well. In particular, if the organizational capabilities enabled by the IT artifact can (1) help in the identification, attainment and retention of an attractive market position (Porter 1996), or (2) provide competitive advantage for the focal organization, and yet, are inimitable by existing and potential competitors (Barney 1991; Peteraf 1993), then, in spite of turbulent environmental conditions, the focal IT artifact may yet be able to facilitate organizational value creation through the logics of positioning or leverage respectively.

6.2.3 Specific Contributions of the Second Case Study

Fifth, although a technology-enabled platform that facilitates inter-firm collaboration has been identified as one of the primary mechanisms for attaining partnering agility (Sambamurthy et al. 2003), there is a lack of research on how such a platform may be nurtured and exploited. Focusing on the DBE as a specific instance of a technology-enabled platform, the second case study of our thesis contributes to the state of existing knowledge by examining how specific combinations of the strategies and ecosystem roles of a core firm may contribute to the development of a DBE, and how the DBE, in the various stages of its development, can be leveraged for differing levels of partnering agility. In addition, by examining how partnering agility was attained through the development and leverage of a DBE at Alibaba, this study contributes to a networked perspective of IT-enabled enterprise agility and provides important indications for firms that have the ability and motivation to operate as a core firm within business networks. In doing so, this study complements the existing perspectives that emphasize internal organizational processes such as the development of IT capabilities (e.g. Weill et al. 2002) and organizational learning (e.g. Sambamurthy et al. 2003) as the means of achieving enterprise agility, and contributes to a more holistic perspective of IT-enabled enterprise agility.

Sixth, the second case study also makes an important contribution to the literature on business ecosystems. Although previous studies have identified a number of antecedents of ecosystem development (e.g. Iansiti and Levien 2004b; Moore 1993), this study takes a step further by describing and explaining the dynamics of ecosystem development. More specifically, our second case study reveals the sequence of strategies that a core

firm should employ as well as the complementarities between the strategies and ecosystem roles that a core firm could adopt. Moreover, while prior research have suggested that business ecosystems can facilitate partnering agility by enhancing the organizational ability to sense and respond to market and technological opportunities (Teece 2007), and facilitating the co-creation of effective and timely innovations (Adner 2006), this study advances the state of knowledge by making a conceptual distinction between the different stages of ecosystem development, and providing detailed explanations of the underlying mechanisms through which each of the stages gives rise to partnering agility.

6.2.4 Specific Contributions of the Third Case Study

Seventh, in tracing the development of a specific mechanism (i.e. improvisation in IT deployment) for agile IT deployment in its entirety, the process model constructed in the third case study takes an important step towards addressing the lack of knowledge on the attainment of agility in IT deployment. This is significant as agility in IT deployment is viewed as one of the primary means of achieving operational agility (Mathiassen and Pries-Heje 2006; Tiwana et al. 2003). Moreover, in providing insights about how improvisation in IT deployment leads to operational agility, this study has opened the "black box" of the relationship between agile IT deployment and operational agility (e.g. Donnellan and Kelly 2005; Hovorka and Larsen 2006). By doing so, this study sheds light on a number of theoretical constructs, as well as the relationships and temporal sequence between them, which are pertinent to agile IT deployment and the broader concept of IT-enabled enterprise agility. In this way, it is hoped that this study can serve as a signpost for future research and contribute towards addressing the lack of clarity,

unified direction, parsimony, and a cumulative research tradition that characterizes the existing research in this area (see Conboy 2009; Dyba and Dingsøyr 2008).

Finally, this study also makes two important contributions to the literature on organizational improvisation. First, although the generic process of organizational improvisation can be inferred from the cumulative research in the area (as in Figure 7), our review of the literature has failed to identify a single process model that describes and explains the intricacies and dynamics of improvisation. The process model developed in this article is thus an important contribution, as it not only describes the necessary conditions for successful improvisation, but structures them in a step-by-step "*recipe that strings (the conditions) together in such a way as to tell the story of how (the outcome) occurs whenever it does occur"* (Mohr 1982). Second, while prior research have suggested that the ability to improvise improves with practice (Vera and Crossan 2005), and each successive iteration enhances the memory, expertise, coordination and communications that are required for organizational improvisation (Crossan et al. 2005; Moorman and Miner 1998), our suggestion that this capability can be routinized for repeated application is novel and goes against the conventional school of thought (e.g. Bergh and Lim 2008). As our arguments are corroborated by the empirical evidence from the CCP case, it at least suggests the need for more research in this area so that the boundary conditions surrounding our arguments can be better defined.

6.3 Practical Contributions

Beyond its theoretical implications, this thesis also makes a number of contributions to practice. For VC sponsors and managers, our first case study is significant in that it provides a comprehensive and empirically supported framework for leveraging their

investments in VCs. Given that a VC carries both opportunities and risks for the sponsoring organization (see, e.g. Preece 2001; Walden 2000), the process model developed from the case study can serve as a detailed roadmap for practitioners to identify the potential pitfalls and "missing links" associated with nurturing and leveraging a VC. In particular, by describing and explaining the specific mechanisms for developing and leveraging a VC across the various stages of the VC development lifecycle (e.g. Lee et al. 2005; Mohammed et al. 2004), this study should be especially useful for the majority of sponsoring organizations and VC practitioners who have been unable to translate their resource investments in VCs into economic returns, as it helps to identify the appropriate remedial measures to re-align their investments in VCs to the path of commercial success.

For organizations operating in the networked economy and the managers of the core firms in business networks in particular, our second case study is significant in that it provides a holistic and systematic framework for the development and subsequent leverage of a DBE. More specifically, the process model developed from the case study has identified the crucial drivers of DBE development, and provided important indications on how a DBE, in the various stages of its development, can be leveraged for different levels of enterprise agility. Moreover, in tracing the antecedents, nature and implications of DBE development from its initial formation to maturity, this study should be useful for practitioners managing DBEs in varying stages of development. In particular, it is hoped that practitioners who face difficulty in advancing the development of their ecosystems or leveraging their ecosystems for tangible gains can use the process model as a detailed roadmap to identify the appropriate remedial actions, so that they can

make the most of the efforts and resources invested in managing their DBEs, and exploit their fullest potential.

For managers overseeing the implementation of new IT initiatives, our third case study is significant in that it provides a detailed blueprint for the development and routinization of the capability to improvise during the deployment of IT. If improvisation can enhance the creativity, efficiency and effectiveness (Crossan et al. 2005; Orlikowski 1996; Weick 1998) of IT deployment, and provide the means for the implementation of a IT system that would otherwise have been impossible (Baker and Nelson 2005), then improvisation can be a key mechanism for the attainment of the capability for agility in IT deployment (Hovorka and Larsen 2006). Moreover, if the capability for improvisation can be routinized for repeated application, then it essentially means that the organization has acquired a consistent mechanism for sensing market opportunities and developing IT-enabled solutions to seize the opportunities with speed and surprise (Sambamurthy et al. 2003). This is because the ability to be consistently agile in deploying IT is associated with operational agility (Mathiassen and Pries-Heje 2006), which creates strategic benefits for the organization by enabling the creation of a series of transient competitive advantages amidst the turbulence of the contemporary business landscape (Overby et al. 2006).

In particular, the process model developed in the third case study is useful as it has not only identified the crucial enabling factors, environmental triggers, necessary steps, and potential benefits of improvisation in IT deployment, but provided specific and actionable prescriptions for how the capability can be reinforced iteratively and leveraged for repeated application as well. This should be especially relevant for practitioners who face

resource constraints or time pressures in IT deployment as they can use our prescriptions to identify the appropriate actions and steps to undertake, so that they can leverage their existing resources and capabilities to develop innovative solutions to the problems at hand, and consequently, maximize the speed and effectiveness of IT deployment.

REFERENCES

Abrahamsson, P., Conboy, K., and Wang, X. 2009. "'Lots Done, More to Do': The Current State of Agile Systems Development Research," *European Journal of Information Systems* (18:4), pp. 281-284.

Adler, P.S., and Kwon, S.-W. 2002. "Social Capital: Prospects of a New Concept," *Academy of Management Review* (27:1), pp. 17-40.

Adner, R. 2006. "Match Your Innovation Strategy to Your Innovation Ecosystem," *Harvard Business Review* (84:4), pp. 98-107.

Adrot, A., and Robey, D. 2008. "Information Technology, Improvisation and Crisis Response: Review of the Literature and Proposal for Theory," in: *AMCIS 2008 Proceedings*.

Amit, R., and Zott, C. 2001. "Value Creation in E-Business," *Strategic Management Journal* (22:6-7), pp. 493-520.

Armstrong, A., and Hagel, J., III. 1996. "The Real Value of on-Line Communities," *Harvard Business Review* (74:3), pp. 134-141.

Armstrong, A.G., and Hagel, J., III. 1995. "Real Profits from Virtual Communities," *Mckinsey Quarterly* (1995:3), pp. 127-141.

Asvanund, A., Clay, K., Krishnan, R., and Smith, M.D. 2004. "An Empirical Analysis of Network Externalities in Peer-to-Peer Musich Sharing Networks," *Information Systems Research* (15:2), pp. 155-174.

Austin, R.D., and Devin, L. 2009. "Weighing the Benefits and Costs of Flexibility in Making Software: Towards a Contingency Theory of the Determinants of Development Process Design," *Information Systems Research* (20:3), pp. 462-427.

Bacharach, S.B. 1989. "Organizational Theories: Some Criteria for Evaluation," *Academy of Management Review* (14:4), pp. 496-515.

Baker, T., Miner, A.S., and Eesley, D.T. 2003. "Improvising Firms: Bricolage, Account Giving and Improvisational Competencies in the Founding Process," *Research Policy* (32:2), pp. 255-276.

Baker, T., and Nelson, R.E. 2005. "Creating Something from Nothing: Resource Construction through Entrepreneurial Bricolage " *Administrative Science Quarterly* (50:3), pp. 329-366.

Balasubramanian, S., and Mahajan, V. 2001. "The Economic Leverage of the Virtual Community," *International Journal of Electronic Commerce* (5:3), SPR 2001, pp. 103-138.

Barney, J.B. 1991. "Firm Resources and Sustained Competitive Advantage," *Journal of Management* (17:1), MAR 1991, pp. 99-120.

Barrett, F.J. 1998. "Creativity and Improvisaiton in Jazz and Organizations: Implications for Organizational Learning," *Organization Science* (9:5), pp. 605-622.

Barua, A., and Mukhopadhay, T. 2000. "Information Technology and Business Performance: Past, Present and Future," in *Framing the Domains of It Management: Projecting the Future through the Past*, R.W. Zmud (ed.). Cincinnati, OH: Pinnaflex Educational Resources.

Baskerville, R.L., Mathiassen, L., and Pries-Heje, J. 2005. "Agility in Fours: It Diffusion, It Infrastructure, It Development and Business," in *Business Agility and Information Technology Diffusion*, R.L. Baskerville, L. Mathiassen, J. Pries-Heje and J.I. DeGross (eds.). New York, NY: Springer.

Bergh, D.D., and Lim, E.N. 2008. "Learning How to Restructure: Absorptive Capacity and Improvisational Views of Structuring Actions and Performance," *Strategic Management Journal* (29:5), pp. 593-616.

Bhattacharya, C.B., and Sen, S. 2003. " Consumer-Company Identification: A Framework for Understanding Consumers' Relationships with Companies," *Journal of Marketing* (67:2), pp. 76-88.

Bieber, M., Engelbart, D., Furuta, R., Hiltz, S.R., Noll, J., Preece, J., Stohr, E.A., Turoff, M., and van de Walle, B. 2002. "Toward Virtual Community Knowledge Evolution," *Journal of Management Information Systems* (18:4), pp. 11-35.

Biernacki, P., and Waldorf, D. 1981. "Snowball Sampling: Problems and Techniques of Chain Referrall Sampling," *Sociological Methods and Research* (10:2), pp. 141-163.

Bjurwill, C. 1993. "Read and React: The Football Formula," *Perceptual and motor skills* (76:3), pp. 1383-1386.

Blaikie, N.W.H. 1991. "A Critique of the Use of Triangulation in Social Research," *Quality and Quantity* (25:2), pp. 115-136.

Blanchard, A.L., and Markus, M.L. 2004. "The Experienced "Sense" of Virtual Community: Characteristics and Processes," *The Database for Advances in Information Systems* (35:1), pp. 65-79.

Blyler, M., and Coff, R.W. 2003. "Dynamic Capabilities, Social Capital, and Rent Appropriation: Ties That Split Pies," *Strategic Management Journal* (24:7), pp. 677-686.

Broadbent, M., and Weill, P. 1993. "Improving Business and Information Strategy Alignment: Learning from the Banking Industry," *IBM Systems Journal* (32:1), pp. 162-179.

Brown, J.S., and Duguid, P. 1991. "Organizational Learning and Communities-of-Practice: Toward a Unified View of Working, Learning, and Innovation," *Organization Science* (2:1), pp. 40-57.

Brown, S.L., and Eisenhardt, K.M. 1995. "Product Development: Past Research, Present Findings, and Future Directions," *Academy of Management Review* (20:2), pp. 343-378.

Brown, S.L., and Eisenhardt, K.M. 1997. "The Art of Continuous Change: Linking Complexity Theory and Time-Paced Evolution in Relentlessly Shifting Organizations " *Administrative Science Quarterly* (42:1), pp. 1-34.

Brown, S.L., Tilton, A., and Woodside, D.M. 2002. "The Case for on-Line Communities," in: *Mckinsey Quarterly*.

Bruque-Camara, S., Vargas-Sanchez, A., and Hernandex-Ortiz, M.J. 2004. "Organizational Determinants of It Adoption in the Pharmaceutical Distribution Sector," *European Journal of Information Systems* (13:2), pp. 133-146.

Butler, B.S. 2001. "Membership Size, Communication Activity, and Sustainability: A Resource-Based Model of Online Social Structures," *Information Systems Research* (12:4), pp. 346-362.

Cao, L., Kannan, M., Xu, P., and Ramesh, B. 2009. "A Framework for Adapting Agile Development Methodologies," *European Journal of Information Systems* (18:4), pp. 332-343.

Carr, N. 2008. *The Big Switch: Rewiring the World from Edison to Google*. New York, NY: W.W. Norton.

Chan, Y.E., and Reich, B.H. 2007. "It Alignment: What Have We Learnt," *Journal of Information Technology* (22:4), pp. 297-315.

Chandra, C., and Kumar, S. 2001. "Enterprise Architectural Framework for Supply Chain Integration," *Industrial Management and Data Systems* (101:6), pp. 290-303.

Ciborra, C. 1996a. "Improvisation and Information Technology in Organizations," in: *ICIS 1996 Proceedings*.

Ciborra, C. 1996b. "The Platform Organization: Recombining Strategies, Structures and Surprises," *Organization Science* (7:2), pp. 103-118.

Conboy, K. 2009. "Agility from First Principles: Reconstructing the Concept of Agility in Information Systems Development," *Information Systems Research* (20:3), pp. 329-354.

Conboy, K., and Fitzgerald, B. 2010. "Method and Developer Characteristics for Effective Agile Method Tailoring: A Study of Xp Expert Opinion," *ACM Transactions on Software Engineering and Methodology* (20:1), pp. 2:1-2:30.

Cothrel, J.P. 2000. "Measuring the Success of an Online Community," *Strategy and Leadership* (20:2), pp. 17-21.

Crossan, M. 1998. "Improvisation in Action," *Organization Science* (9:5), pp. 593-599.

Crossan, M., Cunha, M.P., Vera, D., and Cunha, J.V. 2005. "Time and Organizational Improvisation," *Academy of Management Review* (30:1), pp. 129-145.

Crossan, M., and Sorrenti, M. 1997. "Making Sense of Improvisaiton," in *Advances in Strategic Management*, J.P. Walsh and A.S. Huff (eds.). Greenwich, CT: JAI Press, pp. 155-180.

Crossan, M., White, R.E., Lane, H., and Klus, L. 1996. "The Improvising Organization: Where Planning Meets Opportunity," *Organizational Dynamics* (24:4), pp. 20-35.

Cunha, M.P., Cunha, J.V., and Kamoche, K. 1999. "Organizational Improvisation: What, When, How, and Why," *International Journal of Management Reviews* (1:3), pp. 299-341.

Cunha, M.P., Kamoche, K., and Cunha, R.C. 2003. "Organizational Improvisation and Leadership: A Field Study in Two Computer-Mediated Settings," *International Studies of Management and Organization* (33:1), pp. 34-57.

D'Aveni, R.A. 1994. *Hypercompetition: Managing the Dynamics of Strategic Maneuvering*. New York, NY: Free Press.

Dacin, M.T., Beal, B.D., and Ventresca, M.J. 1999. "The Embeddedness of Organizations: Dialogue & Directions," *Journal of Management* (25:3), pp. 317-356.

Damanpour, F., and Gopalakrishnan, S. 1998. "Theories of Organizational Structure and Innovation Adoption: The Role of Environmental Change," *Journal of Engineering and Technology Management* (15:1), pp. 1-24.

Darke, P., Shanks, G., and Broadbent, M. 1998. "Sucessfully Completing Case Study Research: Combining Rigour, Relevance and Pragmatism," *Information Systems Journal* (8:4), pp. 273-289.

Dellarocas, C. 2003. "The Digitization of Word of Mouth: Promise and Challenges of Online Feedback Mechanisms," *Management Science* (49:10), pp. 1407-1424.

Denzin, N.K., and Lincoln, Y.S. 2000. "Introduction: The Discipline and Practice of Qualitative Research," in *Handbook of Qualitative Research*, N.K. Denzin and Y.S. Lincoln (eds.). Thousand Oaks, CA: Sage, pp. 1-28.

Desouza, K.C. (ed.) 2011. *Agile Information Systems: Conceptualization, Construction and Management*. Burlington, MA: Butterworth-Heinemann.

Dholakia, U.M., Bagozzi, R.P., and Pearo, L.K. 2004. "A Social Influence Model of Consumer Participation in Network- and Small-Group-Based Virtual Communities," *International Journal of Research in Marketing* (21:3), pp. 241-263.

DiMaggio, P.J., and Powell, W.W. 1983. "The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields," *American Sociological Review* (48:2), pp. 147-160.

Du, W., and Pan, S.L. 2010. "Boundary Spanning by Design: Insights from a Vendor Perspective," in: *ICIS 2010 Proceedings*.

Dube, L., and Pare, G. 2003. "Rigor in Information Systems Positivist Case Research: Current Practices, Trends and Recommendations," *MIS Quarterly* (27:4), pp. 597-635.

Dyba, T., and Dingsøyr, T. 2008. "Empirical Studies of Agile Software Development: A Systematic Review," *Information & Software Technology* (50:09/10), pp. 833-859.

Dyer, J.H., and Singh, H. 1998. "The Relational View: Cooperative Strategy and Sources of Interorganizational Competitive Advantage," *Academy of Management Review* (23:4), pp. 660-679.

Eisenberg, E.M. 1990. "Jamming: Transcendence through Organizing," *Communication Research* (17:2), pp. 139-164.

Eisenhardt, K.M. 1989. "Building Theories from Case Study Research," *Academy of Management Review* (14:4), pp. 532-550.

Eisenhardt, K.M. 1997. "Strategic Decision Making as Improvisation," in *Strategic Decisions*, V. Papadakis and P. Barwise (eds.). Norwell, MA: Kluwer, pp. 251-257.

Eisenhardt, K.M., and Graebner, M.E. 2007. "Theory Building from Cases: Opportunities and Challenges," *Academy of Management Journal* (50:1), pp. 25-32.

Eisenhardt, K.M., and Martin, J.A. 2000. "Dynamic Capabilities: What Are They?," *Strategic Management Journal* (21:10-11), OCT-NOV 2000, pp. 1105-1121.

Eisenhardt, K.M., and Sull, D.N. 2001. "Strategy as Simple Rules," *Harvard Business Review* (79:1), pp. 107-116.

Faia-Correia, M. 2003. "Mind the Gap between Processes and Practice!," *International Studies of Management and Organization* (33:1), pp. 58-85.

Fay, B. 1996. *Contemporary Philosophy of Social Science: A Multicultural Approach*. Oxford, UK: Blackwell.

Fichman, R.G. 2004. "Real Options and It Platform Adoption: Implications for Theory and Practice," *Information Systems Research* (15:2), pp. 132-154.

Fuller, J., Bartl, M., Ernst, H., and Muhlbacher, H. 2006. "Community Based Innovation: How to Integrate Members of Virtual Communities into New Product Development " *Electronic Commerce Research* (6:1), pp. 57-73.

Gephart, R.P., Jr. 2004. "From the Editors: Qualitative Research and the Academy of Management Journal," *Academy of Management Journal* (47:4), pp. 454-462.

Ginsburg, M., and Weisband, S. 2006. "Volunteerism and Virtual Community Business Success: The Case of the Internet Chess Club," *Journal of Organizational Computing and Electronic Commerce* (16:3-4), pp. 325-343.

Glaser, B.G. 1992. *Basics of Grounded Theory Analysis*, (. ed.). Mill Valley, CA: Sociology Press.

Glaser, B.G., and Strauss, A. 1967. *The Discovery of Grounded Theory: Strategies for Qualitative Research*. Hawthorne, NY: Aldine de Gruyter.

Glick, W.H., Huber, G.P., Miller, C.C., Doty, D.H., and Sutcliffe, K.M. 1990. "Studying Changes in Organizational Design and Effectiveness: Retrospective Event Histories and Periodic Assessments " *Organization Science* (1:3), pp. 293-312.

Goh, J.C.-L., Zuo, M., and Pan, S.L. 2010. "Transforming Organizational Capabilities into Agile It Adoption: A Case Study of Beijing International Airport," in: *ICIS 2010 Proceedings*.

Goldman, S., Nagel, R., and Preiss, K. 1995. *Agile Competitors and Virtual Organizations: Strategies for Enriching the Customer*. New York, NY: Van Nostrand Reinhold.

Granovetter, M. 1973. "The Strength of Weak Ties," *American Journal of Sociology* (78:6), pp. 1360-1380.

Grewal, R., and Tansuhaj, P. 2001. "Building Organizational Capabilities for Managing Economic Crisis: The Role of Market Orientation and Strategic Flexibility," *Journal of Marketing* (65:2), pp. 67-80.

Gu, B., Konana, P., Rajagopalan, B., and Chen, H.M. 2007. "Competition among Virtual Communities and User Valuation: The Case of Investing-Related Communities," *Information Systems Research* (18:1), pp. 68-85.

Hagel, J., III, and Armstrong, A.G. 1997. "Net Gain: Expanding Markets through Virtual Communities," *McKinsey Quarterly*:1), pp. 140-153.

Halaweh, M., Fidler, C., and McRobb, S. 2008. "Integrating the Grounded Theory Method and Case Study Research Methodology within Is Research: A Possible 'Road Map'," in: *ICIS 2008 Proceedings*.

Hall, C.S., Lindzey, G., and Campbell, J.B. 1998. *Theories of Personality*, (4th ed.). Hoboken, NJ: John Wiley & Sons.

Hallen, B.L., and Eisenhardt, K.M. 2008. "Catalyzing Strategies: How Entrepreneurs Accelerate Inter-Organizational Relationship Formation Toe Secure Professional Investments," in: *Working Paper*.

Hannan, M.T., and Freeman, J. 1977. "The Population Ecology of Organizations," *American Journal of Sociology* (82:5), pp. 929-964.

Hargrave, T.J., and van de Ven, A.H. 2006. "A Collective Action Model of Institutional Innovation," *Academy of Management Review* (31:4), pp. 864-888.

Harris, M.L., Collins, R.W., and Hevner, A.R. 2009. "Control of Flexible Software Development under Uncertainty," *Information Systems Research* (20:3), pp. 400-419.

Helfat, C.E. (ed.) 2003. *The Sms Blackwell Handbook of Organizational Capabilities*. Malden, MA: Blackwell Publishing.

Holm, D.B., Eriksson, K., and Johanson, J. 1999. "Creating Value through Mutual Commitment to Business Network Relationships," *Strategic Management Journal* (20:5), pp. 467-486.

Holmqvist, M., and Pessi, K. 2006. "Agility through Scenario Development and Continuous Implementation: A Global Aftermarket Logistics Case," *European Journal of Information Systems* (15:2), pp. 146-158.

Hoopes, D.G., Madsen, T.L., and Walker, G. 2003. "Guest Editors' Introduction to the Special Issue: Why Is There a Resource-Based View? Toward a Theory of Competitive Heterogeneity," *Strategic Management Journal* (24:10), pp. 889-902.

Hovorka, D.S., and Larsen, K.R. 2006. "Enabling Agile Adoption Practices through Networked Organizations," *European Journal of Information Systems* (15:2), pp. 159-168.

Iansiti, M., and Levien, R. 2004a. *The Keystone Advantage: What the New Dynamics of Business Ecosystems Mean for Strategy, Innovation and Sustainability*. Boston, MA: Harvard Business School Press.

Iansiti, M., and Levien, R. 2004b. "Strategy as Ecology," *Harvard Business Review* (82:3), pp. 68-78.

Kamoche, K., Cunha, M.P., and Cunha, J.V. 2003. "Towards a Theory of Organizational Improvisation: Looking Beyond the Jazz Metaphor," *Journal of Management Studies* (40:8), pp. 2023-2051.

Kannan, P.K., Chang, A.-M., and Whinston, A.B. 2000. "Electronic Communities in E-Business: Their Role and Issues," *Information Systems Frontiers* (1:4), pp. 415-426.

Karlsson, F., and Agerfalk, P. 2009. "Exploring Agile Values in Method Configuration," *European Journal of Information Systems* (18:4), pp. 300-316.

Kidd, P.T. 1995. *Agile Corporations: Business Enterprises in the 21st Century*. Macclesfield, UK: Cheshire Henbury.

Kim, A.J. 2000. *Community Building on the Web: Secret Strategies for Successful Online Communities*. Berkeley, Ca: Peachpit Press.

Kirsch, L.J. 2004. "Deploying Common Systems Globally: The Dynamics of Control," *Information Systems Research* (15:4), pp. 374-395.

Klein, H.K., and Myers, M.D. 1999. "A Set of Principles for Conducting and Evaluating Interpretive Field Studies in Information Systems," *MIS Quarterly* (23:1), pp. 67-93.

Koh, J., and Kim, Y.-G. 2003. "Sense of Virtual Community: A Conceptual Framework and Empirical Validation," *International Journal of Electronic Commerce* (8:2), pp. 75-93.

Koka, B.R., and Prescott, J.E. 2008. "Designing Alliance Networks: The Influence of Network Position, Environmental Change, and Strategy on Firm Performance," *Strategic Management Journal* (29:6), pp. 639-661.

Kozinets, R.V. 2002. "The Field Behind the Screen: Using Netnography for Marketing Research in Online Communities," *Journal of Marketing Research* (39:1), pp. 61-72.

Kumar, R., Novak, J., and Tomkins, A. 2010. "Structure and Evolution of Online Social Networks " in *Link Mining: Models, Algorithms, and Applications,* P.S.S. Yu, J. Han and C. Faloutsos (eds.). New York, NY: Springer.

Langley, A. 1999. "Strategies for Theorizing from Process Data," *Academy of Management Review* (24:4), pp. 691-710.

Lee, A.S., and Baskerville, R.L. 2003. "Generalizing Generalizability in Information Systems Research," *Information Systems Research* (14:3), pp. 221-243.

Lee, A.S., and Hubona, G.S. 2009. "A Scientific Basis for Rigor in Information Systems Research," *MIS Quarterly* (33:2), pp. 237-262.

Lee, G., and Xia, W. 2010. "Toward Agile: An Integrated Analysis of Quantitative and Qualitative Field Data on Software Development Agility," *MIS Quarterly* (34:1), pp. 87-114.

Lee, M.S., Sutanto, J., Kankanhalli, A., and Tan, B.C.Y. 2005. "Coverting Online Community Visitors to Online Consumers," in *Encyclopedia of Virtual Communities and Technologies,* S. Gupta (ed.). Hershey, PA: Idea Group, pp. 54-60.

Lee, O.-K., Banerjee, P., Lim, K.H., Kumar, K., van Hillegersberg, J., and Wei, K.-K. 2006. "Aligning It Components to Achieve Agility in Globally Distributed System Development," *Communications of the ACM* (49:10), pp. 49-54.

Leimeister, J.M., Ebner, W., and Kremar, H. 2005. "Design, Implementation and Evaluation of Trust-Supporting Components in Virtual Communities for Patients," *Journal of Management Information Systems* (21:4), pp. 101-135.

Lengnick-Hall, C.A. 1996. "Customer Contributions to Quality: A Different View of the Customer-Oriented Firm," *Academy of Management Review* (21:3), pp. 791-824.

Lengnick-Hall, C.A., and Wolff, J.A. 1999. "Similarities and Contradictions in the Core Logic of Three Strategy Research Streams," *Strategic Management Journal* (20:12), pp. 1109-1132.

Li, H. 2004. " Virtual Community Studies: A Literature Review, Synthesis and Research Agenda," in: *AMCIS 2004 Proceedings*.

Lin, H.-F. 2008. "Determinants of Successful Virtual Communities: Contributions from System Characteristics and Social Factors," *Information & Management* (45:8), pp. 522-527.

Lin, H., Fan, W., and Wallace, L. 2007. "An Empirical Study of Web-Based Knowledge Community Success," in: *Proceedings of the 40th Hawaii International Conference on Information Systems*.

Lombard, M., and Ditton, T. 1997. "At the Heart of It All: The Concept of Presence," in: *Journal of Computer Mediated Communications*.

Lyytinen, K., and Rose, G.M. 2006. "Information Systems Development Agility as Organizational Learning," *European Journal of Information Systems* (15:2), pp. 183-199.

Ma, M., and Agarwal, R. 2007. "Through a Glass Darkly: Information Technology Design, Identity Verification, and Knowledge Contribution in Online Communities," *Information Systems Research* (18:1), pp. 42-67.

Madill, A., Jordan, A., and Shirley, C. 2000. "Objectivity and Reliability in Qualitative Analysis: Realist, Contextualist and Radical Constructionist Epistemologies," *British Journal of Psychology* (91:1), pp. 1-20.

Mahadevan, B. 2000. "Business Models for Internet-Based E-Commerce: An Anatomy," *California Management Review* (42:4), pp. 55-69.

Malone, T.W., Crowston, K., Lee, J., and Pentland, B.T. 1999. "Tools for Inventing Organizations: Toward a Handbook of Organizational Processes," *Management Science* (45:3), pp. 425-443.

Mangalaraj, G., Mahapatra, R., and Nerur, S. 2009. "Acceptance of Software Process Innovations - the Case of Extreme Programming," *European Journal of Information Systems* (18:4), pp. 344-354.

March, J.G. 1991. "Exploration and Exploitation in Organizational Learning," *Organization Science* (2:1), pp. 71-87.

Markus, M.L., and Tanis, C. 1999. "The Enterprise System Experience - from Adoption to Success," in *Framing the Domain of It Management: Projecting the Future through the Past*, R.W. Zmud (ed.). Cincinnati, OH: Pinnaflex Educational Resources.

Maruping, L.M., Venkatesh, V., and Agarwal, R. 2009. "A Control Theory Perspective on Agile Methodology Use and Changing User Requirements," *Information Systems Research* (20:3), pp. 377-399.

Mathiassen, L., and Pries-Heje, J. 2006. "Business Agility and Diffusion of Information Technology," *European Journal of Information Systems* (15:2), pp. 116-119.

Maxwell, J.A. 1996. *Qualitative Research Design: An Interactive Approach*. Thousand Oaks, CA: Sage.

McAfee, A., and Brynjolfsson, E. 2008. "Investing in the It That Makes a Competitive Difference," *Harvard Business Review* (86:7-8), pp. 98-107.

McAvoy, J., and Butler, T. 2009. "The Role of Project Management in Ineffective Decision Making within Agile Software Development Projects," *European Journal of Information Systems* (18:4), pp. 372-383.

Meyer, C.B. 2001. "A Case in Case Study Methodology," *Field Methods* (13:4), pp. 329-352.

Miles, M.B., and Huberman, A.M. 1994. *Qualitative Data Analysis: An Expanded Sourcebook*, (2nd ed.). Thousand Oaks, CA: Sage.

Miner, A.S., Bassoff, P., and Moorman, C. 2001. "Organizational Improvisation and Learning: A Field Sutdy," *Administrative Science Quarterly* (46:2), pp. 304-337.

Mingers, J. 2003. "The Paucity of Multimethod Research: A Review of the Information Systems Literature," *Information Systems Journal* (13:3), pp. 233-249.

Mingers, J. 2004. "Realizing Information Systems: Critical Realism as an Underpinning Philosophy for Information Systems," *Information & Organization* (14:2), pp. 87-103.

Mohammed, R.A., Fisher, R.J., Jaworski, B.J., and Paddison, G.J. 2004. *Internet Marketing: Building Advantage in a Networked Economy*, (2nd ed.). New York, NY: McGraw-Hill.

Mohr, L.B. 1982. *Explaining Organizational Behavior*. San Francisco, CA: Jossey-Bass.

Moore, J.F. 1993. "Predators and Prey: A New Ecology of Compeititon," *Harvard Business Review* (71:3), pp. 75-86.

Moore, J.F. 1996. *The Death of Competition: Leadership and Strategy in the Age of Business Ecosystems*. New York, NY: HarperCollins.

Moorman, C., and Miner, A.S. 1998. "Organizational Improvisation and Organizational Memory," *Academy of Management Review* (23:4), pp. 698-723.

Myers, M.D. 1997. "Qualitative Research in Information Systems," *MIS Quarterly* (21:2), pp. 241-242.

Myers, M.D., and Newman, M. 2007. "The Qualitative Interview in Is Research: Examining the Craft," *Information & Organization* (17:1), pp. 2-26.

Nagel, R., Dove, R., Goldman, S., and Preiss, K. 1991. *21st Century Manufacturing Enterprise*. Bethlehem, PA: Iacocca Institute.

Nahapiet, J., and Ghoshal, S. 1998. "Social Capital, Intellectual Capital, and the Organizational Advantage," *Academy of Management Review* (23:2), pp. 242-266.

Nambisan, S. 2002. "Designing Virtual Customer Environments for New Product Development: Toward a Theory," *Academy of Management Review* (27:3), pp. 392-413.

Neuman, L.W. 2005. *Social Research Methods: Qualitative and Quantitative Approaches*, (6th ed.). Boston, MA: Allyn and Bacon.

O'Reilly, C.A., and Tushman, M.L. 2004. "The Ambidextrous Organization," *Harvard Business Review* (82:4), pp. 74-81.

Oliver, P., Marwell, G., and Teixeira, R. 1985. "A Theory of the Critical Mass. I. Interdependence, Group Heterogeneity, and the Production of Collective Action " *American Journal of Sociology* (91:3), pp. 522-556.

Orlikowski, W.J. 1996. "Improvising Organizational Transformation over Time: A Situated Change Perspective," *Information Systems Research* (7:1), pp. 63-92.

Orlikowski, W.J. 2000. "Using Technology and Constituting Structures: A Practice Lens for Studying Technology in Organizations," *Organization Science* (11:4), pp. 404-428.

Orlikowski, W.J. 2006. "Material Knowing: The Scaffolding of Human Knowledgeability," *European Journal of Information Systems* (15:5), pp. 460-466.

Orlikowski, W.J., and Baroudi, J.J. 1991. "Studying Information Technology in Organizations: Research Approaches and Assumptions," *Information Systems Research* (2:1), pp. 1-28.

Osterloh, M., and Frey, B.S. 2000. "Motivation, Knowledge Transfer, and Organizational Forms," *Organization Science* (11:5), pp. 538-550.

Overby, E., Bharadwaj, A., and Sambamurthy, V. 2006. "Enterprise Agility and the Enabling Role of Information Technology," *European Journal of Information Systems* (15:2), pp. 120-131.

Palloff, R.M., and Pratt, K. 2007. *Building Online Learning Communities: Effective Strategies for the Virtual Classroom* (2nd ed.). San Francisco, CA: Jossey-Bass.

Pan, G., Pan, S.L., and Newman, M. 2009. "Managing Information Technology Project Esclation and De-Escalation: An Approach-Avoidance Perspective," *IEEE Transactions on Engineering Management* (56:1), pp. 76-94.

Pan, S.L., and Leidner, D. 2003. "Bridging Communities of Practice with Information Technology in Pursuit of Global Knowledge Sharing," *Journal of Strategic Information Systems* (12:1), pp. 71-88.

Pan, S.L., Pan, G., Chen, A.J.W., and Hsieh, M.H. 2007. "The Dynamics of Implementing and Managing Modularity of Organizational Routines During Capability Development: Insights from a Process Model," *IEEE Transactions on Engineering Management* (54:4), pp. 800-813.

Pan, S.L., Pan, G., and Devadoss, P.R. 2005. "E-Government Capabiltiies and Crisis Management: Lessons from Combating Sars in Singapore," *MIS Quarterly Executive* (4:4), pp. 385-397.

Patton, M.Q. 2003. *Qualitative Research and Evaluation Methods*, (3rd ed.). Thousand Oaks, CA: Sage.

Pavlou, P.A., and El Sawy, O.A. 2010. "The "Third Hand": It-Enabled Competitive Advantage in Turbulence through Improvisational Capabilities," *Information Systems Research* (21:3), pp. 443-471.

Peppard, J., and Ward, J. 2004. "Beyond Strategic Information Systems: Towards an Is Capability," *Journal of Strategic Information Systems* (13:2), pp. 167-194.

Perry-Smith, J.E., and Shalley, C.E. 2003. "The Social Side of Creativity: A Static and Dynamic Social Network Perspective," *Academy of Management Review* (28:1), pp. 89-106.

Peteraf, M.A. 1993. "The Cornerstones of Competitive Advantage: A Resource-Based View," *Strategic Management Journal* (14:3), pp. 179-191.

Pettigrew, A.M. 1990. "Longitudinal Field Research on Change: Theory and Practice," *Organization Science* (1:3), pp. 267-292.

Pierce, L. 2009. "Big Losses in Ecosystem Niches: How Core Firm Decisions Drive Complementary Product Shakeouts," *Strategic Management Journal* (30:3), pp. 323-347.

Port, D., and Bui, T. 2009. "Similuating Mixed Agile and Plan-Based Requirements Priortization Strategies: Proof-of-Concept and Practical Implications," *European Journal of Information Systems* (18:4), pp. 317-331.

Porter, C.E. 2004. "A Typology of Virtual Communities: A Multi-Disciplinary Foundation for Future Research " in: *Journal of Computer Mediated Communications*.

Porter, C.E., and Donthu, N. 2008. "Cultivating Trust and Harvesting Value in Virtual Communities," *Management Science* (54:1), pp. 112-128.

Porter, M.E. 1980. *Competitive Strategy: Techniques for Analyzing Industries and Competitors*. New York, NY: Free Press.

Porter, M.E. 1996. "What Is Strategy?," *Harvard Business Review* (74:6), pp. 61-78.

Pratt, M.G. 2009. "For the Lack of a Boilerplate: Tips on Writing up (and Reviewing) Qualitative Research," *Academy of Management Journal* (52:5), pp. 856-862.

Preece, J. 2001. "Socialbility and Usability: Twenty Years of Chatting Online," *Behaviour & Information Technology* (20:5), pp. 347-356.

Raschke, R.L., and David, J.S. 2005. "Business Process Agility," in: *AMCIS 2005 Proceedings*.

Rheingold, H. 1993. *The Virtual Community: Homesteading on the Electronic Frontier*. Reading, MA: Addison-Wesley.

Ridings, C., Gefen, D., and Arinze, B. 2002. "Some Antecedents and Effects of Trust in Virtual Communities," *Journal of Strategic Information Systems* (11:3-4), pp. 271-295.

Riggins, F.J., and Rhee, H.-S. 1998. "Toward a Unified View of Electronic Commerce," *Communications of the ACM* (41:10), pp. 88-95.

Rockart, J.F. 1979. "Chief Executives Define Their Own Data Needs," *Harvard Business Review* (57:2), pp. 81-93.

Rogers, E.M. 2003. *Diffusion of Innovations*, (5th ed.). New York, NY: Free Press.

Ross, J.W., and Westerman, G. 2004. "Preparing for Utility Computing: The Role of It Architecture and Relationship Management," *IBM Systems Journal* (43:1), pp. 5-19.

Rothaermel, F.T., and Sugiyama, S. 2001. "Virtual Internet Communities and Commercial Success: Individual and Community-Level Theory Grounded in the Atypical Case of Timezone.Com," *Journal of Management* (27:3), pp. 297-312.

Sambamurthy, V., Bharadwaj, A., and Grover, V. 2003. "Shaping Agility through Digital Options: Reconceptualizing the Role of Information Technology in Contemporary Firms," *MIS Quarterly* (27:2), pp. 237-263.

Sambamurthy, V., and Zmud, R.W. 1999. "Arrangements for Information Technology Governance: A Theory of Multiple Contingencies," *MIS Quarterly* (23:2), pp. 261-290.

Sangwan, S. 2005. "Virtual Communitiy Success: A Uses and Gratifications Perspective," in: *Proceedings of the 38th Hawaii International Conference on System Sciences*. Hawaii, US.

Sarker, S., Munson, C.L., Sarker, S., and Chakraborty, S. 2009. "Assessing the Relative Contribution of the Facets of Agility to Distributed Systems Development Success: An Analytic Hierarchy Process Approach," *European Journal of Information Systems* (18:4), pp. 285-299.

Sarker, S., and Sarker, S. 2009. "Exploring Agility in Distributed Information Systems Development Teams: An Interpretive Study in an Offshoring Context," *Information Systems Research* (20:3), pp. 440-461.

Schubert, P., and Ginsburg, M. 2000. "Virtual Communities of Transaction: The Role of Personalization in Electronic Commerce," *Electronic Markets* (10:1), pp. 45-55.

Schultze, U., and Leidner, D. 2002. "Studying Knowledge Management in Information Systems Research: Discourses and Theoretical Assumptions," *MIS Quarterly* (26:3), pp. 213-242.

Seo, D., and La Paz, A.I. 2008. "Exploring the Dark Side of Is in Achieving Organizational Agility," *Communications of the ACM* (51:11), pp. 136-139.

Shang, R.-A., Chen, Y.-C., and Liao, H.-J. 2006. "The Value of Participation in Virtual Consumer Communities on Brand Loyalty," *Internet Research* (16:4), pp. 398-418.

Shapiro, C., and Varian, H.R. 1999. *Information Rules: A Strategic Guide to the Network Economy*. Boston, MA: Harvard Business School Press.

Sharifi, H., and Zhang, Z. 1999. "A Methodology for Achieving Agility in Manufacturing Organizations: An Introduction," *International Journal of Production Economics* (62:1-2), pp. 7-22.

Sharifi, H., and Zhang, Z. 2001. "Agile Manufacturing in Practice: Application of a Methodology," *International Journal of Operations and Production Management* (21:5/6), pp. 772-794.

Siggelkow, N. 2007. "Persuastion with Case Studies," *Academy of Management Journal* (50:1), pp. 20-24.

Sirmon, D.G., Hitt, M.A., and Ireland, R.D. 2007. "Managing Firm Resources in Dynamic Environments to Create Value: Looking inside the Black Box," *Academy of Management Review* (32:1), pp. 273-292.

Srinivasan, S.S., Anderson, R., and Ponnavolu, K. 2002. "Customer Loyalty in E-Commerce: An Exploration of Its Antecedents and Consequences," *Journal of Retailing* (78:1), pp. 41-50.

Stacey, R.D. 1995. "The Science of Complexity: An Alternative Perspective for Strategic Change Processes," *Strategic Management Journal* (16:6), pp. 477-495.

Strauss, A., and Corbin, J. 1998. *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*, (2nd ed.). Thousand Oaks, CA: Sage.

Suddaby, R. 2006. "From the Editors: What Grounded Theory Is Not," *Academy of Management Journal* (49:4), pp. 633-642.

Sull, D. 2009. "How to Thrive in Turbulent Markets," *Harvard Business Review* (87:2), pp. 78-88.

Sutton, R.I., and Staw, B.M. 1995. "What Theory Is Not," *Administrative Science Quarterly* (40:3), pp. 371-384.

Tan, B., Pan, S.L., and Hackney, R. 2010. "The Strategic Implications of Web Technologies: A Process Model of How Web Technologies Enhance Organizational Performance," *IEEE Transactions on Engineering Management* (57:2), pp. 181-197.

Tan, B., Pan, S.L., Lu, X., and Huang, L. 2009. "Leveraging Digital Business Ecosystems for Enterprise Agility: The Tri-Logic Development Strategy of Alibaba.Com," in: *International Conference on Information Systems*. Phoenix, USA.

Teece, D.J. 2007. "Explicating Dynamic Capabilities: The Nature and Microfoundations of (Sustainable) Enterprise Performance," *Strategic Management Journal* (28:13), pp. 1319-1350.

Teece, D.J., Pisano, G., and Shuen, A. 1997. "Dynamic Capabilities and Strategic Management," *Strategic Management Journal* (18:7), pp. 509-533.

Tiwana, A., Bharadwaj, A., and Sambamurthy, V. 2003. "The Antecedents of Information Systems Development Capability in Firms: A Knowledge Integration Perspective," in: *ICIS 2003 Proceedings*.

Tsang, E.W.K., and Kwan, K.-M. 1999. "Replication and Theory Development in Organizational Science: A Critical Realist Perspective," *Academy of Management Review* (24:4), pp. 759-780.

van de Blonk, H. 2003. "Writing Case Studies in Information Systems Research," *Journal of Information Technology* (18:1), pp. 45-52.

van den Bosch, F.A.J., Volberda, H.W., and de Boer, M. 1999. "Coevolution of Firm Absorptive Capacity and Knowledge Environemtn: Organizational Forms and Combinative Capabilities," *Organization Science* (10:5), pp. 551-568.

van Maanen, J., Sorensen, J.B., and Mitchell, T.R. 2007. "The Interplay between Theory and Method," *Academy of Management Review* (32:4), pp. 1145-1154.

van Oosterhout, M., Waarts, E., and van Hillegersberg, J. 2006. "Change Factors Requiring Agility and Implications for It," *European Journal of Information Systems* (15:2), pp. 132-145.

Venkatraman, N., and Henderson, J.C. 1998. "Real Strategies for Virtual Organizing," *Sloan Management Review* (40:1), pp. 33-48.

Vera, D., and Crossan, M. 2004. "Theatrical Improvisation: Lessons for Organization," *Organization Studies* (25:5), pp. 727-749.

Vera, D., and Crossan, M. 2005. "Improvisation and Innovative Performance in Teams," *Organization Science* (16:3), pp. 203-224.

Vidgen, R., and Wang, X. 2009. "Coevolving Systems and the Organization of Agile Software Development," *Information Systems Research* (20:3), pp. 355-376.

Vinekar, V., Slinkman, C.W., and Nerur, S. 2006. "Can Agile and Traditional Systems Development Approaches Coexist? An Ambidextrous View," *Information Systems Management* (23:3), pp. 31-42.

Walden, E. 2000. "Some Value Propositions of Online Communities," *Electronic Markets* (10:4), pp. 244-249.

Walsham, G. 1995. "Interpretive Case Studies in Is Research: Nature and Method," *European Journal of Information Systems* (4:2), pp. 74-81.

Walsham, G. 2006. "Doing Interpretive Research," *European Journal of Information Systems* (15:3), pp. 320-330.

Walsham, G., and Sahay, S. 1999. "Gis for District-Level Administration in India: Problems and Opportunities," *MIS Quarterly* (23:1), pp. 39-65.

Wasko, M.M., and Faraj, S. 2005. "Why Should I Share? Examining Social Capital and Knowledge Contribution in Electronic Networks of Practice," *MIS Quarterly* (29:1), pp. 35-57.

Weick, K.E. 1979. *The Social Psychology of Organizing*, (2nd ed.). Reading, MA: Addison-Wesley.

Weick, K.E. 1993. "The Collapse of Sensemaking in Organizations: The Mann Gulch Disaster," *Administrative Science Quarterly* (38:4), pp. 628-652.

Weick, K.E. 1996. "Drop Your Tools: An Allegory for Organizational Studies," *Administrative Science Quarterly* (41:2), pp. 301-313.

Weick, K.E. 1998. "Improvisation as a Mindset for Organizational Analysis," *Organization Science* (9:5), pp. 543-555.

Weick, K.E. 2007. "The Generative Properties of Richness," *Academy of Management Journal* (50:1), pp. 14-19.

Weick, K.E., Sutcliffe, K.M., and Obstfeld, D. 2005. "Organizing and the Process of Sensemaking," *Organization Science* (16:4), pp. 409-421.

Weill, P., Subramani, M., and Broadbent, M. 2002. "Building It Infrastructure of Strategic Agility," *Sloan Management Review* (44:1), pp. 57-65.

Wellman, B., Haase, A.Q., Witte, J., and Hampton, K. 2001. "Does the Internet Increase, Decrease, or Supplement Social Capital? : Social Networks, Participation, and Community Commitment," *American Behavioral Scientist* (45:3), pp. 436-455.

Wellman, B., Salaff, J., Dimitrova, D., Garton, L., Gulia, M., and Haythornthwaite, C. 1996. "Computer Networks as Social Networks: Collaborative Work, Telework and Virtual Community," *Annual Review of Sociology* (22), pp. 213-238.

Wenger, E.C., and Snyder, W.M. 2000. "Communities of Practice: The Organizational Frontier," *Harvard Business Review* (78:1), pp. 139-145.

Yin, R.K. 2003. *Case Study Research: Design and Methods*, (3rd ed.). Thousand Oaks, CA: Sage.

Zaheer, A., and Zaheer, S. 1997. "Catching the Wave: Alertness, Responsiveness and Market Influence in Global Electronic Networks," *Management Science* (43:11), pp. 1493-1509.

Zahra, S.A., and George, G. 2002. "Absorptive Capacity: A Review, Reconceptualization and Extension," *Academy of Management Review* (27:2), pp. 185-203.

Zain, M., Rose, R.C., Abdullah, I., and Masrom, M. 2005. "The Relationship between Information Technology Acceptance and Organizational Agility in Malaysia," *Information & Management* (42:6), pp. 829-839.

Zhang, W., and Storck, J. 2001. "Peripheral Members in Online Communities," in: *AMCIS 2001 Proceedings*.

APPENDIX A: METHODOLOGICAL DETAILS FOR HARDWAREZONE CASE STUDY

A.1 Details of Primary Interviews

Table 27: Informants and Topics Discussed - HWZ

Interviewee	Topics Discussed
ITC General Manager	Background of ITC, Overview of the IT publications industry and ITC's business strategies over the years
IT Publications Industry Analyst	Evolution of IT publications industry, ITC's performance and effect on the IT publications industry
Local IT Enthusiast	Key players, market offerings and state of the local IT scene over time
ITC Investor	Reasons for ITC investment, Views on ITC's strategies & direction
ITC Managing Director	The factors driving ITC's success, the evolution of ITC's strategies, as well as the development and leverage of ITC's VC
ITC Product Manager	ITC operations, the leverage of ITC's VC, business strategies, and current challenges
ITC Chief Content Officer	Content generation process, organizational culture, leverage of ITC's VC in content generation
VC Member A	Opinion of ITC's website, content, management, VC, and new business initiatives
VC Member B	Opinion of ITC's website, content, management, VC, and new business initiatives
VC Member C (Pioneering member)	The origins of ITC, state of the IT publications industry, early measures undertaken by the ITC management in developing the VC
VC Forum Moderator	Measures undertaken by the ITC management in developing, managing and leveraging the VC, role of forum moderators
VC Member D (Foreign member)	ITC's foreign initiatives, and the development, management and leverage of ITC's foreign community
ITC Editor-in-Chief	The content generation process and the role of VC members in the process of innovation
ITC Co-founder	Benefits of VCs for ITC, evolution of ITC's business strategies
VC Member E	Cultural norms and governance policies within the VC, as well as the measures undertaken by the ITC management in developing and leveraging the VC
ITC Senior Executive	Benefits of VCs for ITC, evolution of the IT publications industry and ITC's business strategies
VC Member F	Measures undertaken by the ITC management in developing, managing and leveraging the VC
VC Member G (Pioneering member)	Early measures undertaken by the ITC management in developing and leveraging the VC, origins of ITC

ITC Managing Director (2nd Interview)	Follow up questions on the development and leverage of ITC's VC, the evolution of the IT publications industry, and ITC's business strategies
VC Member C (Pioneering member, 2nd interview)	Early measures undertaken by the ITC management in developing and leveraging the VC
VC Member H	Measures undertaken by the ITC management in developing, managing and leveraging the VC between 2000 and 2007
VC Member I (Foreign member)	Measures undertaken by the ITC management in developing, managing and leveraging the VC, in comparison to the measures of other community sponsor in the member's home country
VC Member B (2nd interview)	Measures undertaken by the ITC management in developing, managing and leveraging the VC between 2000 and 2007.
VC Member J	Measures undertaken by the ITC management in developing, managing and leveraging the VC between 2005 and 2007

A.2 Sample Interview Questions for HWZ's Top Management

1. **HWZ's History**
   - What was the situation in IT publications industry before the inception of HWZ?
   - What impact did HWZ have on the IT publications industry?
   - What was the reason for the GDIS investment?
   - What is the impact of the GDIS investment?

2. **Current Challenges**
   - Who are your current competitors?
   - Are there any threats and business opportunities in the business environment?

3. **Current Strategy**
   - What is HWZ's current business strategy for dealing with the challenges it face at the moment

4. **Diversification Strategy**
   - Why the need for Diversification?
   - How does HWZ decide on the new products to develop?
   - What kind of resources does HWZ need to acquire/develop for its new products?
   - What can you tell me about Carma and Inside Golf?

5. **Regionalization Strategy**
   - What is the rationale behind Regionalization?
   - What is the basis for choosing the countries to expand into?
   - What kind of resources does HWZ need to acquire/develop to support its regionalization

- How do you plan to avoid the problem of being viewed as a "foreign" publication in the countries you expand into?
- What are HWZ's future regionalization plans?

6. **Vision for HWZ**
   - What is your vision for HWZ? What do you think the evolution of HWZ's business will lead to?
   - What are HWZ's future plans?

A.3 Sample Interview Questions for HWZ's Technical Staff

1. **About yourself**
   - When did you join HWZ?
   - What is your role in HWZ?

2. **Content Generation**
   - Can you describe the content generation process?
   - Is it any different comparing how content is generated now in the beginning?
   - How do you decide which reviews go into the website and which reviews go into the magazines?
   - What are the advantages of having developing proprietary content as opposed to buying content from other IT publications?
   - Given that some of the vendors you are reviewing are HWZ's advertisers as well, how do you maintain neutrality/ objectivity
   - How do you keep the information timely and accurate?

3. **Managing the HWZ forums**
   - What do you feel is unique about the HWZ forum?
   - As a moderator at the HWZ forum, are there any rules/ regulations in the forum?
   - How does one go about becoming a moderator?
   - Does the HWZ community have a physical presence, are there outings being organized etc.?
   - How do you make the forum and hence the website sticky?
   - What is the makeup of HWZ community members in terms of Nationality, age, etc.?
   - A lot of HWZ's content (Gameaxis & Photoi) included originated from the forum. What is the basis for deciding which information to include?
   - How are new forums created?

4. **Your perspective of HWZ as a staff member**
   - How would you describe HWZ as an organization?
   - Can you describe HWZ's culture?
   - Can you describe the management style at HWZ?
   - Where do you see HWZ in the future?

A.4 Sample Interview Questions for HWZ's Investors

1. **Background of GDIS**
   - Can you tell me a little bit more about GDIS other than the information on corporate website? In terms of management structure, its core business and strategies?
   - What is the investment strategy of GDIS?
   - I noticed GDIS has a very diverse portfolio in that it operates miw, onemotoring, can.com.sg. How does the investment in HWZ complement GDIS's existing business?

2. **Rationale behind investment in HWZ**
   - What is the rationale behind GDIS's investment in HWZ
   - I noted that the price GDIS paid for a 20% stake is significantly higher than HWZ's net assets of $2million as reported in The Business Times. What is the reason for paying a premium for HWZ?
   - Can you tell me who the other shareholders of HWZ are and the stake they are holding in HWZ?

3. **GDIS's role after the investment**
   - Based on the 20% stake in HWZ, What is the role of GDIS in the operations of HWZ?
   - Were there any cultural changes/ changes in reporting structure and working styles after GDIS's investment?

4. **GDIS's expected returns on investment**
   - What does GDIS expect to gain from its investment, financially or otherwise?

5. **GDIS's vision for HWZ in the future**
   - Where does GDIS see HWZ in the near future? What is your vision of HWZ?
   - Any obstacles that you foresee HWZ must overcome in order to fulfill that vision?

A.5 Email Interview Form for Community Members

Email Interview

The purpose of this research is to develop a case study on Hardwarezone, which is of interest to e-commerce educators, students and practitioners in Singapore and around the world due to its unique success in a country where dotcom failures are the norm rather than the exception. Your input will be immensely valuable as it would provide a view of Hardwarezone from the perspective of a group of stakeholders that possibly contributed most to Hardwarezone's success; the members of its community.

Please answer the following questions. If the space provided for your answer is insufficient, please feel free to make the necessary adjustments. When you have completed the interview, please send the completed interview to the following email address:

tancheec@comp.nus.edu.sg.

Do drop me a mail if you wish to clarify anything as well. Thank you so much for your time and sorry for any inconvenience caused!

Name:_____

Number of Years of Participation in Hardwarezone: _____

1. **What does Hardwarezone mean to you?**

2. **What is it about Hardwarezone that keeps you coming back?**

3. **What is your opinion on the HWM magazines?**

4. **What is your opinion on some of Hardwarezone's other products (such as GameAxis.com, GameAxis Unwired, PhotoVideoi, etc.)?**

5. **What do you think of the new products that Hardwarezone is currently developing (such as Carma and Inside Golf)?**

6. **What improvements do you hope to see at Hardwarezone in the future?**

7. **Anything else regarding Hardwarezone you would like to add?**

APPENDIX B: METHODOLOGICAL DETAILS FOR ALIBABA.COM CASE STUDY

B.1 Details of Primary Interviews

Table 28: Informants and Topics Discussed - Alibaba

Interviewee	Topics Discussed	Interviews
Internal Stakeholders		
Manager (Strategic Planning) – Alipay	Motivation for establishing Alipay, competitive environment of Alibaba, interactions with ecosystem members and complementary service providers (e,g. banks and government agencies), evolution of Alibaba's strategies	1
Manager (Public Relations) - Taobao	Initial strategy at the founding of Taobao, business objective of Taobao Mall (Alibaba's B2C platform), developmental stages of Taobao, trust system of Taobao	1
Senior Manager – Alimama	Business rationale for the establishment of Alimama, strategic objectives of Alimama, difference between Alimama and Alisoft, competitive environment of Alimama, marketing of Alimama, services provided by Alimama, position of Alimama in the Alibaba group	1
Senior Manager – Alisoft	Business rationale for the establishment of Alisoft, strategic objectives of Alisoft, competitive environment of Alisoft, services of Alisoft, openness of Alisoft platform, collaborative projects undertaken with Alisoft users	1
General Manager – Alibaba B2B	Evolution of Alibaba's business strategies, competitive environment of Alibaba B2B, continuous innovation at Alibaba, Business ecosystem of Alibaba, future plans of Alibaba	1
Vice President of Research and Training – Alibaba HQ	Business rationale for the establishment of Alimama, organizational structure of Alibaba, concept of business ecosystems at Alibaba, Alibaba's competitive environment, establishment of Aliresearch and Alicollege	2
Communications Manager – Yahoo Koubei	Rationale behind the acquisition of Yahoo and Koubei, strategic objectives of Yahoo and Koubei, competitive implications of Yahoo and Koubei for the Alibaba group	2
Vice President of Operations – Alibaba B2B	Structure of Alibaba group, evolution of Alibaba's business strategies, role of subsidiaries in Alibaba's business model	1
Senior Executive – Alibaba B2B	Evolution of Alibaba's business strategies, role of subsidiaries in Alibaba's business model, business rationale for the establishment of new subsidiaries, competitive environment of Alibaba	3

Ecosystem Partners		
Industry Analyst	Development of Alibaba's platform, competitive advantages and disadvantages of Alibaba, the embeddedness of Chinese culture in Alibaba's business practices	2
Alibaba Seller	Formation of networks between sellers on Alibaba's platform, evolving customer needs over time, business ecosystem of Alibaba, embeddedness of Chinese culture in Alibaba's business practices	1
Taobao Power Seller A	Relationship and interactions between Alibaba and customers. Entrepreneurship on the Taobao platform, services rendered by Alibaba through the Taobao platform	2
Taobao Power Seller B	Relationship and interactions between Alibaba and customers. Entrepreneurship on the Taobao platform, services rendered by Alibaba through the Taobao platform	2
Taobao Power Seller C	Relationship and interactions between Alibaba and customers. Entrepreneurship on the Taobao platform, services rendered by Alibaba through the Taobao platform	2
Yahoo Koubei User	Experience of using Yahoo and Koubei. Services and benefits provided by Yahoo and Koubei.	1
Taobao User A	Experience of using Taobao. Services and benefits provided by Taobao.	1
Taobao User B	Experience of using Taobao. Services and benefits provided by Taobao.	1
Alibaba User	Experience of using Alibaba's B2B platform. Services and benefits provided by Alibaba's B2B platform	1
Alisoft User A	Experience of using Alisoft. Services and benefits provided by Alisoft	1
Alisoft User B	Experience of using Alisoft, Services and benefits of using Alisfot	1

B.2 Alibaba in Phase 1 (1999-2004): Sample Interview Questions

1. **Industry Background**
   - What is the estimated size of the SME market in China?
   - What is the estimated number of SMEs in China?
   - What is their contribution (in terms of percentage) to China's economy?

2. **Alibaba's Corporate Strategy**
   - What was the reason for founding Alibaba.com?
   - Why was the Small Medium Enterprises (SME) market targeted specifically?
   - What was the market situation at the time?

- Were there unmet needs in the market?
- How did Alibaba fulfill those needs?
- Why was the B2B exchange market depressed in 2000?
- When did business for Alibaba pick up? What were the factors that caused the market to pick up?

3. **Alibaba's Competitors**
   - Who were Alibaba's main competitors at the time of its launch (both local and international)?
   - What were the factors that helped Alibaba defeat its competitors (both local and international)?
   - How has the market share of Alibaba grown over time in the B2B marketplace industry (in terms of local market share and global market share)?

4. **Taobao.com**
   - What was the reason for founding Taobao.com?
   - What was the market situation at the time?
   - Were there unmet needs in the market?
   - How did Taobao fulfill those needs?
   - What were the key factors that helped Taobao defeat Eachnet?
   - How has the market share of Taobao grown over time?

5. **Alibaba's Business Ecosystem**
   - How did Alibaba's actions and strategies affect the development of its business ecosystem?
   - What is the impact of the ecosystem development on Alibaba's organizational performance?

B.3 Alibaba in Phase 2 (2005-2006): Sample Interview Questions

1. **Alibaba's Corporate Strategy**
   - What were the strategic initiatives pursued by the Alibaba group between 2005 and 2006?
   - What were the impact of these initiatives on Alibaba's operations?

2. **Acquisition of Yahoo China**
   - What was the original strategic intent behind the acquisition of Yahoo China?
   - What is the impact of the acquisition of Yahoo China on Alibaba's operations?
   - Who are the targeted customers of Yahoo China? Has Yahoo China been successful in acquiring these customers?
   - What is the market share of Yahoo China?

3. **Acquisition of Koubei**
   - What was the original strategic intent behind the acquisition of Koubei?

- What is the impact of the acquisition of Koubei on Alibaba's operations?
- Who are the targeted customers of Koubei?
- Has Koubei been successful in acquiring these customers?
- What is the market share of Koubei?

4. **Rivalry with Baidu**
   - When did Alibaba begin to perceive search engines such as Baidu as a rival?
   - Why did Alibaba perceive search engines such as Baidu as its rival?

5. **Alibaba's Business Ecosystem**
   - How did Alibaba's actions and strategies affect the development of its business ecosystem?
   - What is the impact of the ecosystem development on Alibaba's organizational performance?

B.4 Alibaba in Phase 3 (2005-2006): Sample Interview Questions

1. **Alibaba's Corporate Strategy**
   - When did the concept of ecosystem mentality of Alibaba originate?
   - How did the ecosystem mentality of Alibaba come about?
   - What benefits did the management of Alibaba expect from developing an ecosystem mentality?
   - What were the initiatives implemented by Alibaba for the purpose of strengthening the capabilities of the members of the ecosystem?
   - What was Alibaba's rationale for developing these initiatives?
   - How did these initiatives benefit the members of Alibaba's business ecosystem?

2. **Launching Alimama**
   - What was Alibaba's rationale for developing Alimama?
   - How does Alimama benefit the members of Alibaba's business ecosystem?

3. **Launching Alisoft**
   - What was Alibaba's rationale for developing Alisoft?
   - How does Alisoft benefit the members of Alibaba's business ecosystem?

4. **Launching Aliloan**
   - What was Alibaba's rationale for launching Aliloan?
   - How does Aliloan benefit the members of Alibaba's business ecosystem?

5. **Alibaba's Business Ecosystem**
   - How did Alibaba's actions and strategies affect the development of its business ecosystem?
   - What is the impact of the ecosystem development on Alibaba's organizational performance?

B.5 Members of Alibaba's Ecosystem: Sample Interview Questions

1. **For customers of Alibaba.com**
   - Why did you choose to become a member of Alibaba.com?
   - How is Alibaba.com different from other B2B exchanges?
   - What improvements would you like to see in the future at Alibaba.com?

2. **For customers of Taobao.com**
   - Why did you choose to become a member of Taobao.com?
   - How is Taobao.com different from other online auction sites?
   - What improvements would you like to see in the future at Taobao.com?

3. **For users of Yahoo/Koubei**
   - How do the search capabilities provided by Yahoo China benefit your business (e.g. does it help in your search for customers or suppliers?)?
   - How do the review capabilities provided by Koubei benefit your business (e.g. does it help in your search for customers or business partners?)?
   - What is the difference between Yahoo China and other search engines like Baidu?

4. **For users of Alisoft**
   - How does Alisoft benefit your business (e.g. what software modules do you use and what are the benefits of using these software?)

5. **For users of Alimama**
   - How does Alimama benefit your business (e.g. Describe how Alimama has made it easier for you to purchase and sell advertising web space)

APPENDIX C: METHODOLOGICAL DETAILS FOR CHANG CHUN CASE STUDY

C.1 Details of Primary Interviews

Table 29: Informants and Topics Discussed - CCP

Interviewee	Topics Discussed	Interviews
Top Management		
Senior Executive Vice President	Overview of IS Strategy, history of systems development, rationale for systems development approaches, challenges of systems developments, role in initiating systems development across the three phases	2
Chief Information Officer	Overview of systems development, IS strategy and vision, rationale for systems development approaches, resources and capabilities required, role in directing systems development across the three phases	3
IT Department (System Developers)		
Deputy Head A	Organizational and departmental culture, enactment of IS strategies, process of systems development, bricolage and development of capabilities, challenges and consequences of systems development across the three phases	2
Deputy Head B	Overall structure of the IT department, triggers of systems development, bricolage and development of capabilities, consequences of systems development across M and U phases	2
Group Leader A	Operations and routines of the IT department, response to IS strategy, triggers of system development, process of systems development across the M and U phases	2
Group Leader B	Triggers of systems development, bricolage and development of capabilities, consequences of systems development across the three phases	2
Executive Officer A	Organizational and departmental culture, process of systems development, resources and capabilities required, challenges of systems development across the M and U phases	3
Executive Officer B	Operations and routines of the IT department, process and consequences of systems development, interactions with business users across the M and U phases	2
Executive Officer C	Opinions on the IS leadership of CCP, interactions with business units, process and consequences of systems development across the M and U phases	2
Executive Officer D	Operations and routines of the IT department, triggers of systems development, process of systems development, resources and capabilities required, challenges of systems development across the three phases	2

Executive Officer E	Triggers of systems development, bricolage and development of capabilities, consequences of systems development across the M and U phases	1
Executive Officer F	Organizational and departmental culture, rationale for systems development, process and consequences of systems development in the E Phase	1
Executive Officer G	Operations and routines of the IT department, bricolage and development of capabilities, consequences of systems development across the three phases	3
Executive Officer H	Opinions on the IS strategy of CCP, triggers of systems development, process and consequences of system development, interactions with business users across the three phases.	2
Executive Officer I	Process and consequences of systems development in the U phase, organizational and departmental culture, opinions on the IS leadership of CCP.	1
Business Units (System Users)		
Senior Consultant (Planning)	Alignment of IT systems and business processes, effectiveness of systems development, performance of IT department, benefits of systems across the three phases	1
Technical Specialist (Overseas Group)	Technical specifications of developed systems, use of systems, effectiveness of systems development, performance of IT department, benefits of systems across the three phases	1

C.2 IT Deployment in the E-Phase (2001-2004): Sample Interview Questions

Q1. Organizational Resources: IT Infrastructure
Describe the IT infrastructure at Chang Chun before the implementation of the ERP system in terms of the

- Hardware used ?
- Software used (i.e. DOS-Based System)?
- Network (e.g. Internal networks, intranets)?

Q2. Sensing Capabilities
How did the organization find out that Microsoft was no longer supporting their old DOS-based systems?

- Was it due to active technology monitoring by the internal IT department?
- Did the IT department hear about this from other IT professionals or the top management?

Q3. Planning: Evaluating Alternatives
Prior to the implementation of the ERP system, Chang Chun considered the commercial packages from SAP, Oracle and JD Edwards.

- What is the estimated cost of implementing these packages if Chang Chun had decided to implement them?

Q4. Execution: Bricolage

- How did the organization make use of their existing IT infrastructure (see **Q1 –** i.e. existing hardware, software and network infrastructure) in the implementation of ERP system
- How did the job scope of the IT department change when the ERP system was implemented (e.g. organizational role changed from IT support to systems development)?

Q5. Partnering Agility: Implementation Agility

- How long did the organization take to implement the ERP system?
- How long would it typically take to implement a packaged system from a commercial vendor?
- If the development cycle was shortened as a result of internal development (i.e. the answer to 5.1 is less than 5.2), please provide an explanation for the shorter development cycle
- What are the other benefits of the internally developed ERP?

C.3 IT Deployment in the M-Phase (2005-2006): Sample Interview Questions

Q1. Organizational Resources: Human Resources

- There were 2-3 personnel assigned to the implementation of the M-ERP system. Were these personnel also involved in the implementation of the previous phase?

Q2. Organizational Resources: Top Management Endorsement

- Was the top management supportive of the initiatives of the M-Phase?
- Describe the ways in which they supported the project
- Do you think that they had more confidence in the implementation initiatives of the M-Phase because of the successful ERP implementation of the previous phase?

Q3. Organizational Resources: Organizational Knowledge

- In the cross-functional steering committee established to manage ERP implementation, did interactions between committee members over time enhance their knowledge of the business processes of the other departments?

Q4. Planning: Developing and Evaluating Alternatives

- Besides the systems implemented under the M-Phase, were there other alternatives considered? (e.g. packaged systems from commercial vendors, systems based on different technologies)?
- How were the alternatives evaluated and how did the organization decide on the implementation method?

Q5. Execution: Bricolage

- How did the organization make use of their existing IT infrastructure in the implementation of initiatives under the m-phase?
- How did the job scope of personnel involved in implementation change when the initiatives of the m-phase were being implemented (e.g. organizational role changed from systems maintenance to systems development)?

Q6. Partnering Agility: Implementation Agility

- How long did the organization take to implement the initiatives under the M-Phase?
- How long would it typically take to implement a similar packaged system purchased from a commercial vendor?
- If the development cycle was shortened as a result of internal development (i.e. the answer to 5.1 is less than 5.2), please provide an explanation for the shorter development cycle
- What are the other benefits of the developing the initiatives of the M-phase internally?

C.3 IT Deployment in the U-Phase (2007-Present): Sample Interview Questions

Q1. Organizational Resources: IT Infrastructure

- Did the initiatives of the U-Phase build on the systems developed during the M-Phase?

Q2. Organizational Resources: HR

- There were 5-6 personnel involved in the implementation of the initiatives of this phase. Were these personnel also involved in the implementation of the previous phases?

Q3. Organizational Resources: Organizational Knowledge

- Many of the systems (e.g. QR code, GPS tracking) require an in-depth knowledge of the business processes of the various functional departments. How did the IT department acquire knowledge of these business processes? Did knowledge of these business processes come about as a result of ERP/ M-ERP/ M-CRM / Pushmail implementation?

Q4. Organizational Resources: Top Management Endorsement

- Was the top management supportive of the initiatives of the U-Phase?
- Describe the ways in which they supported the project
- Do you think that they had more confidence in the implementation initiatives of the U-Phase because of the successful systems implementation experience of the previous phase?

Q5. Improvisational Capabilities: IT Skills

- Explain how the implementation team's knowledge of Visual Studio contributed to the implementation of the initiatives in the U-phase

Q6. Motivation for Improvisation: Intangible

- Was there a strong sense of responsibility to ensure that systems implementation was successful in the U-Phase?
- Describe how the IT personnel feel when the systems is implemented successfully. Was there a great sense of achievement?

Q7. Motivation for Improvisation: Culture

- How did the organizational culture facilitate systems implementation in the U-Phase?

Q8. Experimentation

- Did the organization implement the QR code on a smaller scale before implementing the initiatives organization wide? Describe the sequence of implementation at different locations

Q9. Execution: New Capability Development

- Was there a need to develop or acquire new resources (e.g. IT infrastructure, IT staff, organizational knowledge) and capabilities (e.g. technical capabilities, coordination capabilities) during the implementation of the initiatives of the U-Phase?

Q10. Execution: Bricolage

- How did the organization make use of their existing IT infrastructure in the implementation of initiatives under the m-phase?
- How did the job scope of personnel involved in implementation change when the initiatives of the m-phase were being implemented (e.g. organizational role changed from systems maintenance to systems development)?

Q11. Partnering Agility: Implementation Agility

- How long did the organization take to implement the various initiatives under the U-Phase?
- How long would it typically take to implement a similar packaged system purchased from a commercial vendor?
- If the development cycle was shortened as a result of internal development (i.e. the answer to 5.1 is less than 5.2), please provide an explanation for the shorter development cycle
- What are the other benefits of the developing the initiatives of the U-phase internally?

APPENDIX D: SNAPSHOTS OF HARDWAREZONE.COM

Figure 7: Hardwarezone Portal circa 2008

Figure 8: Hardwarezone Portal circa 2011

Figure 9: Printed Magazines/ Product Range Extensions (Early 2000 – Late 2004)

Figure 10: Regional Portalites – Hardwarezone Thailand

Figure 11: Printed magazines/ Product Range Extensions (2005 – Present)

APPENDIX E: SNAPSHOTS OF ALIBABA.COM

Figure 12: Alibaba.com (International Portal)

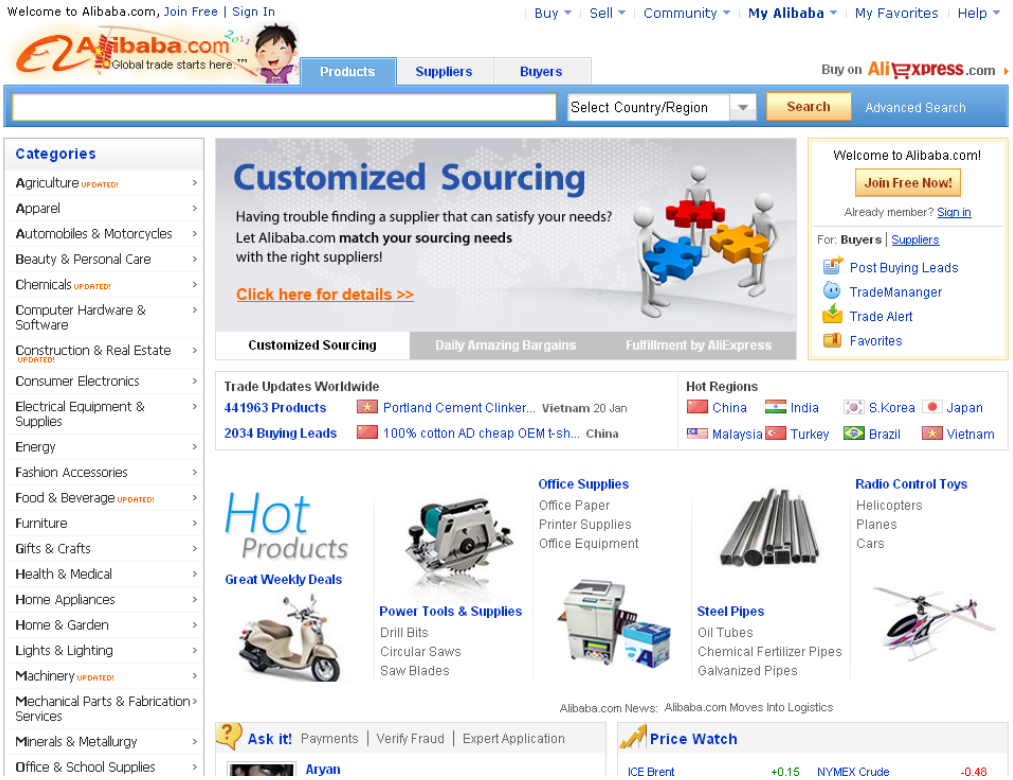


Figure 13: Alibaba.com (Chinese Portal)

Figure 14: Taobao.com

Figure 15: Yahoo China

Figure 16: Koubei.com

Figure 17: Alisoft.com

Figure 18: Alimama.com

APPENDIX F: SNAPSHOTS OF CHANG CHUN PETROCHEMICALS

Figure 19: Subsidiaries of Chang Chun Petrochemicals

長春關係企業 www.ccp.com.tw

CCP： 長春人造樹脂廠股份有限公司

CCPC：長春石油化學廠股份有限公司

RCCT：長捷士科技股份有限公司

DCC： 大連化學工業股份有限公司

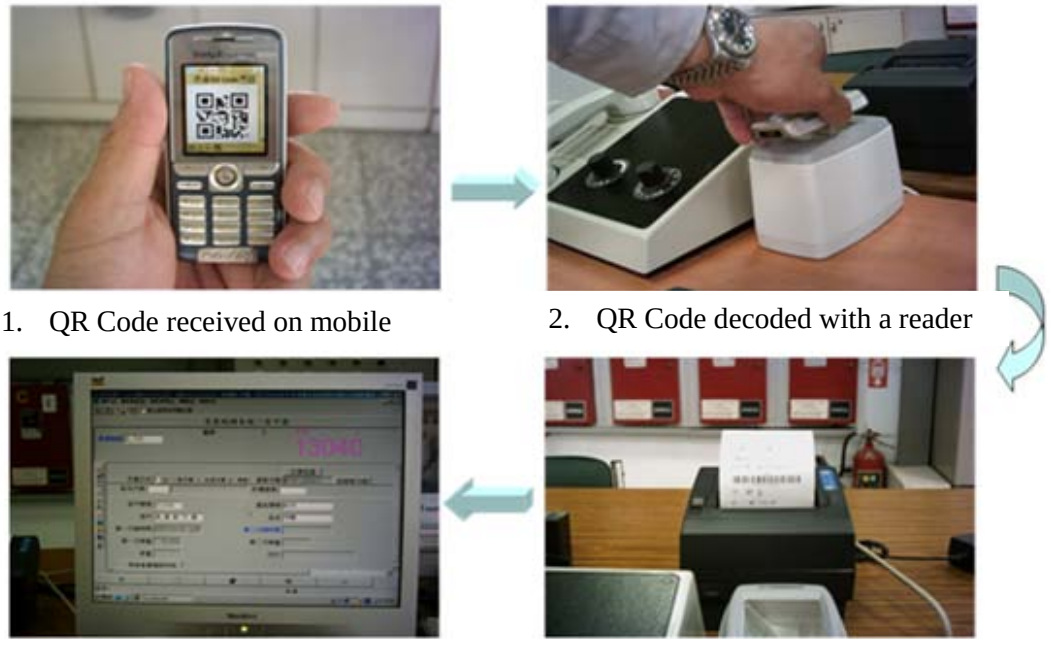
TCI： 台豐印刷電路工業股份有限公司

GDSX： 廣東申星化工有限公司

CCDPN : PT.Chang Chun DPN Chemical Industry

Figure 20: Snapshots of QR Code System

圖片資料來源：長春企業提供



1. QR Code received on mobile
2. QR Code decoded with a reader
3. Decoded information is printed
4. Verification with ERP Records

Figure 21: Screenshots of GPS Tracking System