

Completed Research Paper

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Organizations are commonly bothered by paradoxical pursuits, which make them demand on the development of organizational ambidexterity with dual exploitation and exploration abilities. This paper drawing on the organizational learning perspective, aims to uncover how the interaction of Information Technology (IT) and two distinguished organizational learning processes (i.e., strategic learning and business learning) dynamically contribute to the construction of organizational ambidexterity. To address this key research question, we studied an outstanding Chinese high-tech firm (Huawei) by revealing its evolutionary journey. We described how the IT-driven strategic learning leads to strategic transformation, while business learning results in the organizational stability in a certain period. Continuous exploration and exploitation constructed organizational ambidexterity. Specific strategic learning and business learning activities and methods were identified. This study not only fills the gap of the missing of IT artifacts in organizational learning and ambidexterity literatures but also offers valuable insights for other firms.

organizational ambidexterity, IT-enabled learning, strategic learning,
business learning

High-tech companies are characterized by their reliance on their Information Technology (IT) advantage and their particular emphasis on organizational ambidexterity. On the one hand, IT not only acts as the instruments of improving efficiency, enhancing productivity, and reducing operational costs (Banker et al. 2006), but also plays an important role of enabling business transformation and even driving strategy reorientation. On the other hand, the increasingly rapid changes of IT make the companies have to have the strategic paradoxical pursuits (Hitt 2005). Organizational ambidexterity, which is defined as an organization's capability to simultaneously perform both exploitation and exploration activities (Tushman et al. 1996), is prerequisite for high-tech companies to survive and thrive in the hyper-dynamic competitive environment. In the development of organizational ambidexterity, companies pursue the seemingly contradictory strategic intentions, which is shaped by their refinement of existing technologies and the search of promising new ones, their pursuits of both short-term profitability and long-term sustainability, their attempts of obtaining both internal stability and external flexibility (Adler et al. 1999; March 1991; Raisch et al. 2008; Tushman et al. 2006). Therefore, as a strategic goal of high-tech companies against the dynamic and competitive market landscape, the development of organizational ambidexterity relies on the judicious deployment of IT assets and capabilities.

The extant research has shown that both IT and organizational ambidexterity play a critical role for organizations. Organizational ambidexterity has been recognized as a "prerequisite of organizational survival and success" (e.g. (Gibson et al. 2004; He et al. 2004), whereas IT has been viewed as a source of an organization's core competence (e.g. (Tippins et al. 2003). However, little knowledge has been gained in regard to the relationship of IT and organizational ambidexterity, as seldom has research integrated the two critical factors to discuss the organizational success (Roberts N 2012). Thus, this study attempts to investigate the organizational ambidexterity development via IT-enabled organizational learning processes. Specifically, we identify three research gaps in the related literature as follows, which motivate us to conduct a deep investigation of the IT-enabled learning for organizational ambidexterity.

The first research gap is associated with the little knowledge of how strategic factors and operational practices jointly but distinctly contribute to organizational ambidexterity. To be ambidextrous, organizations have to reconcile internal tensions and conflicting demands in their task environments. While earlier research often discussed the existence of these trade-offs, recent research has paid attention to organizational solutions for building up the ambidexterity. Three approaches have been proposed, including (1) structural mechanisms that enable different organizational units to perform separate activities at the same time (Birkinshaw 2004); (2) context design that encourages members to divide their time between conflicting demands under particular systems, processes and beliefs (Ghoshal et al. 1994); and (3) leadership that stresses the responsibility of top management for the tension of explorative and exploitative activities (Lubatkin et al. 2006). Although these studies have shed light upon the design and availability of the three broad approaches at the strategic level, little research addressed the specific challenges faced by each approach during implementation at the operational level. For example, the inter-unit coordination and integration is considered as the main challenges of structural separation (Adler et al. 1999; Gibson et al. 2004; Siggelkow et al. 2006). Lack of general guidelines and case-specific best practices are the main challenge for contextual solutions (Mom 2007). While in terms of leadership-based antecedents, recommendations are partly contradictory. Some suggest division of labor for exploration and exploitation hierarchically (e.g. (Floyd et al. 2000)), while others suggest to simultaneously pursue both sides inside the same level or unit (e.g. (Lubatkin et al. 2006)). Furthermore, the interrelations between different antecedents had not been fully conceptualized (Raisch et al. 2008). As a result, we have little knowledge of the practical challenges faced by each alternatives and the interrelations among the three antecedents,

The second research gap is associated with the ignorance of the strategic role of IT for developing organizational ambidexterity. Different literature streams, including organizational learning, organizational adaptation, strategic management, and organizational design, have contributed to the research on organizational ambidexterity. Raisch and Birkinshaw (2008) attempted to develop a comprehensive framework to cover research on the antecedents, moderators, and outcomes of organizational ambidexterity. However, the existing research has largely ignored critical role of IT for organizational ambidexterity. Although IT can facilitate structural mechanism and context design for

organizational ambidexterity, IT capability has been only mentioned as an interest in the discussion (Abhishek Kathuria 2012). In fact, in the Information Systems (IS) research area, the roles of IT for supporting organizational memory and operational efficiency as well as enabling process transformation have been well established (Alavi et al. 2001). These two-sided findings imply that IT is crucial for developing organizational ambidexterity. However, little research has investigated how IT initiatives exert the strategic impacts for developing organizational ambidexterity. In addition, “a substantial amount of IS research employs a nominal view of the IT artifacts in relation to absorptive capacity”(Orlikowski et al. 2001; Roberts N 2012), which underestimates the strategic role of IT for organizations in capability building on the one hand, and implies the appropriateness of taking a learning perspective to study IT impacts on the other hand.

The third research gap is associated with the lack of an evolutionary view of organizational ambidexterity development in prior research. Prior research often examines organizational ambidexterity from a cross-sectional static perspective while ignoring the time dimension that matters to the capability building process. Organizational ambidexterity should be developed over time when organizations remains fit, survive and thrive in a complex adaptive system. Different explorative and exploitative activities should be implemented for organizations to deal with the evolutionary dancing rugged competitive environment. Also, IT initiatives should also be implemented and play different roles for enabling the capabilities on-demand in different competitive environments. But, few studies have uncovered the actual evolutionary building processes of organizational ambidexterity (Birkinshaw 2008).

To address the above research gaps, this study aims to investigate the IT-enabled organizational learning for the achievement of ambidexterity from an evolutionary perspective. We argue that organizational learning plays an essential mediating role between IT and organizational ambidexterity, because (1) organizational learning is a heterogeneous and inexhaustible resource (Vera & Crossan, 2004); (2) the organizational learning theory addresses the process and dynamic perspective (Fiol et al. 1985) and (3) learning from the developed countries' best practices catches the essence of catch-up strategy adopted by developing countries (Kim 1998a). Firstly, according to the Resource Based View, a firm's sustainable competitive advantage origins in its valuable, rare, imitable and non-substitutable resources (Barney 1991). While IT enables new business opportunities, it's not considered as heterogeneous resource due to the fact that it can be easily duplicated or imitated. Thus a number of MIS researchers heavily stress the necessity of combining IT with other valuable organizational resources and capabilities (e.g. (Bharadwaj 2000) (Drnevich et al. 2013)) rather than a stand-alone resource. In view of this, combining “organizational learning” with IT meets the key criterion proposed by Barney (1991). Besides, empirical studies also reveal that organizational learning is the possible missing link between IT competency and firm performance (Tippins et al. 2003). Secondly, the organizational learning theory focuses on specific learning processes, behaviors, as well as the dynamic interrelations of organizational elements, which is useful to reveal the details and practices in our case materials. Thirdly, due to the lag in economic development, Chinese local companies hang behind their western counterparts in management and technologies. Thus learning serves as an intuitive but key route for them to deal with the challenges and catch up with their competitors. So in our study, we combine IT with organizational learning to present a more reasonable explanation on the establishment and development of organizational ambidexterity. Further, organizational learning is composed by strategic learning and business learning (Kuwada 1998). The former focuses on the set up of new organizational rules, whereas the latter focuses on gaining efficiency on established routines. Strategic learning and business learning at different levels shape the explorative and exploitative activities for organizational ambidexterity. We conducted a longitudinal case study over an outstanding Chinese high-tech company, Huawei Technologies Co Ltd. (hereafter Huawei in short) to show how the IT-enabled strategic learning and business learning contribute to the development of organizational ambidexterity and tease out the evolutionary path such a capability building in the past two decades.

The Chinese company is selected with several reasons. Firstly, as a representative of the transitional economy, China is characterized by rapid growth and extremely fluctuated institutions and market transformations (Hoskisson 2000; Peng 2003; Peng 2004). The Chinese high-tech companies are constantly bothered by contradictions between the abundant market opportunities and weak knowledge accumulations (Tan et al. 2003). Appropriate strategic learning to explore new knowledge and opportunities and business learning to exploit the market for efficiency are particularly important for Chinese firms. Secondly, the arising of Chinese high-tech firms occurs in past one or two decades, which is

in line with the time window of the fast evolution and resolution of IT. It is easier to identify the IT impacts for organizational ambidexterity development, as such a high-level complex organizational capability development is related to a brunch of organizational issues. Furthermore, we also attempt to find out whether organizational ambidexterity development in the context of resource-limited companies (e.g., Chinese companies) has difference with that in the context of resource-rich companies in which organization ambidexterity has often been discussed.

In the following section, we first review relevant literatures on relationships among organizational ambidexterity, organizational learning and IT, and develop our research framework of organizational ambidexterity building. Next, we describe the research methodology of case study and then carefully present how organizational ambidexterity was developed and enhanced in three information construction stages of the Huawei Company. Then, we discuss the critical findings through the case study, and provide two illustrative figures to show the evolutionary journey of Huawei. Finally, we draw a conclusion with the theoretical and practical implications of this study.

Organizational Ambidexterity, Organizational Learning and IT

Organizational ambidexterity is defined as an organization's capability in simultaneously pursuing both exploitation and exploration related activities (Birkinshaw 2004; Birkinshaw 2008; O'Reilly 2004), where exploitation means dealing with what have been learned and exploration means searching for new possibilities. , Exploitation contributes to the current viability by "refinement, efficiency, selection and implementation", whereas , exploration ensures organizations' future viability by "search, variation, experimentation and discovery"(Levinthal 1993; March 1991). Organizational ambidexterity, aiming at the synergy of both exploitation and exploration, has been viewed as a prerequisite of organizational survival and success (Birkinshaw 2008).

Four questions related to organizational ambidexterity remains controversial in previous literature (Tushman 2009). The first question asks whether organizations separate exploration and exploitation sequentially (differentiation) or parallel them within the same organizational unit (integration) for developing ambidexterity. Although an integration approach is most desired, the degree of combination can be influenced by complex contingency factors (Tiwana 2008). The second one asks whether organizations cultivate personal ambidexterity (at an individual level) or create organizational mechanisms or contexts that enable different foci (at an organizational level). The third one asks whether organizational ambidexterity can be achieved by adopting certain configuration once for all (a static view) or through continuously reconfiguring (a dynamic view). The fourth one casts doubts on whether organizations source all knowledge activities within the organization boundary (internal) or through external acquisition of new knowledge (external). Further, Tushman, et.al (2009) proposed a special issue involved with seven important articles, and pointed out that studies that take a longitudinal perspective are scarce and few studies examine the conditions under which ambidexterity leads to success. Thus, we make effort in investigating the organizational ambidexterity building process across from a evolutionary perspective, with the aim of teasing out the differentiation-integration, individual-organizational, static-dynamic, and internal-external relationships in an ambidextrous organization.

A learning perspective for organizational ambidexterity. Organizational ambidexterity has been investigated from various perspectives (Birkinshaw 2008), in which organizational learning for ambidexterity has a substantial impact. Since March (1991) has proposed exploitation and exploration as two fundamentally different learning activities that ambidextrous organizations would simultaneously pursue. Kuwada (1998) further conceptualizes organizational learning into strategic learning and business learning at different levels, which shape an organization's exploration and exploitation, respectively.

Strategic learning focuses on the set up new organizational rules, interpretative mechanisms or new strategic orientation, resulting in a long-term and overall impact (Thomas 2001). It usually occurs in an ambiguous context and is characterized by revolutionary, radical and discontinuous organizational changes. Strategic learning is similar to double-loop or second-order learning (Fiol et al. 1985; Kuwada 1998). Business learning focuses on gaining efficiency on current routines, resulting in short-term and

local impacts in organization (Kuwada 1998). It usually occurs in a well-structured context and is characterized by evolutionary, incremental changes. Business learning is similar to single-loop or first-order learning (Argyris 1983; Fiol et al. 1985; March 1981; Mezias 1992). Kuwada (1998) points out that, strategic learning can guide the direction of business learning, while business learning serves to strengthen the rules established by the previous strategic learning. But whether business learning can trigger strategic learning or not depends on certain conditions, including adequate experience, available access and commitment to raw data, presence of slack resources and autonomy (Kuwada 1998).

Regarding the existing organizational ambidexterity research lacks of a consideration of strategic elements (Raisch et al. 2008), the distinction between strategic learning and business learning would fill up this gap. Strategic learning allows an organization to have a strategic intent to explore new knowledge and opportunities, while business learning allows the organization to exploit the established rules with efficiency. Strategic learning can lead the organization to perform strategic transformations, whereas business learning can make the organization stay stable in a certain period before the next wave of strategic learning occurs. In this sense, strategic learning and business learning contribute to the development of organizational ambidexterity.

An IT perspective for organizational ambidexterity. Although IT components are indispensable for the implementation of almost all organizational activities, few studies have discussed how IT contributes to organizational ambidexterity (Abhishek Kathuria 2012). The research on IT investment paradox implies that merely investing in IT or simply presence of advanced IT applications may not necessarily improve a firm's profitability and productivity, because these IT elements can be easily obtained through imitation or acquisition (Clemons et al. 1991; Lim et al. 2011). However, prior research shows that IT initiatives do enhance an organization's dynamic capability and improvisational capability (El Sawy et al. 2008), agility (Sambamurthy et al. 2003), and absorptive capacity (Tippins et al. 2003). From the paradox paradigm, IT or the IT initiatives should have contributions to organizational ambidexterity development. In this paper, we propose that strategic learning and business learning are the missing link between IT and organizational ambidexterity.

IT and Organizational Learning

In this paper, we regard IT as a physical asset (e.g., IT initiatives) rather than a capability. According to Bharadwaj (2000), IT capability has a much wider range, including tangible IT infrastructure components, human IT resources and intangible IT-enabled resources. Two main research themes have been discussed to address the relationship between IT and organizational learning (Robey et al. 2000). In the first theme, organizational learning is considered as a heterogeneous resource (Argote et al. 2011; Hendry 1996; Vera et al. 2004), whose combination with IT contribute to the protection of IT advantage (Bharadwaj 2000; Powell et al. 1997; Tippins et al. 2003). The second theme stresses IT as an enabling tool that facilitates the organizational learning processes, resulting in higher efficiency and more flexibility (Kane et al. 2007).

In the first theme, IT initiatives are targeted objects of organizational learning. Based on the Resource Based View, the potential value of IT has to be protected through its combination with other unique or scarce organizational resource (Powell et al. 1997). While a number of such combinations have been identified with IT, such as superior customer service and new product development (Banker et al. 2006; Ray et al. 2005), there is a limited discussion on combining IT with organizational learning. As a heterogeneous resource that is hard to duplicate, organizational learning largely relies on an organization's previous experience, accumulated culture and different learning capabilities as well as its dynamically changing nature (Argote et al. 2011; Hendry 1996; Vera et al. 2004). Exemplary studies claim that firms must complement IT with the organizational-level learning processes to become successful (Anand et al. 1998), and empirically support that organizational learning plays a significant role in determining the outcomes of IT (Tippins et al. 2003). However, ongoing studies are yet incomplete on how organizational learning processes contribute to the establishment of IT advantages.

Our study highlights the role of organizational learning as a heterogeneous resource and delves into comprehensive case materials to present the learning methods and principles. During the implementation of a particular IT initiative, strategic learning occurs to facilitate the identification, assimilation and creation of appropriate IT solutions. Exemplary strategic learning activities, such as discovering external opportunities, encourage radical changes and enable a comprehensive consideration of long-term

sustainability. Once this particular IT initiative becomes a smooth daily operation, business learning occurs to dig the potential positive effect of IT through repetition and refinement.

In the second theme, IT serves as a tool to facilitate organizational learning. Many researchers claim that IT is a value creator rather than a cost generator (Sampler 1998). If the virtual asset can be managed properly, it can be used to leverage other resources (Tippins et al. 2003). Previous research categorizes IT has three types of roles, including automation, information and transformation (Abhishek Kathuria 2012; Dehning et al. 2003; Schein 1992). Automation refers to the use of IT to improve the efficiency of existing processes; information refers to the use of IT to assist decision-making of senior managers and decision-taking of subordinates; and transformation refers to the use of IT to fundamentally redesign operational processes, relationships and business scopes (Dehning et al. 2003). This typology echoes with on the earlier five levels of IT-enabled business transformation, including Local Exploitation, Internal Integration, Business Process Redesign, Business Network Redesign, and Business Scope Redefinition (Venkatraman 1994).

At the “Local Exploitation” level, IT mainly plays the role of automation to redesign focused, high-value areas of business operations, where only minimum changes occur. At the “Internal Integration” level, IT mainly plays the role of information to create seamless organizational processes, where both technical interconnectivity and organizational interdependence are reflected. At the last three levels, IT mainly plays the role of transformation that enables future viability. Since both “Local Exploitation” and “Internal Integration” focus on rectify current weakness, they are more related to efficiency. Thus, IT applications at the two levels are powerful to support business learning activities. The other three levels focus on create strategic capabilities oriented at future development, they are implemented for capability enhancement, thus, IT applications at these three levels tend to support strategic learning activities (Venkatraman 1994).

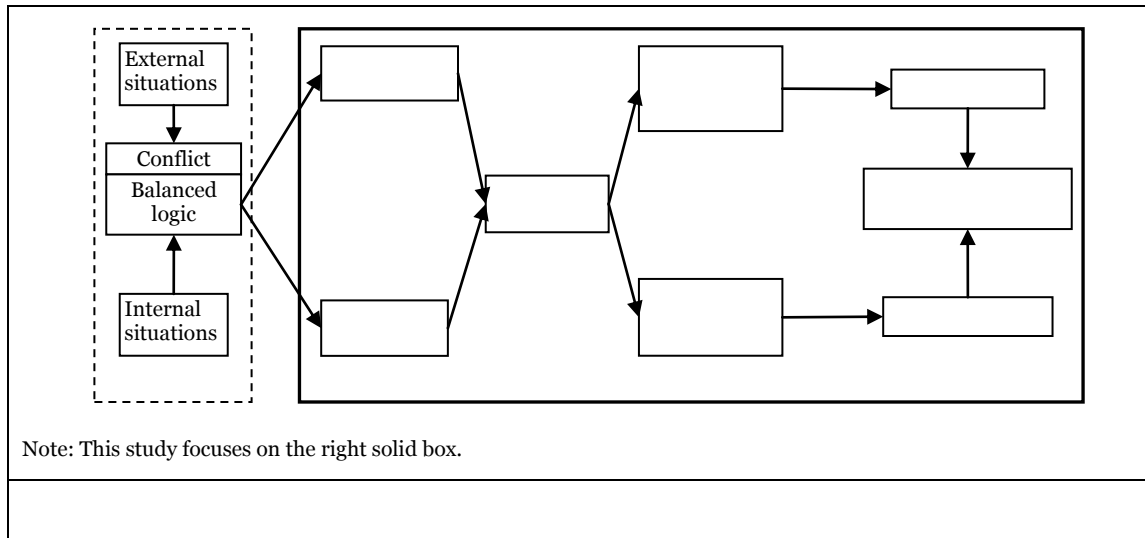
The term “IT-enabled learning mechanism” refers to both the IT applications (e.g. CRM, DSS) and the mechanisms and structures that these IT applications enable (e.g. virtual community) (Kane et al. 2007). Accordingly, we define IT-enabled strategic learning as IT applications and the mechanisms and structures that these applications enable to facilitate future-oriented learning activities. IT-enabled strategic learning is characterized by setting up new rules, establishing interpretive schemes and search for new strategic orientations. While IT-enabled business learning refers to IT applications and the mechanisms and structures that these applications enable to facilitate learning activities in the current governing rules, including repeating successful programs, reinforcing institutions, with the aim of improving efficiency and correcting mismatches.

Recent research tend to investigate the relationship between IT and organizational learning in a unidirectional way but it may be bidirectional (Robey et al. 2000). Thus, we attempt to investigate the interactive and reinforcing relationship between IT and organizational learning and meanwhile to pinpoint what specific IT artefacts contribute to different learning activities along different development stages.

Based on the critical literature review, we initially develop a theoretical framework shown in Figure 1 to depict the relationships among strategic learning, business learning, IT initiatives and organizational ambidexterity. The conflicts or paradox of external and internal situations serve as the triggers for an organization to develop the organization ambidexterity, and request the organization to choose a balanced logic. The competitive environment that an organization resides in is often complex and dynamic (Gibson et al. 2004), thus, the organization always struggles for addressing the paradox and conflicts, e.g. between external abundant opportunities and internal limited resources, and between external fierce competition and internal aggressive expectations. The organization starts at an intuitive or heuristic balanced idea that based on its value system, and then proactively seeks for possibilities to reconcile the conflict to the largest degree, resulting in organizational ambidexterity. IT provides such strategic possibilities (Lucas Jr 1995; Mahmood et al. 1991).

In our framework, both strategic learning and organizational learning occurs to cope with difficulties in the importation and implementation of IT initiatives. These initiatives together with appropriate strategic

learning form a distinctive advantage for the organization. After the IT initiatives are completed, the organization will institutionalize these initiatives and can benefit from IT supported strategic learning and business learning. Thus, both strategic learning and organizational learning dynamically interact with IT during different organization development stages and contribute to the construction of organizational ambidexterity.



A longitudinal single case study is suitable to investigate the proposed research questions with the following three reasons. First of all, we aim to uncover how questions: how to establish organizational ambidexterity and how to balance contradictory pursuits by IT-enabled learning processes. Adequate explanations and broader causal linkages that are deeply embedded in complex organizational contexts make case study a proper choice towards theory building (Walsham 1995; Yin 2002). Secondly, an investigation of capability building from an evolutionary perspective requires time-series or longitudinal data (Ella 2009). Finally, the lack of prior research makes revelatory and typical case study appropriate for exploring untouched areas.

To fulfil our research objectives, we selected the Huawei Technologies Co Ltd, a leading player in the telecommunications industry in China. Firstly, this company has gone through major changes in its information construction. Within 25 years, it has standardized its operations, upgraded its management systems and shifted its orientations according to the demands from the markets. Secondly, the case company demonstrates an adequate level of organizational ambidexterity in managing conflicts and challenges originated from these strategic changes. Thirdly, the contrasts between strategic learning and business learning are sharp. Typical learning activities as well as methods can be easily identified.

Case Access and Data Collection

Our research access was negotiated with Wang, Jiehong, the Vice President in the infrastructure department of Huawei, on 26th, February, 2012. In view of our academic research purpose, the VP provided us with valuable materials and widespread access. We collected abundant case materials from various data sources, including face-to-face interviews, e-mail communications and archival materials, which serves to form data triangulation (Yin 2002). First-hand materials include all 71 discourses from its CEO (Ren Zhengfei), interview transcripts and email responses from 15 targeted employees from all organizational levels, who had directly experienced the major changes or were significantly influenced by the changes. Second-hand materials include published books, official websites, information in the community club of Tiany and internal email communications among management teams, training materials and circulations like “Management Optimization” and “Huawei People”. These archival materials are scattered along the company history, which are relative objective and free of recall bias. To

prevent recalling distortion during interviews and email responses, we collected data from various data sources to form data triangulation (Miles et al. 1984). Employees from both Huawei and corresponding consultant company in different stages were interviewed to ensure consistent responses (Yin 2002).

Our interviews records summed up to 40 hours and were transferred to documents via external professional companies. Basically, all interview questions were open-ended in nature and were prepared in advance. Extensive discussions and debates among researchers are conducted once a week in the past one and a half years with detailed documentation. Data triangulation has been achieved through iterative data validation and consolidation among multiple researchers until a congruent and coherent theme emerged (Yin 2002).

Data Analysis

We follow the 8-steps SPS (Structured-Pragmatic-Situational) research method, which encourages us to collect and analyze data under a proper guidance based on prior theories while also provides useful advices for theory building (Pan et al. 2011). In the “Framing cycle”, we relied on background information, broad interviews and reviews of related theories to conceptualize the phenomenon. We identified relevant concepts like organizational learning, IT-enabled mechanisms and organizational ambidexterity as our core model elements and depicted a broad theoretical framework to guide our further data collection and case analysis. Then we collected initial interview data and organized them to construct and extend our theoretical lens, which served as “sensitizing device”(Klein et al. 1999). The iteration of data collection and theoretical construction continues until we believe that the theoretical lens was an accurate representation of eventual case data. Then we stepped into the “Augmenting cycle”, including steps like confirming and validating data, selective coding and ensuring theory data alignment. We try to incorporate evidences that are triangulated by at least two data sources (Yin 2003). When there is conflicting interpretations of the same phenomena, we seek for additional objective sources to mediate between the conflicting accounts (Pan et al. 2011) or make reasonable and careful adjustments to the theoretical lens accordingly. Following the data coding guidelines (Strauss 1998), four researchers cooperated in data coding and arranging them into the identified set of themes. Our theoretical lens was improved incrementally during the recursively iterating between existing theories, data and the emergent model (Eisenhardt 1989) until theory-data-model alignment and theoretical saturation (Eisenhardt 1989) has been reached. As for report writing, besides narratives, we also adopted organized diagrams to condense the large amount of case information and explain the process of inductive derivation (Pratt 2009). The diagrams were presented to relevant stakeholders of Huawei to validate our interpretations.

Based on our analysis, we identified three distinct stages in Huawei’s information construction progress. Accordingly, the decisions and learning activities are divided into three stages to facilitate the examination of corresponding organizational ambidexterity building.

Huawei Technologies Co Ltd was founded in Shen Zhen in 1987 with registered capital of only 20 thousand RMB (about \$3000). After 25 years growth, Huawei ranks only after Ericsson in the international markets with annual sales reached RMB 220 billion (\$35.4 billion). It provides ICT related products and solutions to customers in more than 140 countries and one third of the world’s population, covering telecom operators, enterprises and end-users. The company now employed 146,000 staff, with over 20% expats (see <http://www.huawei.com/cn/>). In 2008, the Business Week magazine lists Huawei in "The World's Most Influential Companies", exhibiting the significant role Huawei is playing in the telecom business landscape (see http://finance.yahoo.com/news/pf_article_106294.html). In 2010, Huawei was ranked the 5th most innovative company in the world by Fast Company, only behind Facebook, Amazon, Apple, and Google (Foster et al. 2010).

Inspired by our review of the literature on relationships between IT, strategic learning, business learning and organizational ambidexterity, we focus our inquiry on four pertinent themes: (1) the initial strategic learning and business learning to put forward and carry out judicious IT initiatives; (2) the particular IT initiatives adopted against the external and internal situations at a particular stage; (3) the effect of completed IT projects on strategic learning and business learning activities, and (4) the ultimate obtained organizational ambidexterity. Next, we’ll present 3 distinctive informationization stages of the targeted

organization by narratives. We play down Huawei's history between 1987 and 1994 due to the little IT construction during that period.

Stage 1: IT-enabled strategic and business learning for ambidextrous product development (1995-2005)

In 1995, Huawei faced up to a rapidly increasing domestic market. In the aspiration of its CEO, Ren, Zhengfei, Huawei aimed to become a leading company in the world. But the company was only in an initial stage of technology and management development, and its financial situation was out at elbows. In the first eight years, Huawei used the informal "guerrilla forces" that stressed personal experiences and had no unified management. The challenge rose when Huawei tended to scale up for more opportunities. Huawei performed extensive learning activities to catch up with the leading players under the CEO's leadership. Mr. Ren indicated that:

"The company's most serious problem is lag in management, which is even more serious than the lag in technology. Human resource, technology and capital can be brought, but the management and service can't and has to rely on self-creation. (Ren Zhengfei, 1998.9)"

In order to identify the right IT initiatives, Huawei invited IBM and PWC as external consultancy. The CEO first sought unity of thinking in a top-down manner. He stressed, "never mind grass-root employees not understanding the IPD processes, but managers and leaders in product lines have to thoroughly understand the essence". When there were conflicts between the imported system and the previous habitual operations, Huawei adopted the rule of "freeze, institutionalize and optimize" to remove the incompatibility. As the CEO noted, "in the current 2 or 3 years, we focus on total and uncritical acceptance, but 2 or 3 years later, we can make proper changes." The rule emphasizes to unlearn the past experience and learn without challenging and questioning to consultants. According to the CEO, "cut the feet to fit the shoes" is a way to comprehensively learn the essence of western management system. Meanwhile, "self-criticism" was advocated for "removing the soil of cognitive construction", breaking the barriers of self-constrain, and keeping open-minded to others' advices. Core members of the project team were changed once a month to ensure that only people who fully understand the IT initiatives can be retained. They paid special attention to the reflection on failures, in order to form the right perception of new rules. To pull through its initial financial difficulty, Huawei pulled all sources at one point. This principle passes on the firm belief in success and also strong pressure to all staff and cultivated aggressive and striving culture.

Huawei emphasized constant refinements in current processes through learning by doing and spontaneous learning among employees. Managers were encouraged to write articles and case study notes of their foreign visits and recommend business readings to other staff, in order to share experiences and encourage learning from mistakes. Besides, the Management Optimization, an internal journal is issued particularly for the discovery, discussion and sharing of practical problems and errors during IT projects.

Selected projects included Integrated Product Development (IPD), Integrated Supply Chain (ISC), human resource management, quality management and financial management. IT mainly played the role of product development processes automation and standardization.

The implementation of IPD had enabled a series of decision making processes in the R&D department, including steps like evaluating and segmenting market, searching opportunities, making and integrating plans and evaluating performance. Compared with their original separate developments on short-term products, IPD unifies business strategy, historical data and technology and ensures long-term products to be managed as an investment. In a similar way, ISC managed to coordinate each link on the supply chain and enables the benchmarking with best practices.

Besides the simplification of business learning steps and well-organized documentation, IT initiatives like IPD had established mechanisms of proficient cross-functional teams that break the barriers of all departments.

¹ Cited from current CEO, Ren, Zhengfei's speech in September, 1998, with the title "How long will Huawei's red flag sustain?"

By this stage, Huawei upgraded its management level in product development and improved efficiency in supply chain management. IPD reduced the development cycle by 50% and the rate of defect by 95%, while ISC project increased number of contracts by more 30%, turnover of inventory by 14% and reduced contract operating cycle by 60% (CIO report, 2011). Exploration is mainly performed in the marketing and R&D department, while exploitation is mainly conducted in other functional departments. Under the striving culture, Huawei ensured 10% of sales revenue on R&D investment. Huawei values ambidextrous individuals. Experts in product and technology have to be familiar with customers and markets, while marketing employees have to advise on the product design process. Meanwhile, external acquisition of new knowledge was more relied than knowledge within the organizational boundary.

Stage 2: IT-enabled strategic and business learning for ambidextrous operational management (2005-2009)

In year 2005, external economic downturn led to the shrink of telecommunication market, at the same time, Huawei's sales revenue from the international market had exceeded national market revenue for the first time. The dilemma rose because separated systems cannot satisfy the coordination requirements between different locations, and that established management system slowly engendered organization inertia despite the fact that customers' expectations become much higher. The balanced idea in this stage is evident in the following quote from its CEO:

As an international company in the high-tech field, we haven't any experience to refer when developing overseas market, all we can do is to touch the stones, roll around the market mud and learn in the extremely competitive market. (Ren Zhengfei, 2005.11²)

Targeting at the global market, Huawei adopted new consultancy from HayGroup and launched new IT initiatives. Strategic learning methods like "freeze, institutionalize and optimize" and "self-criticism" were complemented by new principles. Based on its accumulated experiences, Huawei summarized its strategy of global coverage of IT initiatives as "3 Us and 1 D", namely "Unified management, Unified methodology and outputs templates, Unified general plan and Decentralized implementation and change management". Meanwhile, business learning mainly serves to maximize potential value of the existing systems. The business learning includes the replication of unified methodology and templates in a new market, frequent knowledge sharing in formal training programs, summaries of past experiences, and so on.

Integrative IT initiatives included leadership development, Integrated Financial System (IFS), CRM, International Major Consumer Management System and Joint Innovation System, which combines decentralized systems in the first stage and aims at effective international operation.

Since 2005, the Leadership Development System (LDS) was used to provide support on cultivation and assessment of leaders, which enables new interpretative schemes and new strategic orientations. The Joint Innovation Management (JIM) was implemented to promote technology innovation by leveraging partnerships with leading operators, who shares the burden of potential risks and provide insights in product design. For example, Huawei cooperated with Vodafone in 2006, innovative products like SingleRAN, transitional scheme for IPv6 and IP microwave have demonstrated a profound effect on their sustain success.

. By this stage, Huawei had the IP phone system and Telephone Conference System (TCS) to achieve real-time communication and information sharing, and had the Notes and email systems to achieve non-real time data communication across the organization. Moreover, virtual communities were developed as information sharing and distribution platform, and Viewpoint and ZhiZhen systems were adopted for full-view teleconferences. The IFS, CRM were integrated with previous systems to offer a seamless flow of information and capital. Wang, Jie hong, the vice president in infrastructure department, mentioned as below,

"IFS is not simply transformation on the financial system, it relates to the whole management system

² Cited from current CEO, Ren, Zhengfei's speech in November, 2005, with the title "Research direction of seeking truth from facts with twenty years of hard work"

of Huawei. The IFS experimental unit will take off along with the integration of product line and research platform.”(Wang Jiehong, 2012, internal memo)

By this stage, Huawei has advanced its integrated management over financial and customer resources. The initiatives provided an excellent communication and coordination platform for the organization. Both explorative and exploitative activities were carried out in the organization via corresponding IT applications. Individuals can resort to IT-enabled matrix management systems for resources when performing searching and refining tasks. Since 2008, Huawei required that 50% percent of the new product components should come from the established “product shelf”. The organization expanded the rule of “sufficient rewards on small improvements, limited encouragement on broad recommendation” across the organization to encourage more prudent internal knowledge focus.

Stage 3: IT-enabled strategic and business learning for ambidextrous customer management (2009-till now)

Under the dark clouds of financial crisis, both domestic and international market was depressed. Huawei slowed down its pace and realized that there was still big management gap with its international competitors. By analyzing its project failure in the Sudan, the organization had realized that solely downsizing structures and simplify procedures in a top-down manner would cause pressure on the frontier employees. The dilemma face by Huawei in this stage is the hierarchical functional system and the requirement of a flexible customer-oriented system. This reverse of decision direction should be adjusted incrementally, which requires openness, compromise and tolerance.

Inspired by the strategic learning method of US special troops, Huawei established a special team structure targeted at customers – “The iron triangle combat unit”, which basically consists of a customer manager, a solution provider expert and a delivery professional. This empowerment operating mode unifies the best organizational resources to interpret customer needs, ensure timely delivery and reduce cost. Besides, strategic learning occurs to help identify promising future technologies like cloud computing or the network cloud architecture to provide on demand IT operation.

Business leaning occurs to duplicate and make appropriate adjustments to the “combat unit” in other countries. Moreover, latter rounds of previous IT projects were initiated in this stage. In order to align with the customer-focus strategy, business learning enabled extensive refinements in the current system.

IT initiatives at this stage aimed to support End-to-end process and customer-centered organizational structure, such as the Lead to Cash (LTC) program.

Huawei’s has three core business processes, namely IPD+ (from customer demand to product launch), OTC (Opportunity to Cash) and ITS (Issue to Solution), which are characterized by ill-structured information and high variation. By borderless access to net service (e.g. WLAN, Internet), flat international WAN architecture and separated layer of multiple data centers, Huawei moved up a notch to manage its business demand and IT investments. In the next three years, OTC will be prioritized in development.

By 2012, IT aims to visualize internal processes, including global procurement, logistics, capital and assets flow, abidance of overseas laws and regulations, internal control and reliable financial statement, and contribute to strengthen internal control and reduce risks. The sharing of hardware platform, software platform, chip platform and integrated testing across the R&D department along with the CMM5 software quality management construct a “combinative advantage” over “Cost, Quality and Speed”.

By this stage, Huawei has transformed into a customer-centered organization. IT-enabled platforms serve to enhance its international business with efficiency In July, 2010, Huawei added “reduction rate of service expenditure” as a new KPI for the R&D team. Along with the original emphasis on “new product ratio”, Huawei stresses the simultaneous pursuit of both new products and low operation costs in the same unit. Besides, the KPI system of a particular department is related to other departments, in order to break the departmental boundary and facilitate coordination. The international operating platform connects headquarter, local office and representative office to

balance between centralized management and empowerment, to unite both decision in the frontline and regulatory audit in the rear. The IT initiatives are implemented through “introduction and management”, which requires both external and internal knowledge focus.

In this study, we aim to find out how organizational ambidexterity is achieved through the iterative interaction between IT, strategic learning and business learning. From the Huawei case, we find that the interaction relationships in each stage are progressed with loops (see Figure 2): (1) to deal with dilemmas arising from external and internal situations, strategic learning occurred to identify suitable IT initiatives, and business learning facilitate the IT initiatives exert marginal value; (2) different IT assets serve to influence strategic learning and business learning in different ways; (3) the resultant organizational ambidexterity evolves over time when new IT initiatives are imported into the company. In each specific

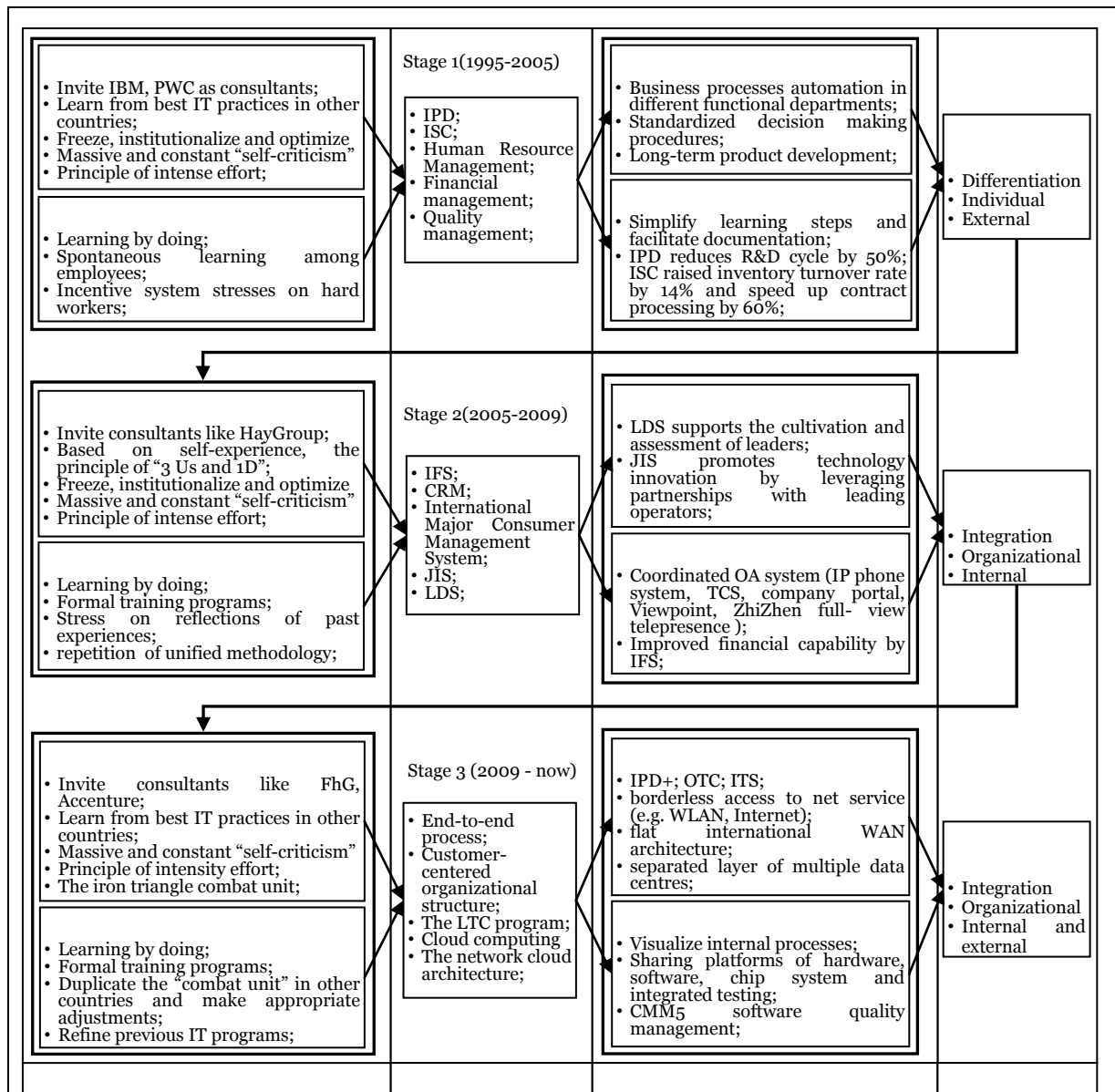
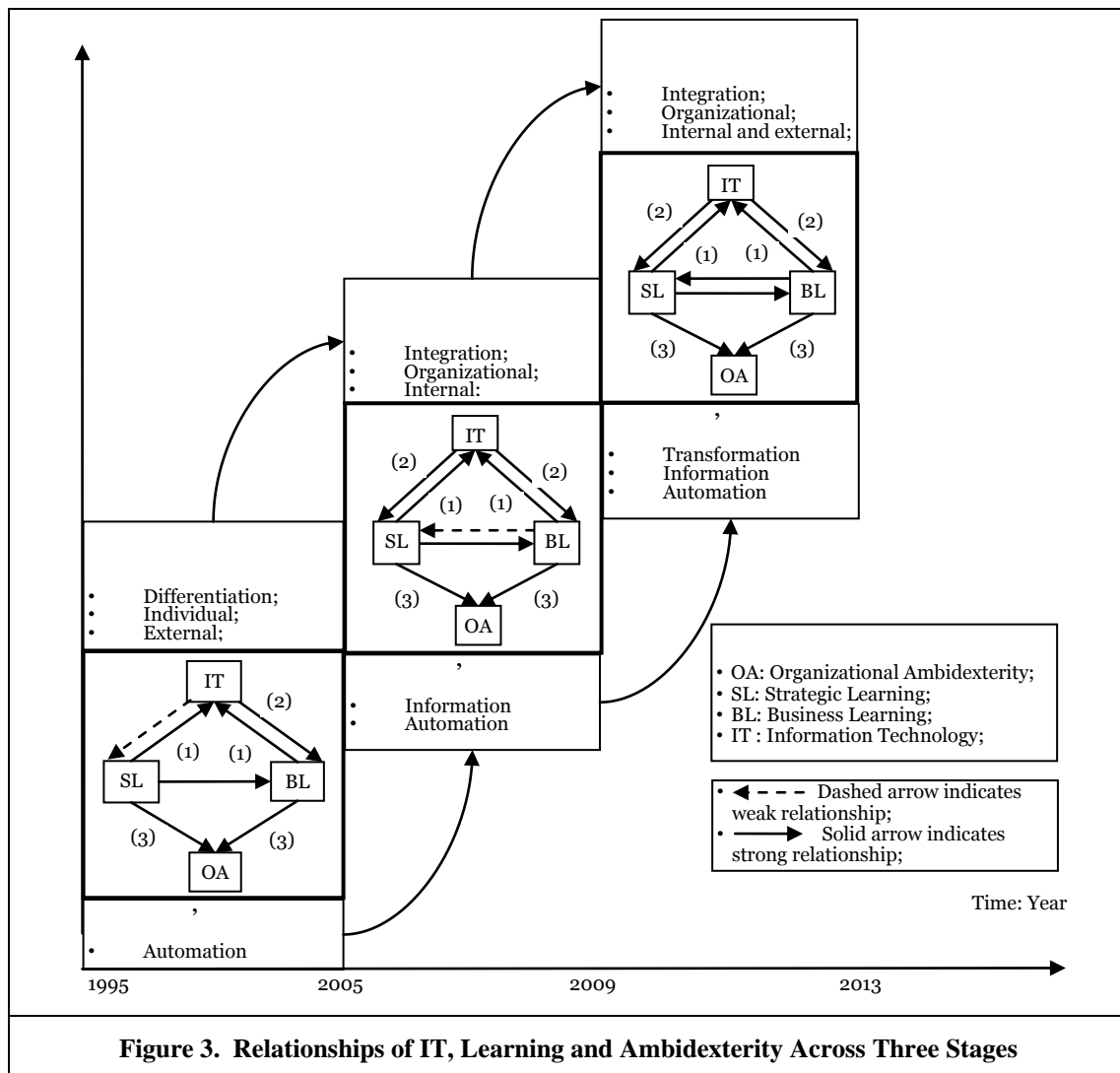


Figure 2. Evolutionary Journey of Organizational Ambidexterity Building of Huawei

Stage, Huawei developed ambidexterity by using differentiation and integration approaches alternatively, balancing the internal and external knowledge sources, appropriately dealing the relationship between individuals and the organization. The whole evolutionary journey of Huawei offers an insight of how the company develops organizational ambidexterity in the Static and Dynamic modes. While the evolution shapes a dynamic ambidexterity development, the ambidexterity in each stage shapes a static development. Figure 2 illustrates how Huawei’s organizational ambidexterity advanced across three stages. More importantly, we depicted a spiral up path of organizational ambidexterity building in Figure 3, which indicates how the IT roles changed along the evolution journey across the three stages.

In the first stage, Huawei was in an adverse situation especially for exploration, which demands large financial investment and adequate prior experience level (Kim 1998b). So they focus on external best practices and forced a struggling culture under the huge pressure of survive. This is a wise choice for most catching up Chinese firms since “the technological environment shapes performance priorities”(Cardinal et al. 2011). During the period of 1995 to 2005, Huawei faced a high-variability environment where market space was increasing and the competitive landscape had undergone big changes. Huawei realized the importance of moving toward higher effectiveness and lower efficiency(Drnevich et al. 2013), they managed to invest IT-based flexibility to meet the challenges in a rapid changing environment, even when the investment is a burden for them in the short-run. The strategic learning rules like “freeze, institutionalize and optimize” and “self-criticism” contribute to the discovery of the essence and new opportunities of the imitative IT initiatives. Besides, active business learning serves to quickly routinize



the radical changes (Crossan et al. 1999). Although IT plays a key role in automating business learning activities, it only provides limited support on strategic learning due to the lack of future-oriented cross functional solutions. As a result, organizational ambidexterity was achieved sequentially because of the extreme lack of capital, dependent on individual personalities due to the lack of integrated organizational context and focused on the external knowledge source due to weak internal management and technology base (Lubatkin et al. 2006). Note that due to the thin experience, no access to raw data, absence of slack resources, business learning can barely trigger strategic learning process (Kuwada 1998).

In the second stage, as the company expanding quickly, integrated IT platform was indispensable for its international operation. The accumulated organizational ambidexterity serves as a stronger tool for the new round of knowledge acquisition. However, instead of stressing heavily on external knowledge sources, Huawei adopted an inward looking (Cardinal et al. 2011). By various formal training programs and extensive reflections, Huawei successfully established its integrated platform and managed to repeat the success on other similar projects (Lehn 2002). At this stage, resulted IT assets played the role of both automation and information. Besides, strategic learning and business learning activities can be supported by corresponding applications. As a result, organizational ambidexterity was achieved simultaneously because of the more flexible capital flow, dependent on organization mechanisms supported by advanced IT solutions and focused on the internal knowledge source due to sufficient available experience. Note that at this stage, there are abundant experience, some slack resources and certain level of autonomy, but lower level employees don't have access and commitment to raw data due to the top-down decision flow, so there was only weak relationship from business learning to strategic learning.

In the third stage, the customer-focused process demands a bottom up decision procedure (Lin et al. 2003), which is a radical transformation that reverses the well-accepted top-down information flow. By now, IT has advanced its position to cover the transformation role, and the spiral up cycle among learning activities, IT-enabled learning mechanisms and organizational ambidexterity have become more harmonious. Organization can freely switch between internal and external knowledge focus. Moreover, there is evident interactive relationship between strategic learning and business learning.

It's interesting to notice that exploitative activities are more relied on during economic downturns than during the boomed period, while explorative activities are more frequent during the boomed period (Drnevich et al. 2013). In the booming era with full of opportunities, exploration decides who will enjoy the first-mover advantage and thus the leading market position in the future, so organizations will seek desperately even when there is no favorable condition for explorative activities. While during economic crisis, the imperative task is to survive, so organizations tend to reduce expenditure and focus on incremental changes to improve immediate profitability, namely focus on exploitative activities.

In our case analysis, we revealed how strategic learning and business learning facilitate the importation and implementation of IT initiatives, and how the accomplished IT assets enabled the company's strategic learning and business learning activities that contribute to the enhanced organizational ambidexterity. Our research provides new insights into the existing literatures and practices as well.

Firstly, our study contributes to the organizational ambidexterity research by answering the four questions in terms of the development of organizational ambidexterity. We conclude that (1) the balance between differentiation and integration depends on the relative importance of exploitative and explorative activities (Gulati and Puranam 2009). This strategic choice of the approaches is determined by the external and internal situations in a particular environment. The differentiation approach is favored when an organization has limited resources and capabilities, while the integration approach can be adopted when the organization becomes stronger with resource slack. (2) The pursuit of ambidexterity at the individual level requires less organizational resources and is usually preferred at the initial stage. But this not necessarily indicates that organizational ambidexterity achieved at the organizational level has a predominant advantage over that achieved at the individual level. In fact, ambidextrous individuals serve as nucleus even when the organization shifted its reliance on organizational systems. (3) The pursuit of ambidexterity through an external or internal knowledge focus presents an obvious sequential pattern. For firms operating in China, an external knowledge focus at the start up stage is a wise choice, especially when the firms have limited resources and weak management and technology base. As the firms

accumulated rich experiences, they should focus on internal knowledge in order to deeply understand organizational needs and create really innovative products. With enhanced ambidexterity, the organization triggers another cycle to acquire new knowledge beyond its boundary. (4) The development of organizational ambidexterity over time shapes a dynamic process for creating and sustaining organizational ambidexterity. Our research also has some implications on how the resource endowment impact organizational ambidexterity. Firms with less resource are less likely to afford mixed strategies (Kyriakopoulos et al. 2004). As a result, they have to prioritize the most urgent demand and make tough choices or tradeoffs. In fact, some empirical studies found that small companies benefit from focused or one-sided strategies (Ebben et al. 2005). As the firm accumulates more resource, it becomes more flexible on exploitative and explorative activities. In many literatures, the existence of adequate slack resource is considered as a favorable condition for innovation (Nohria et al. 1996). Thus we are convinced that organizational ambidexterity, which emphasizes the simultaneous pursuit of exploitation and exploration, requires certain amount of resources. However, different from the chronic negative attitude towards resource limited condition, we don't think the forced tradeoffs always impede a company's organizational ambidexterity. Since organizational ambidexterity is an accumulative capability, the cautious shifts between exploitation and exploration in the initial stage are beneficial for companies to gain competence in each side. When there are more available resources, the accumulative advantages in each side are released as the simultaneous pursuit of hybrid activities, or rather, organizational ambidexterity.

Secondly, our research fills the gaps between organizational ambidexterity and IS fields. (1) While IT is a significant component to achieve organizational ambidexterity, the relationship between the two is still not adequately stressed (Abhishek Kathuria 2012). This study reveals how IT contributes to organizational ambidexterity by triggering strategic learning and enabling business learning. (2) Previous literature investigated one-way relationship between IT and organizational learning (e.g. (Attewell 1992; Kane et al. 2007)), but few studies address the bidirectional relationships. This study does find the interaction of IT, strategic learning and business learning. (3) Although the role of general IT plays in organizational transformation is well documented, the ignorance of specific IT artifacts cannot allow us to have a deep understanding of IT impacts and how the impacts are exerted (Roberts 2012). This study identifies the specific IT initiatives in a high-tech company and shows how these initiatives enable strategic learning and business learning for ambidexterity. (4) A longitudinal case study is not often conducted in both IT and organizational ambidexterity research. From the organizational learning perspective, we constructed a spiral model to illustrate interactive reinforcement relationships among organizational learning activities, IT and organizational ambidexterity. Our model offers explanation to questions like how to find proper IT initiatives and make the initiative exert a higher level marginal value after they are institutionalized in an organization.

Thirdly, our research contributes to uniqueness of Chinese context, whose economic environment and culture are distinctive from that in the developed countries. (1) China is an emerging market that is full of opportunities and challenges. More and more foreign companies render Chinese market as their major competition field in the future, thus making local companies face great pressure of survival. Trapping in the abundant opportunity and fierce competition, Chinese firms tend to be more aggressive and desperate in seeking chances. As the CEO of Huawei stated, "to thrive or to die, no third possibility." (2) The development and evolution of organizational ambidexterity is different. Due to the lack of advanced technology and management knowledge, most Chinese firms prefer to learn from the best practice at the initial stage and shift to internal knowledge exploitation and exploration as they accumulate adequate experiences. While in developed countries, original creativity is more appreciated. As a result, Chinese firms start with differentiation, individual and external focus to achieve ambidexterity, while developed countries may choose a path, for example, to start with integration, organizational and internal focus, that stresses more fundamental innovations. We concluded that organizational learning plays a particularly important role against the Chinese background. (3) There are culture differences between China and developed countries. Chinese cultures stress on Confucianism and collectivism (Keller et al. 2005). Chinese organizations tend to prefer ambidexterity at the organizational level and regard employees as strivers. American cultures neither assume or value such connectedness among individuals, thus the organizations appreciate individual heroes and regard employees as professionals (Markus et al. 1991). In Chinese culture, the "principle of intensity" as well as "work hard and live plain inwardly" is widely accepted. The organizations in Western countries may or may not experience the same evolutionary path

of organizational ambidexterity development as Chinese high-tech companies have experienced.

Our study also entails important managerial implications. As technologies upgrading at an unprecedented speed and customer demands fluctuate all the time, firms are constantly bothered by conflicting pursuits. Organizational ambidexterity is essential for both short-term profitability and long-term sustainability (Raisch et al. 2009). We present the organizational ambidexterity development path in which IT plays an important role. IT triggers an organization's strategic learning as well as provides strong supports for its business learning, which allows the organization to transform appropriately and have a sustainable development. Further, we identify the specific strategic leaning and business learning methods in an ambidextrous organization, providing valuable implications to organizations operating in a similar context for the ambidexterity development. Moreover, the evolutionary path of Huawei's ambidexterity development provides insights for other organizations regarding the capability building and scenario planning.

Several limitations have to be admitted in our research. One limitation roots in the limited generalizability of the single case methodology. In the next step, we will invest effort in conducting multiple cases comparison and analysis. Secondly, this study examines organizational ambidexterity from four dimensions that deal with four types of relationships. These relationships are most related to structural and context design. Future research can investigate ambidexterity from strategic leaderships perspective. In fact, the CEOs of outstanding high-tech companies, such as Huawei and Cisco, have presented strong leadership with ambidexterity. This deserves a further investigation.

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