

Leveraging IT-enabled Service Innovation in a Highly Competitive Market

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This study examines strategy applied by firms to leverage emerging information technology (IT) for service innovation. In this paper, the position analysis of strategy is developed on two dimensions, IT capability and complementary resources. We investigated the convenience store industry in Taiwan, which is an intensively competitive market. By analyzing multiple cases, we identified four types of strategy employed by firms to leverage IT-enabled service innovation. By tracking the market evolution, we identified three paths of strategy shifting with the resource reconfiguration. This analysis results explain how firms use continual strategic shifts and resource reconfiguration to sustain the competitive advantages of IT-enabled service innovation in a rapidly changing market.

Key Words: *IT-enabled service innovation, IT strategy, IT capability, complementary resource, resource reconfiguration.*

Introduction

Competition reduces industry growth and profitability in the service industry (Lele, 1992; Swaminathan, 1998), the way to survive in the competitive environment is rough more and more. Over the past decades, information technology (IT) has made

great progress such as the semantic web, social media, and networking applications (Harmon & Demirkan, 2015). Deploying IT is a powerful way for service design (Karwan & Markland, 2006), service delivery (Lovelock, 1995), and service performance (Ku, 2014; Quinn, 1996). Besides, firms can exploit IT resources as a strategic weapon (Bakos & Treacy, 1986; Benjamin, Rockart, Morton, & Wyman, 1984) to achieve service innovation. Service innovation is an enhancement that consumers perceive as providing a new advantage of sufficient appeal (Berry, Shankar, Parish, Cadwallader, & Dotzel, 2006; Bettencourt, 2010).

Although IT can open up innovative opportunities in services (Ananthkrishnan, Atluri, Krishnamurthy, & Muthiah, 2018), it is still a pending issue of how do firms deploy IT-enabled service innovation and gain competitive

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advantages. Considering the competitive advantages of IT innovation vanish as IT has been widely adopted (Carr, 2003), firms' specific strategy needs to be identified to achieve sustainable competitive advantages when deploying IT-driven service innovation. With the resource-based view, we examined IT capabilities and complementary resources to know what strategy firms employ. The strategies are distinct from each other and link with different strategic actions, advantages, and disadvantages. With the dynamic capability view, we examined the reconfiguration of resources and capabilities when the intended strategy shifted for different IT-enabled service innovations.

To explore how do firms deploy and leverage IT-enabled service innovation, this study investigated the convenience store industry in Taiwan. As a chain industry, Taiwan's convenience store industry features the effect of economies of scale. Considering its intensively competitive and changing market, the convenience store industry is proper to examine the adoption and development of IT-enabled service innovation. By analyzing multiple cases, we identified four types of strategy employed by firms to leverage IT-enabled service innovation. By tracking the market evolvement, we identified three paths of strategy shifting with the resource reconfiguration. The analysis results explain how firms use continual strategic shifts and resource reconfiguration to sustain the competitive advantages of IT-enabled service innovation. Several finding and limitations will be discussed in the last section.

Literature Review

IT refers to computer-based technologies used for information storage, access, processing, and communication, and these functions can generate value (Akaka & Vargo, 2014; Polo Peña, Frías Jamilena, & Rodríguez Molina, 2014). Besides, the development of information systems can lead to service innovation; for instance, innovations with respect to service concepts, client interfaces, intra-organizational service delivery systems, inter-organizational service delivery systems, and

embedded technologies (Barrett, Davidson, Prabhu, & Vargo, 2015). IT play three roles in the development of service innovation: (1) integration (Porter & Millar, 1985; Sambamurthy, Bharadwaj, & Grover, 2003; Teece, 1986), (2) long term relationship with customers and suppliers (Rust & Chung, 2006), and (3) business transformation (Venkatraman, 1994).

To leverage IT-enabled service innovation adopted by firms, the strategy needs to be identified. Drawing from the resource-based view, this study examined IT capabilities and complementary resources (Teece, 1986) to know what strategy firms employ. Drawing from the dynamic capability as the macro-view, this study examines strategic shift firms apply to compete and sustain competitive advantages in a rapidly changing market.

Strategy for IT-enabled service innovation

Current researches have examined and explained the relationships between IT deployment and competitive advantage by diverse perspectives, such as strategy (Porter & Millar, 1985), resource (Mata, Fuerst, & Barney, 1995; Wade & Hulland, 2004), and organizational capabilities (Ravichandran & Lertwongsatien, 2005; Teo & Ranganathan, 2003). Considering those perspectives are fragmented, an integrating model to identify the relationships between resources, capabilities, strategy position, and competitive advantage will be more complete to understand the whole formulation concept.

Since the early literature, some strategy choice researches have focused on the link between strategy and the external environment (Child, 1997; Porter & Millar, 1985). Black and Boal (1994) pointed out that excessive emphasis on the analysis of environmental aspects may enhance the tautological risk. Some scholars gradually transferred the target toward adopting problems (Miles, Snow, Meyer, & Coleman, 1978), institutional transitions (Peng, 2003), and even the internal resources (Grant, 1991). This research regards IT as a deployed resource, we adopt Grant's framework to identify its strategy position by resources and capabilities.

Grant's framework completely unites the key components involved in strategy formulation. With the

objective of “IT-enabled service innovation,” this research adjusts Grant’s framework to new construction and

components, as shown in Figure 1.

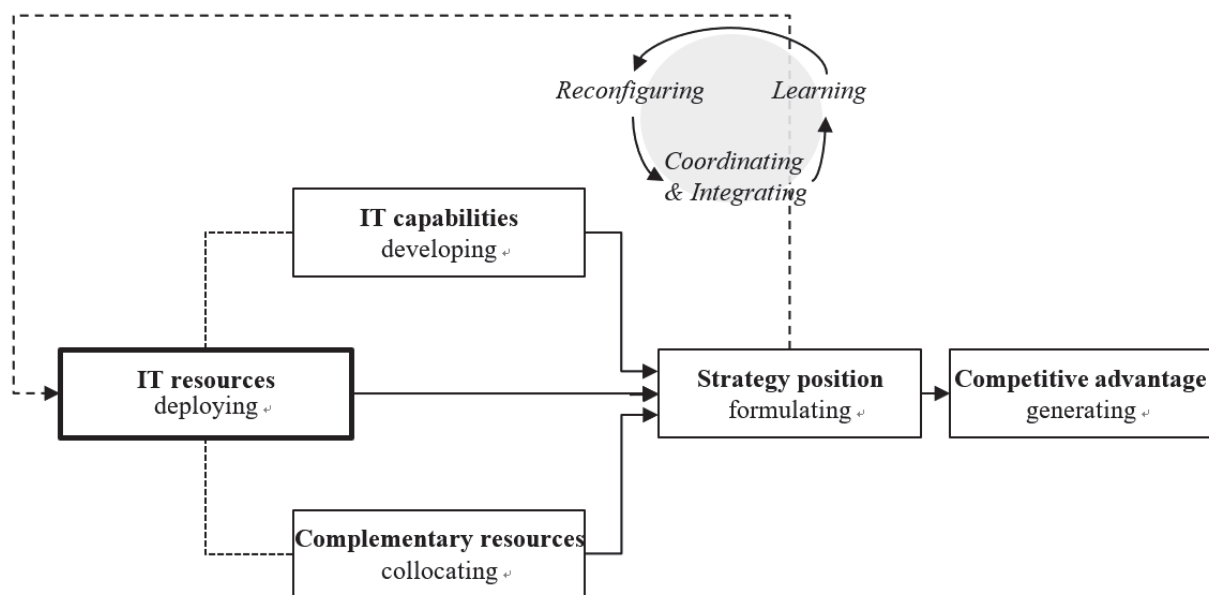


Figure 1 The adjustment model from Grant (1991) strategy formulation

The initiation of IT resources deploying will trigger the IT capabilities developing and complementary resources collocating. With the three prior conditions (IT resources, IT capabilities, and complementary resources) ready, the strategic position formulates. Once the market evolving, “coordinating & integrating,” “learning,” and “reconfiguring” activities will create a new cycle to push firms forward and generate sustainable competitive advantage. Following this adjustment model, the study reviews the related literature in IT capabilities and complementary resources.

IT capabilities

Barney (1991) argued that a resource will be a potential source of competitive advantage when they are valuable, rare, imperfectly imitable, and non-substitutable. IT capabilities enable firms to deploy, mobilize, and manage their own IT resources (Ravichandran & Lertwongsatien, 2005).

Because firms heterogeneously develop and nurture IT capabilities, they are likely to have different potential for leveraging IT resources (Peteraf, 1993). Scholars regarded IT capability as a key to long-term competitive advantages (Bharadwaj, 2000; Ross, Beath, & Goodhue,

1996). In brief, a firm with valuable, rare, and unduplicated IT capabilities can leverage the full competitive potential of IT resources, such as technical IT skills and IT infrastructure. A firm’s heterogeneous capabilities in managing IT resources differentiate firms and enable superior performance in a competitive environment even when the same IT-related resource is homogeneously distributed due to imitation.

Table 1 reviews the IT capabilities literature. This study regards IT capabilities—opportunity sensing, innovation development, system implementation, relationship building, and advantage sustainment—rather than IT resources, to be the analysis unit to closely examine firms’ strategies toward IT-enabled service innovations.

Complementary resources

Studies have discussed how to leverage competitive advantages after deploying IT resources and identified unique complementarities with other firm resources (such as assets, people, and processes from across the firm’s business units) (Clemons & Row, 1991; Powell & Dent-Micallef, 1997). This view follows the same logic of the resource-based view, proposing that the interaction of

Table 1 Summary of IT capabilities

	Aspect	Argument
Opportunity Sensing	IT managers	<ul style="list-style-type: none"> The ability of IT managers to understand how technologies can and should be used, as well as to envision the emerging technologies and trends that allow a firm to quickly take advantage of new advances (Zaheer & Zaheer, 1997)
	IT planning	<ul style="list-style-type: none"> Greater convergence between IT and business managers on IT priorities can support share information across different functions, innovate and exploit business opportunities, and the flexibility to respond to changes in business strategy (Christiaanse & Venkatraman, 2002)
Innovation Developing	Managerial IT skills	<ul style="list-style-type: none"> Managerial IT skills can significantly reduce the costs and lead times associated with innovation development (Bharadwaj, 2000)
	IT business experience	<ul style="list-style-type: none"> IT business experience allows a firm the ability to integrate IT strategy and business strategy, develop reliable and cost-effective systems for the business, and anticipate business needs sooner than the competitors. (Kearns & Lederer, 2003)
System Implementing	IT skills and business expertise	<ul style="list-style-type: none"> IT groups' business expertise, in combination with IT skills, directly determines the firm's ability to rapidly develop and deploy critical systems for the long-term competitive advantage (Clark, Cavanaugh, Brown, & Sambamurthy, 1997)
	System collaboration	<ul style="list-style-type: none"> A fundamental system enables information processing, integration, coordination, and moreover collaboration for continuous innovation development. (Broadbent, Weill, & Clair, 1999)
Relationship Building	IT infrastructure	<ul style="list-style-type: none"> Shared IT infrastructure contributes to the tight relationship among firms in terms of the infrastructure connecting, information processing thereby leads to cooperation and collaborations and reduces the monitoring cost and increases the effectiveness of the coordination among organizations (Bhatt & Grover, 2005)
	Enterprise system	<ul style="list-style-type: none"> Having enterprise-wide architecture allowed linking independently developed systems, reducing disparities and creating purchasing economies (Weill, Subramani, & Broadbent, 2002)
	Inter-organizational systems	<ul style="list-style-type: none"> Through supply chain management systems or inter-organizational systems, firms obtain the intangible relationship asset as the powerful means to position themselves strategically by creating exit barriers for the participants in the value network (Subramani, 2004)
Advantages Sustaining	IT integration skills	<ul style="list-style-type: none"> Some IT skills cannot be easily transferred, such as corporate-level knowledge assets (Bharadwaj, 2000) and technology integration skills (Feeny, Edwards, & Simpson, 1992), and, thus, these resources can become a source of sustained competitive advantage
	Intelligent property	<ul style="list-style-type: none"> Deployment of intellectual property sustain the advantages of IT-based service innovation by preventing rivals from imitation quickly and deterring the progress in the innovation (McGahan & Silverman, 2006)

complementary resources, which is ambiguous but enhances the value of all resources, is difficult for competitors to imitate. Therefore, IT resources by themselves may not provide much direct value; however,

when combined with other organizational practices, they can enable unique combinations of organizational capabilities that lead to superior performance (Zhu, Wymer, & Chen, 2002).

Based on the classification in Keen (1991), this study classifies complementary resources by human, organization, and external linkage (Table 2). Ravichandran and Lertwongsatien (2005) pointed out that one of the complementarity concepts is to understand how resources are deployed and used. Beyond another concept—one resource enhances the value or effect of another resource,

complementarity arises when resources are used in a mutually cooperative and reinforcing manner. In brief, this study regards complementary resources as resources that can be incorporated, integrated, and leveraged with IT capabilities to facilitate IT-enabled innovation, thereby yielding sustained competitive advantages through the firms' deployment of its resource endowments.

Table 2 Summary of complementary resources

	Aspect	Argument
Human	Front-line employee	<ul style="list-style-type: none"> Gaining insight into client needs and opportunities (de Brentani, 2001)
	Multifunctional teams	<ul style="list-style-type: none"> Cross-functional teams contribute to overall effectiveness, and problem-solving capability and performance (Froehle, Roth, Chase, & Voss, 2000)
	Senior manager commitment	<ul style="list-style-type: none"> Commitment from senior managers is a necessary condition for innovation to thrive (Amabile, Conti, Coon, Lazenby, & Herron, 1996)
Organization	Open culture	<ul style="list-style-type: none"> Freedom to self-developing has a positive effect on the propensity of an organization to be innovative (Ahmed, 1998)
	Brand differentiation	<ul style="list-style-type: none"> Customers tend to choose more popular service firms to ensure the quality of service and low risk perceived (Berry et al., 2006)
	Business process (routines, value chain management)	<ul style="list-style-type: none"> Activities underlying value-generating processes, including inbound logistics, manufacturing (Melville, Kraemer, & Gurbaxani, 2004) Business processes are executed to achieve strategic objectives and provide numerous opportunities for innovation discovery and business value (Basu & Blanning, 2003)
	Reward system	<ul style="list-style-type: none"> Reward systems can stimulate and encourage the idea generation and prosper the culture to innovate (McGourty, Tarshis, & Dominick, 1996)
External Linkages	Sharing resource	<ul style="list-style-type: none"> Conserve resources and share risks and as opportunities for gaining new competencies (Hagedoorn, 1993)
	Trusts with suppliers	<ul style="list-style-type: none"> Trusting relationship is a key enabler of many innovations (Holland, Lockett, & Blackman, 1992)
	Position in value network	<ul style="list-style-type: none"> Network position refers to a firm's positional ranking in its inter-firm networks which influence the bargaining power, innovation, and cooperative strategies (Washington & Zajac, 2005; Ahuja, 2000) Firms with superior network position can exploit their internal capabilities to enhance their performance (Zaheer & Bell, 2005)
	Relationship with partners in value network	<ul style="list-style-type: none"> The cooperative buyer-seller relationships can create more value (Anderson, Håkansson, & Johanson, 1994) Increased requirements and frequent iterations with closer suppliers can increase the benefits and enhance the difficulty with which later rivals imitate this progress (Rivkin, 2000; Adner & Kapoor, 2010)
	Customer's involvement	<ul style="list-style-type: none"> Customers are viewed as co-producers of the service, their presence, evaluation, and feedback are key elements for improving service quality (Parasuraman, 2000); the relationship with customers can ensure long-term profit (Magnusson, 2003) IT have a direct effect on value co-creation and on perceived value and loyalty of customers (Polo Peña et al., 2014)

Dynamic capabilities for IT-enabled service innovation

In a changing competitive environment, innovations for sustainable advantages require difficult-to-replicate assets and difficult-to-replicate capabilities as well. The dynamic capabilities view provides a view different from the resource-based view with respect to taking external variables into consideration to assess how an organization reacts to the competition.

Dynamic capability is a firm's ability to integrate, build, and reconfigure internal and external competencies to address rapid changes in the environment (Teece, Pisano, & Shuen, 1997; Winter, 2003). Dynamic capabilities come from three managerial processes—coordination/integrating, learning, and reconfiguring. Teece (2007) further extended the theory by arguing that competitive advantages can be disaggregated into the capacity to (1) sense and shape opportunities and threats, (2) seize opportunities, and (3) maintain competitiveness by enhancing, combining, protecting, and, when necessary, reconfiguring the business enterprise's intangible and tangible assets. In other words, the value of a resource depends on the firm's combination of resources and the path that the firm is following. Additionally, dynamic capability is a keep-learning pattern of activities through which an organization systematically generates and modifies its operating routines in pursuit of improved effectiveness.

Accordingly, the rationale of dynamic capability is based on the resource-based view and explains how and why certain firms have a competitive advantage in situations of rapid and unpredictable change. Moreover, dynamically competitive enterprises do not just build defenses against competition but also help shape competition and marketplace outcomes through innovation. From this perspective, the strategy choice is about how a firm can accumulate its technological assets through path-dependent processes of investment, learning, and decision-making that it adopts overtime. In particular, this approach mainly emphasizes the entire mechanism based on path dependencies through which firms

accumulate and reconfigure new resources and capabilities to respond to a highly competitive environment.

Methods

Case study has adopted over the past decade in the IT field (Benbasat, Goldstein, & Mead, 1987). Moreover, there is a growing tradition of using qualitative research approaches to study various types of business innovation phenomena (Reich & Benbasat, 2000). To explore the IT strategy from the perspective of the contexts in which firms are situated, we used in-depth case studies to examine the heterogeneous resources and capabilities possessed by firms and interpret the behavior or actions undertaken by firms. To better understanding the configuration and interaction of various critical resource and capabilities, we adopted the case study approach, which is useful when a phenomenon is broad and complex, when a holistic and in-depth investigation is needed, and when a phenomenon cannot be studied outside the context in which it occurs (Bonoma, 1985). Therefore, holistic investigation, which represents a key characteristic of case research, was well-suited to our need to understand the complex and ubiquitous interactions between resources, capabilities, and strategies.

In a multiple-case design, selection of cases should follow a literal replication logic (conditions of the case lead to predicting the same results) or a theoretical replication logic (conditions of the case lead to predicting contrasting results) (Yin, 1994). We adopted the literal replication logic in multi-case design because the market is mature and has few potential entrants. Moreover, we chose this method with the aim of demonstrating that the phenomena were not industry-specific to generate more generalizable results and managerial implications (Dubé & Paré, 2003; Yin, 1994).

Case selection

The modern retail industry is highly competitive and retailers have to differentiate themselves through service-oriented business rather than merchandise and lower pricing. Such differentiation strategies are common in the

convenience store industry in Taiwan. Different from manufacturers, service firms rarely deploy IT in the form of advanced machinery and equipment or in the form of intellectual property (IP) (Miozzo & Soete, 2001). We found that Taiwan's convenience stores proactively embrace IT to not only enhance their efficiency but also to

differentiate themselves by developing a variety of value-added services. The convenience store industry in Taiwan is saturated, even they are not homogeneity, it still tends to generate a higher level of competition. There are four main companies in Taiwan's convenience store industry and their background profiles are presented in Table 3.

Table 3 Profile of studied companies in Taiwan's convenience store industry

	Company A	Company B	Company C	Company D
Founded time	1978	1988	1989	1988
Number of stores	4,800	2,820	1,286	890
Revenue (US\$M)	4,090.33	1,580.93	620	272.73

The competition in the convenience store industry is diverse. To cope with the competition, there is a wide range of IT applied in convenience stores. This research takes multiple media kiosks (MMK) as the objective to examine how Taiwan's convenience stores leverage IT-enabled service innovation. Embedding with various technologies (such as touchscreen, Bluetooth, USB port, MicroSD/SD card reader), MMKs provide a convenient means of paying for various services such as overnight delivery, utility bills, parking fees, tickets, and photo printing. There are two features that urge us to adopt MMKs as our observation target. First, MMKs is a real-time information platform between multiple parties (service firms, supplier, and consumers) and enable online services. Second, MMKs is a self-service device and complete more prompt deals with less labor. Besides, MMKs have considerably changed customer behavior and

the rules of competition in the market. The question of how firms adopt IT-enable service innovations is thus suitable to explore.

Data collection

We used primary data from interviews with members of each firm within the industry and secondary data from newspapers and trade magazines to assess the IT strategies of firms in service innovation. Several interviews were conducted to achieve a deeper understanding of each firm's strategy. The data collection involved five semi-structured interviews. The questions mainly focused on service innovation and strategic choice, and the interviewees were an IT manager, assistant managers responsible for the new initiatives and strategic planning, and a chief executive officer (CEO; see Table 4).

Table 4 Profile of interviewee

Company	Department	Job Title	Interview time
A	General manager office	Assistant manager	3hrs
	Information division	Manager	1.5hrs
B	General manager office	Assistant manager	2hrs
C	General manager office	Assistant manager	2.5hrs
	Human resources department	Manager	2.5hrs
D	General manager office	General manager (CEO)	3hrs

Research design

The research materials were the interview, comment from the company, and historical data (as shown in Table 5). The main analytic targets were the strategy that firms applied and the activities took for resource reconfiguration and path shifts. First, we used context analysis to attain an overview of the industry and some explanation of the IT-enabled service innovation. To understand the strategies applied, we verified comments from the interviews and also reviewed some documentation from the secondary sources concerning the strategic orientations of firms and their competitive actions undertaken to achieve service innovation. Next, the analysis of a strategy was based on an examination of the endowment in two critical resource categories—IT capability and the complementary

resource. We also tried to determine the possible events that drive a firm to change its strategy and the associated concerns regarding resource acquisition necessary to fulfill the strategy. Generally, our analysis of strategy focused on descriptions of service innovation cases, interpretation of the strategic orientation in terms of initial resource set, turning points or events that drove the firm to change, and the subsequent resource set acquired after the firm undertook certain actions with respect to the resource; for instance, deployment, acquisition, and exploitation. Finally, we found the shift of the strategies over a period of four years and the resource reconfiguration process to discover how the resources were reconfigured and what effects occurred during the process of implementing a specific strategy.

Table 5 Research design

Analysis Step	Analysed Target	Data Source
Content analysis	Industry-level, Firm-level	Documentation
Strategic position identification	Strategy toward IT-enabled service innovation	Interview
IT capabilities	Critical and strategic IT capabilities	Trade magazine, Comment from company
Complementary resources	Critical and strategic complementary resource	
Turning points as strategy shifts	Time and situation when they change strategy	Historical data review, Interview
The reconfiguration of resources	How resource be reconfigured, integrated to new bundle of resources and capabilities	

Case Study

Company A

According to the research materials of company A, MMK has been under development since 2000. The plan came from top executives in reference to MMK which provides the new kind of distribution of different services different from those products in the stores. However, at that time, they thought it was not mature enough to launch such an initiative, given the limited resources and uncertainty in the markets. Therefore, they did not put the development of ibon in the first priority. In this case, they chose not to be the first mover, which is their preferred strategy. Instead, they thought the introduction of this kind

of new platform involved the consideration of the market environment and the costs on the hardware and software. Thus, they would rather launch innovation at the appropriate time with strong system function and robust platform and then keep up with the competitors later. Compatible with the appearance of small stores, using the interface more with the existing multifunction printers links and reserves the expanded scalability to meet future demand for more and more business opportunities. Implementation costs were over one billion, including the back-end part, network transmission, software, etc.

Soon after the launch of ibon, Company C filed the infringement against Company A for copying their services on the kiosk. Due to the lawsuit, they could not aggressively develop related services and features,

especially the bonus set of points which is claimed to be one of the patents of Company C. Nevertheless, they thought the better way is not to add more functions to the kiosk, but to enhance the utilization rate on the kiosk. The Assistant Manager Lee explained as follows:

“We developed too many multifarious functions which have caused customers to be confused and have wondered what the services they can utilize. Therefore, we thought it would be better to offer simply a function such as the ticket booking that conveys a very clear image for customers to know that our MMK is what customers can buy a ticket from. Perhaps it will be more effective than the numerous functions on increasing usages.”

Later in 2008 they started to offer the ticket booking services, including traffic tickets and concert tickets. In particular, they have offered these services by exclusive contracts with ticket suppliers in an attempt to tie up customers. Taking the advantages of the large customer base, they always try to contract services in limited supply or exclusiveness.

Company B

Company B introduced the MMK by direct technology transfer from the Japanese partner company in 2005. To develop this new type of service, the company spun off this virtual service business embedded on the kiosk to form a subsidiary responsible for the new business. The virtual service provided on MMK is operated by the virtual distribution center (VDC) which is the platform designed for virtual goods trading. Unlike the traditional concept of product distribution, namely that all the products are physical and tangible required for the physical distribution, the VDC is the concept which aims to make the products virtualized and be able to be purchased by information flow processing.

For example, although the same kiosk has been introduced in two other companies, they had their own deployment for this service innovation. In contrast with the emphasis on the technology development, Company B has focused on introducing and improving new services by transforming existing goods and services from physical to virtual distribution. For example, it has replaced physical

game cards with virtual information goods by integrating the information flow across the various game card publishing companies. This new application extremely reduces the costs and risks of stock management. Rather than to invest in the physical facilities and patent, they acquired the kiosk by technology transfer. The consideration of this deployment is keeping their service and marketing rather than by technology development as the core business. The introduction of VDC aims for the benefit from the VDC's capability of “central control, disperse sales”, which can support other business processes and sales in the long term. This implies that the innovation is not just in customer's services but also in their business process, which means that it is more extendable and can be applied in other related business lines. For example, they extended their service by cooperation with the distribution company TECO Group and Pelican, providing income signaling picking parts, and simplifying the delivery company's drivers of customer service and delivery routing operations, reducing store labor costs and telephone charges. More importantly each transaction access to the POS systems of Company B's stores which help Pelican's accounting system processing with transparency.

VDC as a virtual trading platform reduces the threshold of production distribution, and has made supply and demand and more smoothly. On the basis of this advantage, it has largely transformed the conventional “ABC commodity management rules” applied in physical channel stores. In brief, VDC has made it possible that the products with low sales could still exist in stores in terms of virtualized commodities even with limited spaces in stores. The products such as the game point card and the entertainment tickets have caused cost in inventory management and risk of stealing incurred. But with the VDC, they turn this transaction by the virtual process without any physical inventories in store. One of the successful cases is that in which in the sales of Skype, the stored value card sales in five product items with different prices exceeded 10 million NT dollars, while that which sold Skype's own network channel did not reduce, indicating VDC has created another sales channel for

Skype.

Company B strove to create more innovative services and store product management by innovation in a process attributed to the introduction of VDC joint ventured with another company. Instead of self-developed technology in the early stage, their focus was on discovering the potential usages both in customers' services and business applications, provided by new technological roots in the aspect of taking technology as the long term investment.

Company C

As the assistant vice president of Company C talks about the manager's support toward the technological innovation. The top manager's willingness to conceive the technological innovation aligned with the cooperation's strategy becomes the critical factor to the success of every initiative. As they said, we found that the successful initiatives lies not only in the appropriately implemented technology, but also in the long-term support and emphasis from the managers who drive the company to continuously discover the opportunity for innovation. This resource has been found to be necessary for success in the innovation and the initiatives. With the full support and strategic emphasis from top managers, they can conceive a more strategic roadmap with their IT and business.

“For example, the Kiosk had been developed since a long time ago, because our technology Assistant Vice President and the Chairman of the board has addressed the issue of information systems enabled operations and has placed considerable emphasis on the intelligent property deployment.”

Among the industry, Company C was the first to develop the kiosk to provide numerous information-based

services and to enter into the virtual goods market. It took three years to bring it to the market from 2001 to 2004. Relying on strong capabilities and skilled IT employees, they developed the MMK without seeking resources from other organizations, which is critical for their subsequent deployment on patent appliance. It obtained first-mover advantages by rapidly building up the information service value ecosystem after implementing the MMK. Initially, Company C integrated the payment systems of several governmental departments with banking companies to provide payment services such as payments of fees and fines, frequent user reward services, and several banking transactions. These services created a strong cash flow and profit growth from the transaction fees. Accordingly, their most revenue-creating source was the “Cash Card payment service” which had helped them break even between their investment and revenue in three years.

In order to sustain the advantages, Company C has taken several patent protection procedures to keep competitors or potential imitators from copying them. Knowing that the kiosk itself is imitable and thus without entry barriers, they choose to protect the related services embedded in the kiosk. Company C exploits patent deployment to protect the intelligent asset in the technological innovation. Table 6 shows data collected by the Taiwan Patent Search System (Intellectual Property Office, 2020), in this table we can see that Company C has undertaken the patent-protection policy early than other competitors. Under the protection of the patent, the follow-up technological applications and innovations can have more unrestricted access to constant development and can establish entry barriers to some extent.

Table 6 Comparison of patents among Four companies

	Company A	Company B	Company C	Company D
The certification number of the first granted patent for each company's Kiosk services	1455560	1370402	1344113	none
The issued date of the first granted patent	2009/12/31	2008/5/5	2007/2/16	none
The application date of Kiosk of the first granted patent	2014/10/1	2012/8/11	2011/6/21	none

As Company A introduced the ibon facilities and provided some services such as banking payment reward systems, company C started to take the patent protection procedure as their strategy. Company C claimed that the applications of ibon, such as the payment services and the reward point systems, have infringed their patent of “Point of Sales.” Company C asserted that Company A was operated in the same fashion as the specification of the patent described. Regarding these services, Company A explained that it is not illegal, because there have been rich applications in such kinds of kiosks and services in Japan and have been utilized in other industries such as in retailing, banking, restaurant for a long time. Company A further argued that the transaction method on the kiosk to deliver service value to the customer is too prevailing to identify the belongings. Although the verdict of the lawsuit took three years to come to the result and was company C’ lost, Company C still gain the advantage and deter the Company A’s progress in MMK service development during these years.

Company D

Company D did not want to adopt MMK because of the technical problems. Besides, they lack of budget for IT investment. They even lack of loyal customers to continuously create economics of scales to compensate for cost quickly. Company D was only willing to make

investment on technological asset until the specified technology reaches the maturity. Nevertheless, in the face of super-competition the CEO said in addition to screening out the weak for strong, must begin brewing the second growth curve and this part can be built by providing virtual goods and information-based services on the platform. Services provided by electronic media writes print, games, cards and many other service points. They also set up a fingerprint recognition, Bluetooth, and an infrared receiver with wireless devices such as that of the authentication mechanism, mainly used as a future development of government services required for identity verification during the audit function.

Case Analysis

Depending on the IT capabilities and complementary resources that four cases possesses (described in the previous chapter), four strategies are identified, i.e., Predator, Defender, Bider, and Hedger, as depicted in Figure 2. The strategies have distinctive resource set, philosophy toward IT-enabled service innovation, and actions undertaken, as well as different advantages and disadvantages. We explain each strategy in terms of its typical characteristics, such as resource set, strategic action, advantages, and disadvantages, and considering the evidence from the cases (Table 7).

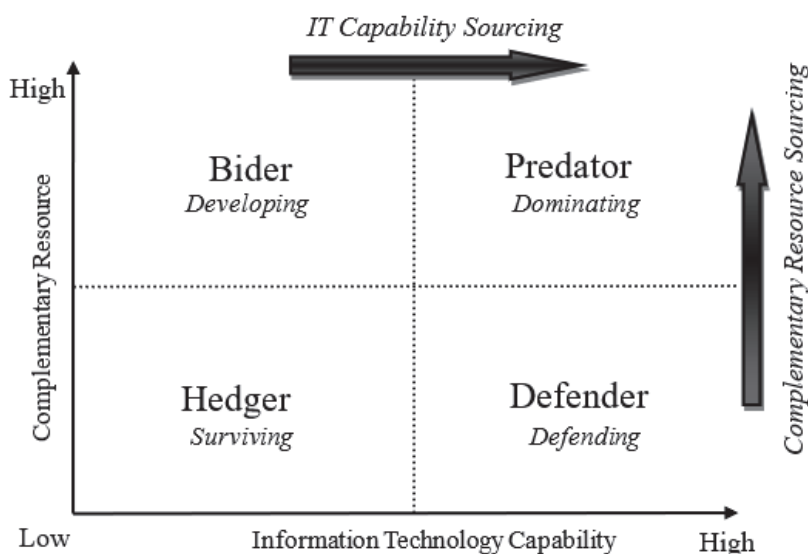


Figure 2 Strategic positions toward IT-enabled service innovations

Table 7 Summary of four strategies of IT-enabled service innovation

	Predator	Defender	Bidder	Hedger
IT capability	<ul style="list-style-type: none"> Specialized spin-off IT department owns rich IT business experience Flexible IT systems enable new service embedded efficiently Robust and flexible IT infrastructure unfolds coordination and cooperation in the value network 	<ul style="list-style-type: none"> Foresighted IT managers discover new value from IT resources Internal R&D and rich experience in IT development provides insights into innovation and quick implementations IP deployment to sustain advantages of IT-based service innovation 	<ul style="list-style-type: none"> Directly accessing IT resources from the foreign associated company 	<ul style="list-style-type: none"> IT outsourcing to quickly adopt new innovation while focusing on business
Complementary resource	<ul style="list-style-type: none"> Large customer base create economies of scale to compensate the cost in the development of service innovation Brand image and marketing capability Foresighted managers in discovering innovative idea and fully supported by senior managers on innovation Open culture for stimulating employees to generate an innovative idea Synthesis of value from group enterprise and streamlined process in the value chain to enable effective service delivery A tight relationship with suppliers to enable cooperation, collaboration, and dominant position to exclusive offering 	<ul style="list-style-type: none"> Strong support from senior managers on service innovation development Core-value insistence and differentiation characteristics 	<ul style="list-style-type: none"> Long focus on the improvement of customer services quality lead to more acceptance of new services Large customer base create economies of scale to compensate the cost in the development of service innovation Rich financial capital for service innovation investment Well-organized human resource training and development A trusted partnership with suppliers enables new service value network construction quickly and smoothly Strong partnership with IT service providers provide professional and quick adoption of new IT 	<ul style="list-style-type: none"> Conservative culture towards service innovation Prudent business practices because no abundant financial capital for resource acquisition and relationship building with suppliers
Philosophy toward service innovation	<ul style="list-style-type: none"> Dominates both market and suppliers Expand in size or market share through service innovation 	<ul style="list-style-type: none"> Change the existing service radically Explore revolutionary services based on IT inventions 	<ul style="list-style-type: none"> Revise the function of existing IT services Develop service based on existing technology 	<ul style="list-style-type: none"> Support a minimum need for information processing Survive in position in the industry
Strategic actions	<ul style="list-style-type: none"> Monopoly service/product suppliers Horizontal integration Exclusive services provision 	<ul style="list-style-type: none"> Intensively R&D activity Protect invention by patent deployment 	<ul style="list-style-type: none"> Follow and revised IT and services Introduce IT from external resources 	<ul style="list-style-type: none"> Invest less and adopt IT as IT is mature with low cost
Advantages	<ul style="list-style-type: none"> Obtain vast market shares broadly Create switching cost with partners Impede rivals with exclusive services 	<ul style="list-style-type: none"> Lead time in new service development Preemption of market and asset Customer loyalty building 	<ul style="list-style-type: none"> Improve based on the pioneer's launch Reduced the uncertainty in the market Cost reducing on mature technology 	<ul style="list-style-type: none"> Stable operation Risk avoidance and cost reduction on mature technology
Disadvantages	<ul style="list-style-type: none"> Requires continuous resource acquisition and reconfiguration which may incur high cost in financial and management 	<ul style="list-style-type: none"> Face with market uncertainty Incur risk in technology development Easily imitated and less entry barrier 	<ul style="list-style-type: none"> A non-innovative image for customers Subject to external IT providers to facilitate service innovations 	<ul style="list-style-type: none"> Less competitive Less possibility to obtain more market shares

IT-enabled service innovation strategies

This study proposed a model with (1) four IT-enabled service innovation strategies in which can be applied when given a certain resource set and (2) two sourcing approaches in which critical resources can be possessed and changes the firm's strategy.

Predator to dominate

The Predator strategy entails a firm to dominate the market and sustain a competitive position through the possession of particular resource sets. There are two features in this strategy. *First, a preemptive action prevents rivals from acquiring scarce assets.* With regard to the preemptive scope of a business entering into a new market ahead of others, the business is more likely to obtain an excess return in the absence of competitors and to attain the brand image and reputation from the local customers in an early stage. In addition to the preemptive asset that may contribute to the value being created solely by a specific resource, the more powerful enabler of the Predator strategy comes from the synthesized value of a certain resource set. *Second, a synergetic effect stemming from the well-fit endowment of certain IT capabilities and complementary resources.* To render a synthetic effect, a well-fit endowment that may either complement or strengthen the value of a resource set is required.

The typical aggressive action of the Predator strategy is to monopolize relationships through vertical integration and horizontal integration and locks in suppliers and customers. However, this strategy requires strong backup resources, IT capabilities, and sufficient customers to compensate for the high cost of the investment. This strategy demands rich resource endowments to fit with the service innovation. A firm is not always able to use this strategy because the main enablers of the strategy come from the preemptive asset and synergetic effect, which are less likely to be obtained in a short time; thus, a firm needs to accumulate resources and capabilities in the development process. Consequently, a firm must rely on its accumulation of strategic resources and capabilities to have these potential resources to synthesize the value of a well-endowed resource set.

Defender to defend

Firms tend to apply the Defender strategy if they have rich IT capability but relatively few complementary resources that can be leveraged to achieve innovations. For keeping the technology edge, the goal of the Defender strategy is *to launch new IT-enabled service innovations, create a new market, reform the competition rule, and reconstruct the service ecosystem* relying on the continuous exploration and exploitation of IT capability. This strategy creates the strongest impacts in the early market position, superior financial performance, and entry barrier building when IT serves as the enabler of coordination and collaboration across stakeholders in service value networks. Nevertheless, while the firm may enjoy the advantages of technology leadership and immobilized IT investment, they also face technology and market uncertainty and immaturity that may lead to unpredictable costs, time of return, customer acceptance, and the entrance to a non-profitable market.

An IT capability mostly applied by the Defender is IT infrastructure, which is employed as the resolution of complex linkages; coordination from different suppliers and vendors; and sales channels (Bhatt, Emdad, Roberts, & Grover, 2010; Mithas, Ramasubbu, & Sambamurthy, 2011). Another critical resource is the internal R&D that fuels the numerous possibilities with the knowledge of existing technology that can discover more insight and accurately assess the potential benefits from the introduction of IT-enabled service innovation. The internal R&D also enables the deployment of intelligent property action against competitors, thereby, creating entry barriers and longer lead times in the new service innovation. For instance, company C's MMK filed a patent lawsuit against company A. The lawsuit deterred company A's progress in developing more features on MMK in spite of company C's loss in this lawsuit. The importance of patents and R&D increases when the protection not only includes the technological asset but also the business model embedded in the technology. Besides, the IT capabilities can be externally sourced from the joint R&D and outsourcing, which enables quick adoption as the IT capabilities move

to other unfamiliar domains where internal technological experience cannot be applied or the existence of high quality IT suppliers.

The advantages of the Defender strategy include the market position in the absence of other competitors and the construction of the service network, which may have the potential to gain revenue. In addition to market performance, firms can accumulate the technological experience and assets that can be employed for subsequent movement into new IT-enabled service innovations. However, the newer technology may incur a huge cost due to the unpredictable market acceptance, which may require several experiments on customer's adoption education. Besides, if firms do not protect this invention through IP appliance or continuously develop new value-added services for the system, the advantages will soon dissipate due to imitation by competitors that have sufficient resources to outsource this type of IT. More importantly, after the Defender strategy is undertaken, firms should take further action to acquire complementary resources, such as reputation, sales channels, and relationships with suppliers, to maximize and diffuse the value of the IT-enabled innovation across other industries and domains.

Bider to develop

Firms applying the Bider strategy waits for an opportunity to strike to further achieve a strong position in the overall quality of service, innovative features, and development of the management of new innovations through the assessment of the actions of market pioneers. Many examples from our cases were consistent with the statement that industry incumbents entering late do not find it as difficult to challenge the early movers and penetrate the market because they can leverage some of the developed resources. Particularly, we found that firms that applied the Bider strategy tend to rely on acquiring resources to achieve external service innovation.

The firms using the Bider strategy may gain competitive advantages on the basis of two actions. The first action is to quickly enter the existing market through the deployment of financial capital, a long-developed

partnership, and external technology sourcing as the market uncertainty is reduced. The second action is to develop and improve the IT applications that have been introduced and further improve the service of the features, functions, stability, and smoothness of the service experience. The second action adjusts the business model according to the information learned from the early entrant. With the Bider strategy, firms can access the condition with the best timing of entry based on the early mover's example. This can be considered the free rider effect resulting from an environmental factor, such as reduced market uncertainty and information spillover (Miyagiwa & Ohno, 2002). Thus, the value of a newly launched service innovation is more accurately evaluated. In another aspect, the technology curve leads to more maturity.

For instance, company B's MMK development entailed the supplier connections first and then a joint venture with a Japanese company to acquire the technical skills for building an MMK. They further focused on the virtual distribution channel development on the basis of a well-accepted market by stakeholders, such as banking and IT service providers. Company B concentrated on its core capability in marketing and sales and acquired the necessary resources to introduce such innovation from external partners without carrying high risk and costs for the development of MMK on their own. However, this strategy may result in relatively lower revenues and may not surprise customers with new services; thus, it may have little effect on improving brand image.

Hedger to survive

Firms tend to apply the Hedger strategy in order to maintain a competitive position through investment in fundamental and mature technologies to support operations when firms lack resources and IT capabilities to innovate. For instance, company D did not want to adopt an MMK because of technical problems and cost. In addition, a firm employing this strategy can only make an investment in a technological asset after the specified technology reaches maturity. Nevertheless, in the face of super-competition, the CEO of company D stated that they

regard the importance of the replacement of old assets with new ones and brew the potential market growth by providing information-based goods and services on their virtual platform. They also set up fingerprint recognition, Bluetooth, the infrared receiver with wireless devices, and an authentication mechanism, which will use for the identification of government services.

The Hedger strategy is the default of a firm's existence prior to entry into a market segment. During the period, they usually do not have sufficient resources from the existing resource set to start the service innovation. The Hedger strategy is feasible when the organization offers stable services for regular customers. The advantages of this strategy are less risk associated with innovation and the ability to be aggressive in pursuing pioneer benefits. Less investment in new technology can reduce the cost of new technology and avoid uncertainty in the market. Enabled by the small scale of information systems, the Hedger strategy can effectively preserve a firm's core business and operation. This strategy prevents firms

from disturbed financial problems and the branch-out issue.

Sourcing Approaches

In addition to the four strategies, we described the action that firms undergo to acquire or exploit critical resources including complementary resources and IT capabilities as the sourcing approaches. We observed that firms shift their strategy as they undertake some sourcing approaches for requiring certain resources that meet the need to achieve the targeted strategy.

IT capability Sourcing

The IT capability sourcing refers to the approaches that firms apply to acquire IT-related capabilities, such as expertise of building infrastructure or skilled employees, and mature infrastructure. Table 8 summarizes the IT capability sourcing approaches firms exploited in the achievement of certain strategy towards service innovation. Below are two discussions.

Table 8 Summary of IT capability sourcing approaches

Sourcing Approaches	Category	Acquired IT capability	Example
Internal R&D	Innovation developing	Managerial IT skills	Company C
Outsourcing	System implemented	Quick adoption on IT	Company D
License	System implemented	IT systems, functionality	Company B
IP deployment	Advantages Sustain	Patent	Company C

Internal VS External Sourcing

The internal R&D is the initiator in the IT-enabled service innovations. The benefit of Internal R&D is to have the rights and the potential to make the patent deployment strategy in later movement. Besides that, if firms plan to become the coordinator in the value network, adopting the internal R&D provides more secure and centralized control in most cases.

However, most firms depend heavily on external sourcing, such as joint R&D outsourcing, to acquire IT capability. Adopting the Defender strategy does not necessarily need internal IT capability sourcing, but it may require more potential sourcing to develop applications

across industries. Contrast to the internal sourcing, the benefit of external sourcing is to more easily and quickly developed, introducing the innovation while allowing more effort put in the core business such as marketing, distribution capability. The need to apply external considers the reasons that are industry heavy and that intensely introduce the IT-enabled service innovation that requires quick adoption surging them to acquire the specialized technology provider to reduce the time to market.

Firms tend to apply the same IT capability sourcing in different service innovation

Generally, literature suggests that applying both

internal and external sourcing contingently be more efficient and effective due to advantage or disadvantage from each side (Veugelers, 1997). In our case study, we found few firms have this tendency but keep applying the same fashion on externally or internally. For example, the company C tend to have their IT capability sourcing from the internally in building their service innovation while Company B tend to acquire the technology resource and IT capability from external source. We observed that the managers' thoughts on the technology will change their orientation on the technology department development which influences their choice in external or internal sourcing. However, we found the leading firm in each industry did contingently acquire the IT capability both from external and internal. These sourcing approaches include internal R&D, joint R&D, and joint venture as IT integration service provider. The reason may underlines that the fact that the leading firm usually have more experience on development of IT resource which can short cutting the R&D process on new technology development and have more financial capability to invest on the technology asset by acquisition or cooperation with technology providers. The more important reason for the two kinds of sourcing is for the focus on their core business including marketing, operation, and service equality. For example, Company A spun off their IT department, which evolved into an enterprise group that focuses on venturing, marketing, and operation. The other reason may account for the relatively easy imitation of IT-related facilities and platforms, which result in less entry barriers in the plant investment and learning curve. However, some firms continuously exploit deployment of patents to protect the technological assets and later developments of technology from patent filing against late entrants and imitators.

Complementary Resource sourcing

Our study showed that the firms frequently acquire their external linkages for the fulfillment of their strategy and the service innovation. Most firms heavily depend on strategic alliance to expand their business scope and reaches to more customers. The external linkages and

relationship among service/product suppliers are most important resource for achieving the service innovation. The reason may lie on the delivery of service experience is a process which require intensively integrated and coordinated corporation contributed by cross industry actors. From our study, we found firms frequently applied the strategic alliance for different resource obtaining in terms of the financial founding, risk sharing, and service markets extension.

External linkages are the most critical resource for firms' sustained competitive advantages

Among the complementary resource, the external linkages are the most critical resource to create sustained competitive advantages in terms of market expansion, financial leverage, and economics of scale by sharing resource across partners. Firms apply a variety of sourcing approaches including strategic alliance, horizontal /vertical integration, joint venture, merger and acquisition which differ by degree of ownership and neighborhood with partners. The strategic alliance often used when firms need to create the market in other domain far from its core industry and with less control on the partners. For example, four cases all frequently exploit this sourcing approach to provide rich services by the integration of information and in the cross-firm's transaction process. Horizontal integration often used when firms tend to create the economics of scope by acquiring the resource and market from the related business.

Lastly, the joint venture is often used to establish a specialized firm to assist and complement the insufficient of existing business while concentrating the core business. For example, Company B initiate a company which focusing on the integration of the IT infrastructure and the logistic center by joint venture with Company C and Company D. The other example is the company B's joint venture with Japan company for the virtual product and services and marketing. Through sourcing approaches firms utilize the complementary resource in cooperation with their existing IT capability to maximize the value of IT-enable innovation thereby obtaining competitive advantages.

The central position in the value network renders power in competition

The position that firms play in the value network affect their power in the influence on the value network. The more central role they play, they may have more benefit and power they can obtain to rule the competitive game in the industry. We found that the firms in our case take the central position in their value network. This central position primarily results from their capability of coordination and integration resource across firms enabled by their mature IT infrastructure. This finding consists

with the argument that firms pertain the central position give more over partners and thereby shaping rule of competition game and bargain power. They utilize this structural position resource to create more service with more involvement and engagement of the transaction process which help them become irreplaceable role to the market.

The complementary resource sourcing approaches applied by firms are summarized in terms of the target resource and examples in the Table 9.

Table 9 Summary of complementary resource sourcing approaches

Sourcing Approaches	Category	Acquired Strategic Resource	Example
Joint Venture	Organizational Resource	Senior manager management skill	Company B
Strategic Alliance	External Linkages	Financial capital (Cost)	Company A
Vertical Integration	Organizational External Linkages	Streamlined value chain; Integrated service domain; Central position in value network	Company A, B, C, D

The paths of the strategy shift in service innovation

Strategy shift refers to the phenomenon where a firm changes its strategy of IT-enabled service innovation. To shift to a new strategy, a firm undertakes necessary sourcing approaches to meet the requirement of the targeted strategy in terms of IT capabilities and complementary resources. The intention to change a strategy from one to another drives the firm to undertake

certain actions with respect to critical resource sourcing, and then its dynamic capacity can lead to renewed competencies that achieve strategic congruence with the changing business environment. The shift, however, takes some degree of change in the organization and requires taking risk to have such potential to successfully make the shift. Alternatively, some firms retain their strategy for the sake of adventure avoidance, which reduces uncertainty in the strategy shift period.

Table 10 Turning points of four cases

Company	Initial	Turning point	Afterword	
	Resource	Challenge/Event	Sourcing	Resource
A	Kiosk and partners, Exclusive contract	Lawsuit from company C, limit the development on MMK	Patent	Freedom of technology development on MMK
B	Less IT to introduce	Improve services on MMK	Joint venture	Focus on virtual distribution
C	Self-developed Kiosk	Competitors follow up	Patent protection	Protection on technology asset
D	Less IT to introduce	More and more technology suppliers and low uncertainty	Outsourcing	With a small numbers of stores MMKs adopted

Below, we discuss some incentives and reasons for a firm's strategy shift and represent the "strategy shift" in Figure 3.

Path I : Strategies shift for competitive position

Firms can obtain a superior competitive position in a competitive market by shifting their strategy to another in a single-service innovation. This shift is about more than obtaining advantages from the strategy itself because the shift contributes to a more competitive position that can profoundly impede competitors' bargaining power, channels, and market shares. The shift has more implications than just the strategy because it includes the weakening of the competitor's capacity and the opportunity to sustain advantages in market share, lead time, and rules of competition. The shift to the same strategy of the competitors directly challenges the competitors and influences the market structure.

Company B illustrates the attempt to use collaboration to exploit the collective assets of its partners. For example, the change of company B's strategy from the Bider strategy to the Predator strategy by forming a joint venture with company C and company D afforded it the capability to compete with company A's long-held market share in the EC market. Furthermore, such collaboration seeks to exploit complementary resources and structural assets and to change organizational boundaries (Teece et al., 1997). This strategy shift created a new competitive scenario, meaning that if they did not shift the strategy from the Bider to the Predator strategy, they could not upgrade their operations to grasp the market share that had been occupied and monopolized by company A. A shift enables a firm to obtain market share and, in turn, impede the competitor's possession of market share.

Path II : Strategy shifts for obtaining advantages and avoiding disadvantages

Each strategy contributes to a different degree of advantages (benefit and opportunity) and disadvantages (risk and threat). Relying on the strategies that are applied toward different situations corresponding to an external environment and internal resource set, firms can obtain the

advantages and avoid the disadvantages by shifting their strategy to a feasible one. Foreseeing emerging disadvantages and searching for opportunities in future drive firms to undergo a strategy shift.

For example, company C was aware that the application platform itself could not serve as a competitive advantage because it could be easily imitated and thus offered no advantages with respect to lead time and entry barriers through patent deployment. Moreover, this resource helped them build entry barriers to block competitors and avert latecomers from imitating them. Generally, the firm's patents fall into one of three categories: kiosk-enabled services, facilities, and energy-saving technology. Company C adopted a patent protection policy more than other competitors. Under such a policy, the follow-up technological applications and innovation are more subject to continual development. Furthermore, the company enjoyed the advantages from being the first in the market, and this resulted in its considerable attractiveness to customers and for application content providers to create the self-owned value-creating network. Aware of its inability to sustain itself solely by the technological asset, the company started to change its strategy from the Defender strategy to the Predator strategy in order to expand the market and license the platform to other countries to prevent their rival's imitation of the same innovation to reduce its market share. This action helped company C to go beyond competitors, acquire new advantages resulting from the new strategy, and prevent disadvantages from the current strategy at the same time.

Path III : Strategies shift is driven by the changes in resource

In the strategic shift process, firms must undertake different sourcing approaches to meet the resource requirement to achieve the target strategy. This process is viewed as a combination of resources and a reconfiguration of resources that yield benefits in two aspects. One aspect is resource accumulation and acquisition, which indicates the possession of valuable and scarce resources with preemptive effects, such as input

factors for finances or geography. This includes valuable scarce resource acquisition that contributes to the preemptive asset (geography resource), other organizational resources (financial capital), and IT capability (technological resource experience). The other aspect is the organizational learning triggered by the sourcing approaches after the resource acquisition leads to the incremental experience of adopting, developing, configuring, and integrating in the resource reconfiguration process. The strategy shift serves as the driving force for firms to take action on resource set reconfiguration. From the strategy changes and the process of resource accumulation, firms can create their own resource set that can be applied and leveraged by the next wave of service innovation from the fulfillment of the resource needs for each strategy.

We determined that these sourcing approaches create various aspects for organizational learning. The two forms of organizational learning that are enabled by IT are exploration and exploitation (Pentland, 1995; Kane & Alavi, 2007). In the process of acquiring the new resource and recombining it with the existing resources, firms obtain the experience of developing certain resources. These experiential resources are complicated and hard to be duplicated. For example, a flexible IT infrastructure, skilled personnel, effective internal partnerships, and external partnerships take time to develop. This finding is consistent with the resource-based view that contends that the sustained advantage of firms relies on the resource that depends on the causal ambiguity path, historical processes of learning, and asset accumulation. Our results also suggest that organizations that have failed to systematically develop IT functional capabilities or to invest in the acquisition of IT resources may find themselves lacking the necessary capacity to leverage IT in the creation and sustenance of competitive positions with respect to various service innovation. The strategic value may not be contributed by a resource itself but rather by the process of developing, learning, and reconfiguring the technological asset so that a firm can gain more experience. In turn, the firm can plan an accurate information system, develop quickly, and

develop a well-designed infrastructure.

For example, company A developed its IT infrastructure by continually introducing many advanced technologies with a high degree of functionality; such technology enables the firm to provide more services to customers. In internal operations, the firms exploited the technology to facilitate the sale, inventory, vendor management which streamline process within their value chain and support the collaboration commerce for their vendors and suppliers. This capacity for building a flexible, robust, and feature-rich technology enabled the firm to implement the Predator strategy and monopolize the suppliers with an exclusive contract by the switching cost among the suppliers' system alignment and compatibility. The learning process through which firms accumulate the resource and capability from IT in use which formed the best practice on the manipulation and deployment of related resource that can be applied in different service innovation which make them more easy to achieve the strategy and respond to competition.

Discussion and Conclusion

The purpose of this study was to examine the strategies of firms that were applied in the IT-enabled service innovations. We examined strategies through the analysis of the resource configuration with two dimensions of critical resources including complementary resources and IT capabilities. From the case studies, this study answers the research questions and suggests: (1) a firm only when it keeps coordinating/integrating, learning, and reconfiguring with its own strategic resources can achieve sustained competitive advantage; (2) to rapidly respond the changing environment, a firm needs to continuously adjust their resources by illustrating the different paths in strategy shift, resource endowments, and embedded reconfiguration mechanisms.

Of the firms studied, we find that those who have developed a rich set of IT capabilities could implement considerable changes in their business processes over relatively short time frames. These findings have several implications for IT strategies based on different resources

and capabilities as facilitators in service innovation. **First**, the firms explored in this article put up entry barriers using two approaches: leveraging IT infrastructure to construct a well-connected value network that increases switching costs for suppliers and protecting the business model or services using IP protections. This demonstrates that soft and hard technologies both contribute to a firm's competitive advantage despite the complementary resources they possess. **Second**, various strategies may be applied to the same technology. The choice depends on the resources and capabilities and the attitude of the firm. Diverse attitudes reflect the various intentions and visions of IT held by various managers, affecting the philosophy and behavior of the entire business. **Third**, the greatest strategic effect of IT is that it creates a new service market that can meet customers' latent needs and rewrite the rules of competition by creating greater benefits for customers. Firms apply different or same strategies with respect to various IT-enabled innovation corresponding to their IT capability and complementary resources.

This study builds an adjustment model of strategy formulation for IT-enabled service innovation. The new model combines the academic research and the practical situation. This model and approach will be very useful when more and more advance IT emerge nowadays such as unmanned store, blockchain, mobile payment, etc. Furthermore, in the research analysis of the method applied in this study, the brand name, business scope, mechanism, and management team of four cases do not discuss on the strategy choices of IT-enabled service innovation.

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高度競爭市場採用資訊科技促發服務創新之研究

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本研究在探討公司以新興資訊科技締造服務創新之策略與運用，針對公司所採用之策略透過資訊科技能耐、互補性資源兩個面向進行探討。本研究運用個案法對台灣便利商店產業進行分析與訪談。便利商店在台灣是高度競爭的市場，企業的激烈競爭衍生動態變動的商業攻防行動。從這些案例分析中，本研究整理出四種策略類型，並且追蹤企業如何改變路徑、調整策略來有效利用資訊科技促發之服務創新取得競爭能耐，進而配合市場變化來重置資源。

關鍵字：資訊促發之服務創新、資訊科技採用策略、資訊科技能耐、互補性資源、資源重置。

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