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# Why information technology is not being used for financial advisory

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# INNOVATIVE CAPABILITY DEVELOPMENT PROCESS:

## A SINGAPORE IT HEALTHCARE CASE STUDY

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### Abstract

*With the global spending of more than US\$4.1 trillion in 2007, healthcare has been one of the largest industries worldwide. To better plan and develop the healthcare system, an effective way is to leverage on the advancement of information technology (IT). However, despite of many attempts in the computerization and automation of healthcare services, most of the healthcare information systems failed to deliver in the era of rising expectations. With respect to this aspect, this study focuses on the success stories of a private-owned hospital in Singapore. We illustrate our lessons learned from this hospital, the Alexandra Hospital, which has successfully innovated a healthcare system setting and making a benchmark standard for the Singapore healthcare industry. By conceptualizing on the generation of innovative capability process, this study complements the scarce innovation literature in the service industry. Theoretical and practical contributions were shared and documented in this paper.*

*Key Words: Information Technology in Healthcare, Innovation in Services, Innovative Capabilities and Case Study*

# 1 INTRODUCTION

Healthcare is the single-largest industry worldwide with a total spending of more than US\$4.1 trillion (World Health Organization, 2007b). In which, the U.S. healthcare expenditures alone make up 14% of its GDP, and this figure is projected to rise to over 16% (\$2.3 trillion) by 2010 (Plunkett Research, 2003). Recognizing the massive size and continuing growth of this industry along with its potential of transforming societal health-and-wellness quality, the Singapore's Ministry of Health sets the mission to develop the world's most cost-effective healthcare system to help keep Singaporeans, the country's key resources, in an ideal state of health (World Health Organization, 2007a).

One of the most prominent ways to improve the healthcare system is to leverage on the advancement of information technology (IT). Healthcare experts, policymakers, payers and consumers find that computerization and automation of health records and processes could critically transform the scenarios of healthcare industry (Dwivedi et al., 2007). Though much in-depth studies had been done to improve the healthcare information system, yet it fails to rise on the occasion.

In view of rapid changes and uncertainty in the healthcare industry, it is crucial, practical and interesting to investigate how organizations can innovate and stay competitive in such a volatile environment. From expert's opinion, organizations could shape the future of their industry through innovative changes (Lawson & Samson, 2001). The problem is that, an acceptable, comprehensive and systematic framework towards successful innovation is difficult to come by. This means that, an ideal and systematic framework of innovation has yet existed (Lawson & Samson, 2001). The scarcity of studies on innovative change in the servicing industries (Amble & Palombarini, 1998, Aranda & Molina-Fernandez, 2002, Martin & Horne, 1993) has motivated to focus on this subject. In this study, we intend to bridge the research gap by conceptualizing the generation of innovation services and innovative capabilities to illustrate lessons learned from a private hospital that has successfully designed and injected an innovative philosophy into its healthcare system- a service firm.

The other parts of this paper are structured as follows. First, a review is presented on the background of innovation services with innovative capabilities before an outline of our research methodology which is coupled with a description of the Alexandra Hospital's case study. Second, the findings and discussion on the generation of innovative capability processes are listed in detail. Finally, the theoretical and managerial contributions are put in place.

## 2 LITERATURE REVIEW

### 2.1 Innovation in services

Despite the growing awareness that innovation is not confined to technical processes and products alone, contemporary research on innovative activities is still largely focused on technical innovations in the manufacturing sectors (Gallouj & Weinstein, 1997, Koch & Strotmann, 2008, Tether, 2003). Until recently, researchers began to recognize that there are differences in the nature of innovation in services in comparison to manufacturing. Probably, the two most prominent characteristics of services compared to manufacturing are: intangibility and interactive aspects of services. The reasons may be that firstly services tend not to have an independent physical existence and also service innovations can be invisible. Secondly, as services are interactive, they are often being co-produced by the providers and users acting together" (Tether, 2003). For these reasons, it is interesting to explore how innovation can be specifically carried out in the services sector of a hospital setting in this study.

Three schools of thoughts have emerged so far in the services innovation. The first school of thought advocates supplier-dominated innovation and suggests that services innovation is largely dependent on adopting externally developed technologies in facilitating the provision of new services and/or

enhancing the productivity of their services (e.g. den Hertog, 2000, Pavitt, 1984). Services are often considered to be “laggards” in terms of innovation and dominated by the technology provided by suppliers (Pavitt, 1984). More recently, some researchers began to suggest that service innovation might be beyond pure technological innovation. Beginning with the “interactive model” suggested by Kline & Rosenberg (1986), the second school of thought on service innovation emphasizes the differences between services and products, and suggests that services are far from dull providers of standard activities, but are instead dynamic and fluid, constantly changing to meet customer requirements, and achieving them through creative combinations of hard (e.g., equipment, computer software, etc.) and soft (human skills, knowledge, etc.) technologies (e.g. Camacho & Rodriguez, 2008, Gallouj & Weinstein, 1997, Kline & Rosenberg, 1986, Sundbo & Gallouj, 2000). This perspective of innovation in services strongly emphasizes interaction with users and is believed to be particularly relevant for a knowledge-intensive business services (KIBS), such as consultancy. The third school of thought sees competition and innovation as related processes, which are themselves related to the scope for strategic positioning (e.g. Tether, 2003). It further suggests positioning and innovation through creative combinations of hard and soft technologies. While this perspective accepts that the adoption of technologies can be hugely significant for service development, it also considers that adoption is rarely as passive or as dependent as the supplier-dominated view (Tether, 2003).

With the basic knowledge on these schools of thought fundamental to services innovation, it provides us a clearer notion to further explore them from a hospital perspective. Most interestingly, in this case, we examine the services innovation in the process of adopting a new workflow and information system in a hospital setting. To further extend the background understanding of this study, we look into IT innovation literature.

## **2.2 Information technology innovation**

Information technology (IT) innovation has been extensively studied by researchers in the Information Systems (IS). Early studies on IT innovation from IS perspective have been focused on the impacts of perceived technology characteristics on adoption of technology. Relying on the theories of innovation diffusion, key perceived technology characteristics have been identified, such as perceived complexity, relative advantage, compatibility, etc (e.g. Rogers 1995, Moore & Benbasat, 1991). More recently, scholars suggest that the fit between technology and the task might significantly influence the success of technology adoption (e.g. Goodhue & Thompson, 1995, Zigurs & Buckland, 1998). On the matter of the main stream philosophy, IT innovation has also been recognized as a process of movement, i.e., transforming inventions into usable forms and use in practice (King et al. 1994). Holding fast to the same belief, we examine the service innovation of this healthcare case study from a process perspective.

By adopting a Health Information Systems (HIS), we could most probably share some similar concepts and situations in normal IS adoption. Nevertheless, the adoption could be quite different from the generic IS approach, given its specific purposes in serving the healthcare practice. For example, Heeks’s (2005) “design-reality gap” conceptual model has highlighted HIS implementation challenges. Hence, it would be interesting to find out the generation of innovative capabilities introduced by AH hospital. Especially, in the case of AH, the extent of its innovation does not only evolve around the technology, but also include the change in its hospital workflow and structure. This has added the creditability to this case study.

## **2.3 Innovative capabilities**

The concept of innovative capabilities refers to a firm’s ability to develop new products, services and/or markets through aligning strategic innovative behaviors and processes to achieve the usual and novel solution (Wang & Ahmed, 2007). In general, there are two types of innovative capabilities: incremental and radical innovative capabilities (Dewar & Dutton, 1986). Incremental innovative

capability is defined as the capability to generate innovation in a progressing manner, which refines and reinforces existing products and services (Subramaniam & Youndt, 2005). Radical innovative capability is the capability to significantly generate and transform existing products and services (Subramaniam & Youndt, 2005). Fundamentally, the distinction between incremental and radical innovative capabilities lies in the ability to draw organization knowledge (Subramaniam & Youndt, 2005). Such capabilities are particularly associated with the ability to enhance a firm's performance (D'Este, 2002, Deeds et al., 1999), evolution and survival in the light of external competition and change (Deeds et al., 1999, Lazonick & Prencipe, 2005).

To innovate, it would require the recognition of the new, unfamiliar capabilities of IT for rethinking business processes instead of its familiar ones (Whitman, 1996). Unfortunately, most organizations often do not provide sufficient supportive resources for individuals who are prone to IT innovations (Wu, 2003). Thus, it would be interesting to study an organization which provides supportive resources to innovate. In this study, we intend to increase the understanding of AH's IT innovation by unveiling its processes and capabilities. Supposedly, the more innovative a firm is, the more it possesses the capability to search for sustained competitive advantage (Wang & Ahmed, 2007).

To innovate, an organization has to have the ability to develop new products, services and/or markets with continual and incremental learning and experimenting from inside and outside of the organization (Aranda & Molina-Fernandez, 2002). Teece, et al. (1997) identified learning, reconfiguration and coordination/integration as the key processes in dynamic capabilities. In this case, learning refers to the ability to acquire, assimilate, transform and exploit existing knowledge to integrate and generate new knowledge (Aranda & Molina-Fernandez, 2002, Teece et al., 1997). It is acknowledged that knowledge and transfer of learning is of utmost importance for the implementation of system innovation (Metcalf, 1995)

Integration and coordination have been viewed as important elements that facilitate the deployment of resource reconfiguration. Such two elements could specify how different resources are integrated to create new ways of performing new sets of activities, for example, by transforming the existing resources into new potential resources that could correspond to volatile environments (Teece et al., 1997).

In this study, we aim to explore the process of innovative capabilities development and its deployment in resetting a new healthcare industry model (including structure and IT systems). In view of our research interests, our study builds on the innovative services and capability conceptualization and commonalities identification derived from the case study.

### **3 METHODOLOGY**

We chose a case study approach to investigate our research interest, as it provides the opportunity for the researchers to explore contemporary events in the case company (Winter, 2003) with the empirical inquiry research on "how" and "why" questions (Lazonick & Prencipe, 2005). The main interest of this study is to discover how a service firm- Alexandra hospital (AH) innovates in a volatile environment to set a new healthcare industry model for Singapore.

In addition, the scarcity of research in this phenomenon (Amble & Palombarini, 1998, Aranda & Molina-Fernandez, 2002, Martin & Horne, 1993) has further substantiated the choice of research method in this study. In particular, an interpretive case study is an appropriate means of empirical inquiry (Lazonick & Prencipe, 2005) when the phenomena to be studied are complex and not easily separated from its original context (Yin, 1994). Thus, drawing from interpretive perspective, a process model of innovative capabilities development will be presented. This study will use the rich insights available in the case by examining the major events (narrative as instance) of the entire innovative response process in the volatile hospital environment.

One of the most dynamic Singaporean hospitals- AH was invited to participate in this study. This case study is particularly appropriate for the purpose of our study because it is cited by the Singapore Health Minister as the piloting prototyping center, which leads and sets the future standards of the Singapore Healthcare industry. In particular, the case study focuses on how innovative they are in deploying resources and capabilities in response to the government challenge to formulate a new explanatory model for the Singapore Healthcare industry.

This case study was conducted over a period of six months with the total of 19 face-to-face interviews with nine distinct interviewees, who were nominated by the Director of Operations according to their expertise and relevance to this case study. In addition, due to the size of the hospital and its limited resources, no more ten staff were allocated to handle matters relating to all its IS projects. At the period of change, employees were bound with multiple tasks in their daily routine. Tasked with heavy workload, our informants were still willing to sacrifice their valuable time over the lunch or even after office hours with us over the interviews, demonstrating their passion for this project. Most interviews were tape-recorded and transcribed, with photos and additional notes taken to collect the best possible events of the case. Each interview session lasted between 1.5 to 3 hours, with informants ranging from nurses, IT specialists, doctors and top-management personnel having an average working experience of three years. We adopted a practical way of understanding textual data that was suggested by Klein & Myers (1999), i.e., via personal visits, emails and phone contacts to foster relationships among researchers and key informants. By doing so, it enables us to understand their rich depictions (Yin, 1994) underlining the meanings of their expressions (Hirschheim et al., 1991) so as to discover the core-case information that is necessary for the comprehending, analyzing and evaluating of the case study (Klein & Myers, 1999). To ensure the quality of data collected, we triangulated the data collected with other resources including empirical observations, follow-up email clarifications, along with about 230 MB softcopy documentations and archive records.

## **4 CASE STUDY**

### **4.1 Case background**

Alexandra Hospital (AH) was first established in 1938 as a British Military Hospital in Singapore. In 2000, AH had undergone a restructure and became a member of the National Healthcare Group (NHG), which is one of the two healthcare clusters in Singapore today. Since then, it has undertaken many initiatives to upgrade its major facilities with the desire to become the Mayo Clinic of Asia complimenting with the objective to provide patients with the hassle-free experience.

As one of the smallest hospitals in Singapore and a lack of government supports, AH was limited to use its scarce resources wisely to achieve its aim towards the upgrading of healthcare service standards in Singapore. That is to offer a better, faster, cheaper and safer-care service to patients on top of developing new business processes, and exploring innovative technologies. Ultimately, they decided to set up a new healthcare standard in Singapore by moving towards a Hassle-Free, patient-centric hospital to be located in the Northern Singapore in 2009.

### **4.2 Planning and preparation for an innovative breakthrough**

To achieve the Hassle-Free Hospital vision, AH referred to the two best practices of US-Japanese Medicine/Healthcare systems (the Mayo Clinics (United States of America) and the Kameda Medical Centre hospitals (Japan)) to realize this vision. In addition, AH staff were sent to visit the Toyota plant in Japan and its workshop in Singapore to study how to transfer the learning into the hospital via the approach of thinking out-of-the-box mindset. Coupling with the impressive Japanese 'Kaizen' (continuous improvement) philosophy, a management team member:

*"It worked for Toyota cars, so why not for patients at hospitals?"*

Motivated with the inspiration of ‘Kaizen’ initiative of the Japanese, AH management team has to nurture the interest of the relevant stakeholders for their intellectual and emotional buy-in before kicking off a series of ‘Kaizen’ activities. Knowing that the change would bring tremendous impact to the hospital, creatively, the management team capitalises on its choice of having a passionate and committed IT personnel to spearhead the change. Through her social network and personal relations in the hospital on top of a supportive medical doctor husband, they managed to bridge the ideas and interests over informal social discussions and gatherings. News spread with the growth of interest and eventually the casual talks and gatherings were supported and attended by more specialised staff forming into an action-oriented team. Such a carefully crafted and planned management initiative has eventually and successfully nurtured the interest and cultivated the need for change in the hospital with minimum hassle.

Following the change, there are improvements whether significance or not were encouraged by the Director of Operation with the aim to save resources, time and add value to patients. According to a senior top-management:

*“We believe in taking small steps in rapid succession approach, where we test new technology and deploy them if suitable”*

Complementing the knowledge learned through the ‘Kaizen Flow’ (refers to Figure 1) initiated by the AH operational team with a small number of volunteered staff, including medical doctors and nurses, to participate in the change, the management incorporated the patients ‘wish list’ into the system. The initiative kicked off with scrutinizing the traditional work processes to identify bottlenecks, reviewing the existing patient-care processes and also re-examine patient services via the exploitation of technologies.

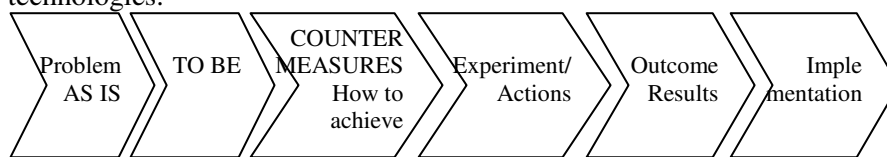


Figure 1. AH's Kaizen flow

To further support the innovative change, all management staff including the operation team were assigned with a mobile phone and relocated to an office with no designated seats to encourage dynamic interactions, responsive and attentive management practices.

With the belief that innovation does not lie in the hands of the top-management, weekly system review session is organized to welcome suggestions from all levels. According to the Director of Projects in Operations:

*“The contribution is from everyone because the process flow and the initiated changes have to happen on the ground then we (the management) help to “systematize” the components or the requirements.”*

The hospital is filled with synergy to innovate. It is not uncommon to detect members of the management team gathering first-hand-on-site problems from the ground staff to understand the practicality and the feasibility of the change. Since then, the process of identifying and solving problems remains part and parcel of everyday work, more importantly, the project specialist 1 claimed:

*“We feel that we should not get a system that changes our workflow. So we started to review our processes and request for an integrated IT system that can support us.”*

On-going trainings were provided to staff to increase their awareness of the undergoing projects in relation to future changes to the hospital performances. In addition, the Andon board<sup>1</sup> is used to notify the new changes and act as a means to justify the improvements and benefits of the newly introduced workflows and healthcare system to staff.

### 4.3 Articulating and integrating resources

A series of continual learning and experimenting activities were carried out by the AH management to identify the necessary improvements before sourcing for further resources to accomplishing the task. The Chief Operating Officer alleged:

*“We will continue to source for relevant technology in the market for our new facility, which will be ready in 2009”*

To offer a more efficient and effective safer-care service to patients, an internal operational team was set up to examine the workflow of emergency-ward patients at the triage. After the review, three potential areas of improvement were identified- the physical layout of the department, the business workflow and the need for an integrated healthcare information system. The proposed improvements were then readily agreed by the management as prompt attention to emergency-department patients is vital and immediate change is targeted to upgrade its conditions and services.

After several intensive meetings on costs-and-benefits analysis, the management decided to invite external collaborators for strategic partnerships in improving the department physical layout, business workflow and the healthcare information systems. The assistant director of operations explained:

*“We are a small hospital. So (for) some of the things we implemented, cost is important, as we don’t have the financial arm to bring in the big software players...”*

To initiate the innovation, AH proposed the idea of setting up its integrated healthcare information system as a business case for a Singapore polytechnic college to take up as an assignment topic.

*“To be able to solve an actual business problem is a precious opportunity for those polytechnic students...” Explained the Assistant director of operations*

Through the ‘kaizen’ management approach and the workflow process review under the guidance of the head of emergency department, the physical layout of the emergency ward was innovatively improved over a short period of time by the internal operational team in ensuring that the point-to-point stations are positioned for the convenience of patients. After due considerations, AH made a bold and historical move to revamp the triage system by allocating a senior doctor (experience doctor), instead of deploying a junior doctor (trainee medical officer) to serve as the first point of contact with patients in the initial consultation process. Within the 90-day commission period, AH surprisingly received an endorsement for IS prototype from the Singapore polytechnic college regarding the newly improved workflow.

To put the IS prototype provided by the Singapore polytechnic collage into practice, AH extended their partnerships with some other industry partners to pilot and test use various advanced technologies in its process of transforming into a hassle-free hospital. Along the exploration journey, Frontline Solutions (FS) Corporation implemented the prototype and played the role of system integrator to merge all the medical records and information, currently stored in various databases into a central-integrated-database system, on top of customizing information for efficient delivery across multiple devices. This collaboration has indeed created a win-win scenario for both parties. While AH benefits

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<sup>1</sup> Japanese name for a visual production-control device (usually a lighted overhead display) that continuously shows changing status of the production line and sounds alerts if a problem is imminent (Business dictionary.com, 2008)



from the integrated healthcare system, FS Corporation enjoyed the privilege of advertising its success story with reference to AH experience. Based on the synergy and creativity manifested by AH staff, an innovative healthcare system is successfully designed from scratch.

#### 4.4 Paving to the innovative hassle-free hospital service model

Taking a bold move to improve the workflows and innovatively develop a better system and workflow process from scratch is an achievement and a great leap forward for AH. The entire innovation service transformation was a great success: 1) AH has tremendously improved patients' satisfaction, but also successfully expedited patient flow by 400% (from 22 to 70 patients attended per hour), 2) Reduced patient waiting time by 50%, and 3) The newly designed system can genuinely contributed to the recording and retention of patients' medical history via the paperless administration in supporting the go-green campaign. By so doing, AH boosted its brand-name in the hospital industry by ranking consistently number one in the Ministry of Health Patient Satisfaction Surveys from 2004 to 2007.

## 5 DISCUSSION

Basing on the AH organization-wide innovation effort, a definition of a high-performing innovation organization suggested by Lawson & Samson (2001), we developed a process model of innovative capabilities development in a hospital-service settings, as showed in Figure 2. As suggested by our model, the development of innovative capabilities is a complex-helix process in articulating and integrating organizational learning and knowledge with tactical partnership and coordination to technologies, processes, services via organizational intelligence, strategic integration and operational articulation. In other words, the capability to innovate is developed through the capability to integrate and to articulate internal and external knowledge, resources and expertise to develop a new standard of products/services through aligning organizational intelligence to create a novel solution.

The conceptualization of strategic integration refers to critical managerial decision process in identifying, modifying and improving the internal and external resources. Operational articulation accounts for the operational activities of a firm in reconfiguring hospital standard, building stability, efficiency and profitability including the reduction costs, risks, and the achievement of economic of scale. Organizational intelligence is known as the capability to deal, process, interpret, manipulate and access information to resolve complicated problems/issues in a purposeful, goal-directed manner so that an organization can increase its potential to adapt and operate strategically (Glynn, 1996, Lawson & Samson, 2001). In other words, organizational intelligence refers to the capability for an organization to harness its preserved knowledge from different problems/issues, then deepen the knowledge through learning and further legitimize its perceived value according to its goal. AH focuses its initiative by learning from foreign hospitals in US and Japan and among its employees through the 'kaizen flow' which allows it to build the capability to identify new avenues for investigation and to innovate (Burgelman & Maidique, 1988).

Given that this model was inductively derived from the AH case study data, we present in a way how the existing literature corroborates with the model and how the model enriches our present understanding of innovative capabilities process model.

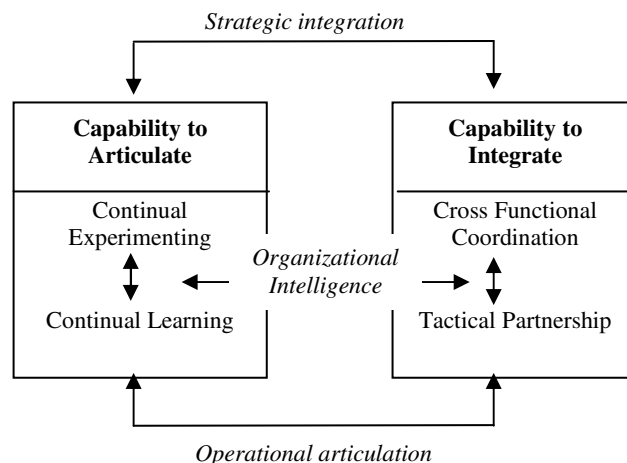


Figure 2: *Process model of innovative capabilities development derived from the AH case study.*

Figure 2 suggests that the process begins with an innovative aim to build a hassle-free hospital by providing faster, cheaper and safer-care services to patients. Such an idea was initiated by the top management since AH became a member of the NHG. To address the initiative, the hospital articulated knowledge from various sources by integrating information and expertise from both internal and external sources (Aranda & Molina-Fernandez, 2002) and transforming them into hospital-embedded knowledge or '*organizational intelligence*'. This is in line with previous research which suggests that a firm can develop superior capabilities through learning mechanisms, including continual experimentation, and the analysis of small mistakes (Eisenhardt & Martin, 2000). The ability of a hospital to integrate and articulate knowledge gained externally through the benchmarking of others' best practices and technological opportunities coupled with the incorporation of its internal capabilities is critical to the success of an innovative change (Cohen & Levinthal, 1990; Anderson & Ejeremo, 2005).

### **5.1 The evolution of capability to articulate in the process model of innovative capabilities development**

The ability to articulate knowledge plays a critical role in innovation process (Andersson & Ejeremo, 2005). Capability to articulate is generated from a series of continual learning and experimenting activities on new healthcare information technologies. These activities were identified by exploring how AH can transform its technology and process experiments to set a new standard in the healthcare industry. From the internal trial-and-error practices, the hospital devoted continual efforts to examine potential mismatches between the work processes and patients expectations. In addition, different experimentation methods were used to explore, investigate and collect stakeholders' feedbacks for articulation purposes before formulating appropriate requests into a business project.

The next phase suggests that the innovative capability processes are involved to find out how continual experimenting and learning activities can evolve in response to feedback and stimuli from the external environment (for example, government and patients). Such external involvement is inevitable, especially, in the volatile industry, where government and practitioners are trying to explore and set right the blurring healthcare IT structure (including standard and systems). To innovate, hospitals ought to conduct operational articulation that identifies discrepancies or gaps for modifications and improvements from trial-and-error processes (Winter, 2003). The innovative achievement in reducing patient waiting time by 50 percent demonstrated that the capability to articulate is crucial for new ideas and knowledge to emerge.

### **5.2 The evolution of capability to integrate in the process model of innovative capabilities development**

Innovative capability refers to a firm's ability to integrate and reconfigure resources within (Eisenhardt & Martin, 2000), and outside the firm (Eisenhardt & Martin, 2000; Wang and Ahmed, 2007) for a novel idea. The development of innovation capability for AH hospital is achieved from the integration of resources and technologies, both internally and externally (Aranda & Molina-Fernandez, 2002). AH leverages on its internal resource integration via the coordination of cross functional team members (operational team member, doctors, nurses, top management, and patients) to draft AS-IS problems and TO-BE statements (refer to Figure 1) AH's Kaizen flow to articulate lessons learned from experimental activities undertaken in the redesigning of the emergency ward workflow. Thus, the soft technologies such as knowledge, skills and expertise from members of the AH's cross functional teams were critical for innovation in services to integrate and create streamlined business processes.

The notion that innovative capability is embedded in distinct ways of tactical partnership and coordination helps to explain how and why process and technological changes can have tremendous impact and influence on a firm's services. This capability enables firms to select, develop exchange relationships with units and/or individuals beyond the traditional organization boundaries, such as networks and alliances of customers, suppliers, competitors and other non-market participants which are the key source of innovations (von Hippel, 1988; Hagedoorn & Duysters, 2004) to improve its services. Besides, the existing literature also suggested that the user-producer partnership and coordination would be fruitful for creating a complex and new-to-market innovation (Koch & Strotmann, 2008).

Not surprisingly, as evident in the case, AH demonstrated its capability to integrate knowledge and expertise from tactical partnership. In the initial stage, AH first partnered with a local polytechnic to develop a prototype healthcare information system that is articulated through experimenting continuous learning by the operation team members. After the test-run of the prototype to enrich the innovation process, AH invites other professional industry partners (e.g. FS Corporation) to take part in its success model. Thus, to innovation, a hospital ought to conduct strategic industry partnership that could integrate and leverage internal and external expertise, knowledge and technology (Teece, et al., 1997; Hagedoorn & Duysters, 2004) as evident in the case. All in all, conscientious and strategic integration planning not only tactically positions AH to innovate, but also benefit its partners to creating a win-win scenario.

## **6 CONCLUSIONS**

The purpose of our paper is to conceptualize the generation of innovative capability from innovative services literature. A service innovation goes beyond pure technological innovation to a creative combination of hard and soft technologies and processes innovation. As evident in AH case, innovative capability development in service industry includes innovative workflow and system improvement. By drawing on the AH case study, we have developed an innovative capability model that depicts innovation as a complex process, whereby an organization's key resources are decomposed into strategic integration and operational articulation that are reconfigured iteratively during the process of capability development.

The innovative capability development model in this paper has significant implications for researchers and practitioners. Previous studies contributed to the understanding of innovative capability as a subset of dynamic capability but not much information was provided as to how innovative capabilities can be developed and achieved. Our model proposes and clarifies that there are certain activities and processes involved in achieving innovative capability. This study contributes to providing some answers in responding to the lack of innovation studies in service firms (Amble & Palombarini, 1998, Aranda & Molina-Fernandez, 2002, Martin & Horne, 1993) and also serving the basis for further investigations.

In addition, this model proposes a process model that describes and analyzes the ways how innovative capabilities are implemented and managed during the innovation of healthcare IT in the hospital backdrop with the aim of setting a new standard for the healthcare industry in Singapore. This innovative development process model presented in this paper is grounded on the activities and processes revealed in the case study. Aspects of this model could be generalized into other cases of dynamic and volatile environments. However, more empirical work is necessary to test the applicability of the model in other settings.

For the practitioner perspectives, this study provides useful insights into the ways to manage innovation capability in order to design and create new industry standards. Taking the initiative to innovate itself into a hassle-free hospital, the AH case underscores the needs for hospital management to understand the concept of innovative capability as well as the approaches to build innovative capability by using organizational intelligence to cross reference with the strategic integration and

operational articulation processes. This study suggests that hospital management could adopt a more systematic innovation process by focusing more on soft technologies while handling services related challenges.

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