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THE IMPLEMENTATION SUCCESS OF HEALTHCARE INFORMATION SYSTEMS: A BUSINESS-IT ALIGNMENT PERSPECTIVE

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Abstract

Alignment has been considered as a multi-dimension concept such as strategic alignment and social alignment. Besides, alignment is also recognized as a dynamic concept, which means it is always an on-going process. Drawing on these two perspectives, we suggest that alignment could be achieved by various implementations, including IT strategy-driven implementation and business-driven implementation that could happen in the same organization, but in different periods of time. We also propose that social alignment is not simply one of the antecedents of strategic alignment, but is embedded in the whole process of implementation to help achieve strategic alignment. To integrate these two sets of findings, we further propose a process model about how the process of IT implementation and social alignment facilitate the alignment between organization's business strategy and IT strategy to illustrate the underlying mechanism.

Keyword: Alignment, Healthcare Information Systems, Implementation, Case Study

1   Introduction

Strategic alignment has long been an issue of importance both in information systems (IS) research and to IS practitioners (Ravishankar et al, 2011). For many years, researchers have spent enormous effort to investigate and verify the importance of aligning IT with business structure (Chan and Reich 2007), with organizational strategy (Chan 2002) and with IS structure (Brown and Magill 1994). According to some previous empirical studies (Beer et al. 2005, Miller 1992, Reich and Benbasat 1996), organizations that successfully achieve strategic alignment will outperform those that do not. A recent Society for information Management (SIM) study of CIOs also found that strategic alignment was still considered as an issue with a top priority facing CIOs (Luftman et al 2006). Despite of the long history of research into strategic alignment in organizational context as well as the increasing emphasis in practical world, alignment remains an inextricable problem for many organizations.

Because of this unsolved challenge, strategic alignment has attracted more and more attention from researchers, who strive to find the effective mechanisms to manage strategic alignment. As a result, two streams of findings emerge. One group of early research focuses on the key factors influencing strategic alignment, and the antecedents of strategic alignment to success, such as support from senior executives for IS (Luftman and Brier 1999), shared domain knowledge between IS and business executives (Reich and Benbasat 2000), communication between business and IT executives (Reich and Benbasat 2000), IT management sophistication (Sabherwal and Kirs 1994) and so on. The other group, on the other hand, looks into strategic alignment per se, however considers alignment as an outcome rather than a dynamic process (Weill and Broadhent 1998; Earl 1989). Interestingly, more recent research advocating this stream, in the contrary, argues for the dynamic trait of alignment instead (Venkatraman 2000, Henderson and Venkatraman 1993). In our opinion, the dynamic alignment perspective deserves more attention than it has received, especially with Business-IT alignment which is defined as the fit between IT and business strategy (Henderson and Venkatraman 1992). This perspective of alignment involves the assessment of implementing business strategy aimed at organizational transformation, by adopting appropriate IT strategy, as well as articulating the required IS infrastructure and process (Henderson and Venkatraman, 1993). A process view of alignment is important because a process-oriented approach could point to the key processes where alignment is strong or weak, and when and where alignment needs more remedial managerial attention (Tallon 2008).

After reviewing the limited research on dynamic perspective of alignment (e.g, Henderson and Venkatraman, 1999; David et al 2004), two major issues remain. First, strategic alignment has been examined as a concept of a single dimension. Until recently, researchers have recognized the significance of alignment with its multiple dimensions, such as strategic, social and cultural dimension (Kearns and Sabherwal 2006). Nevertheless, how these multiple dimensions of alignment shape and facilitate organizational transformation individually, and how they interact with each other to have a synthesized impact on alignment is still unclear. Second, although increasing attention has been attracted to dynamic alignment perspective, questions have been raised, with regard to how to achieve alignment between business and IT strategies and what else worth looking at beside the dynamics of misalignment and alignment transition.

To address these two issues mentioned above, we synthesize the dynamic and social view of alignment to develop a comprehensive model to understand how IT implementation can be supported by those different dimensions of alignment, and to what extent, those alignments will in turn facilitate and improve the organization's performance. In addition, a process view (dynamics) of alignment could not only help us understand the underpinning mechanisms of one specific IT implementation, but also explain a series of continuous implementations by identifying when and how a misalignment or alignment happens and how one situation transforms into its opposite state, and what the drivers or enablers are in behind. To sum up, the research question of this study can be refined as: *how does organization align its IT strategy and business strategy to improve performance?* We took the case study methodology to investigate the

underlying process through which the information technologies enhance the organization's performance of a local reputed hospital of Singapore.

The main part of this article is organized as follows. First, we review the literature on strategic alignment, which will help us understand different perspectives and respective values of strategic alignment as well as provide a decent theoretical lens for understanding how initial implementation is achieved and continuously maintained afterwards. After the literature review, we will briefly describe the background of the case and present our analysis accordingly. The discussion section frames the various strategic alignments happened in different periods of time through the theoretical lens. Finally, we conclude the study by drawing theoretical and practical implications.

2   Theoretical Foundation

The concept of alignment is theoretically based on the organizational psychology concept of fit (Kim 2004). It refers to "the degree to which the needs, demands, goals and structure of one component are consistent with the needs, demands, goals, and structure of another component" (Nadler and Tushman 1980). Alignment between various organizational components is seen as a key to improved organizational performance (Beer et al. 2005; Reich and Benbasat 1996). As IS increasing assumes strategic roles in organizations, Business-IT alignment which indicates IT deployed in organizations should be appropriate to stay congruent with the business strategy (Luftman et al. 1999), has become one of the major focuses for IS alignment researchers to investigate its relationship with organization performance. For instance, Sabherwal and Chan (2001) found that business–IT alignment is significantly correlated with perceived business performance, although the link is complex and dependent on the business strategy (Sabherwal and Chan 2001). Based on a study conducted in the small firm context, Cragg et al (2002) argued that the highly aligned (Business-IT alignment) firms perceived greater impact from IT and will consequently perform better. Our motivation to apply alignment perspective in this study imputes: 1. the characteristics of our study context, where an organization attempts to achieve a "wow" level service (organization transformation) via deploying a set of advanced information systems. Specifically, in order to understand how the successful implementations are achieved and what the role of alignment is in between, we need to look into the whole process and scrutinize every detail. By identifying what the business and IT strategies are, who are involved, picturing each phase, and inspecting every action, we may get the answer. 2. Reich and Benbasat (2000) contended that strategic alignment may be approached from a process perspective investigating planning activities. They also underscored the two dimensions, namely intellectual and social dimension. Hence, we adopt the dynamic and multi-dimension perspectives of alignment to direct our analysis.

2.1   Dynamics of Alignment

Previous research on alignment focus on the antecedents that are vital for reaching and sustaining high alignment (Baker 2004; Reich and Benbasat 2000). However, the main challenge in many real life sites is that how to implement IT that is relatively fixed to an organization to satisfy its business strategy and associated information requirements that are constantly in need of adjustment (Galliers 2004). Due to this concern, researchers' attentions have been pulled from strategy content to strategy process, emphasizing that alignment is a process rather than an end state (Henderson and Venkatraman 1992). Strategy process concerns the question that how does an organization implement its IT strategy to fit its business strategy (Sabherwal and Chan 2001). For instance, previous studies have identified that IT strategy is a collaborative process between all actors and divisions, thus it is not enough to understand the factors involved in the alignment, but have to understand the relationship among them (Baets 1996). In addition, researchers highlight the importance of readjustment and realignment of strategy components, to make alignment in a dynamic condition to achieve the target (Rondinelli et al. 2001). Sabherwal et al. (2001) investigated how alignment evolved over time using a punctuated equilibrium mode, suggesting that even

after alignment is achieved, environmental changes can reduce this alignment due to overemphasis, complacency and inertia, engendering a need for revolutionary change. A widely cited alignment model that represent the process of alignment is the strategic alignment model (SAM), which is a cross-domain relationship model in which strategic alignment emerges as a result of strategic fit (i.e., fit between external and internal domain) and functional integration (i.e., integration between business and IT domain) (Henderson and Venkatraman 1992). The conceptual and practical value of SAM model has been empirically supported that strategic alignment leads to increased profits for an organization and correlates with perceived business performance (Sabherwal and Chan 2001).

2.2 Multi-Dimensionality of Alignment

In addition to examine alignment as a process, research on IT implementation posits that it is important to consider the different dimensions of alignment, whose significant impact on performance has been well recognized during planning a IT implementation (Chan et al. 2006). Social dimension of alignment is one of most well established tracks that concern with the cognitive process of human actors in the alignment mechanism. According to Reich et al. (2000)'s definition, the concept of social alignment is defined as "the state in which business and IT executives within an organizational unit understand and are committed to the business and IT mission, objectives, and plans"(Reich and Benbasat 2000). This concept has already been extended to the partnership building, IT vision sharing between business and IT group members within an organization (Kim 2004). Plenty of evidences indicate that most of IT implementation in organizations failed due to lacking awareness of social dimension of alignment (Chan and Reich 2007). In the contrary, an informal structural elements embedded in the social life of an organization (social alignment) will play an influential and long-lasting role in aligning organization IS with strategic objectives (e.g., Chan 2002). Some studies pertaining to social alignment focus on the relationship between shared knowledge and IT performance (Reich and Benbasat 2000). Nelson and Cooprider (1996) found the mutual interests between IT and business people influence their shared knowledge that turns out to affect IT performance (Nelson and Cooprider 1996). Shared domain knowledge, which is considered as one of the most important manifestations of social alignment, is expected to influence the effectiveness and efficiency of communication between IT and business executives, and further the connections between business and IT planning (Reich and Benbasat 2000). Without shared domain knowledge, business and IT executives may lack the indispensable common ground to achieve social alignment, which will further render a misalignment between business strategy and IT strategy. Chan and Reich (2007) also pointed that a prerequisite for high social alignment is the collaboration of IT personnel and business staff at the level of an organization (Chan and Reich 2007). In addition, Ravishankar et al (2011) found that informal structure embedded in social context influences the perceptions of and responses to implementation efforts and have important organizational consequence (Ravishankar et al. 2008).

3   Research Methodology

The case study methodology was adopted for this study. There are two reasons for this. First, the research question is a "how" question, and it is suitable for exploring and answering such question through case studies (Walsham 1995). Second, alignment, especially from the dynamic and multi-dimension perspectives, is complex in nature and is inextricably linked to the organizational context, which makes the qualitative approach less questionable (Klein and Myers 1999). Regarding the data collection and data analysis process, we adopted the approach of "soft positivism" or "scientific realism" (Kirsch 2004; Madill et al 2000). This approach allowed us to conduct the data analysis with certain expectations based on prior theories, while also allowing some unexpected findings and explanations that emerging from the data, as is more typical of the interpretivist approaches. Directed by the soft positivism, data was collected with the objective of identifying the alignment between business strategy and IT strategy. This alignment is the theoretical lens that functions as the "probe device" (Klein and Myers 1990).

4 Case Description

AH is a small public hospital serving mid-western area of a developed country in Asia. In 2000, AH was taken over by the local government and began its transformation. With the assignment of a new management team, this hospital was tasked with restructuring its working processes. AH aimed to become a hassle-free, patient-centric hospital and began to rethink how to enhance the patient services by exploitation of the technology. Initially, AH focused on adopting a benchmark from the best practice of US-Japanese healthcare systems (e.g., the Mayo Clinic, the Kameda Medical Centre hospitals). With a good understanding of the advantages of these successful examples and its own existing challenges, AH collaborated with its IT partners to develop the Clinical Digital Dashboard (CDD) system. It was initiated in 2004 with collaborative participation of Infocomm Development Authority of local government and Microsoft. The CDD was used to deliver patient-centric, seamless, safe and cost-effective medical service at the Department of Emergency Medicine (DEM). CDD helped change AH's workflow and facilitate the development of AH's physical layout. It was successfully implemented and changed the hospital's workflow. By using of relevant modules within CDD, registration, consultation, treatment and prescription for the patients could be finished using one single system.

After CDD, AH found that the Bed Management System (BMS) was lagged to provide prompt updates of the bed availability, resulting in poor bed turnover rate for patients in need of beds. AH collaborated with Cisco System in 2006 to exploit its smart-phone solution for BMS to provide a real-time visual display of the most current bed census (i.e., instantaneous ward occupancy) to facilitate the process of allocating beds to patients. In order to ensure the seamless flow of patients to the in-patient wards, the BMS adopted the just-in-time (JIT) resource allocation strategy. It offered updated status of bed allocations, shown as "booked", "ready" and "discharged". Based on the status, anyone accessing the BMS was able to know the status and availability of beds instantly. To sum up, the implementation of CDD and BMS represented different strategies of AH's development and both of them achieved some level of business-IT alignment. Table 1 shows the functions of CDD and BMS.

System	Function	Description
CDD	Process Integration	Enable the registration, consultation, treatment and prescription for the patients through the using of relevant modules within a single system.
	Status Monitoring	Provide real-time, integrated and comprehensive view of any patient status from his point of registration to the point of discharge or admission.
	Records Sharing	Allow seamless flow of patients' medical records across all departments, or within the department during his visit.
	Information Storing	To serve as a repository of patient information, including patients' full medical history, current and past treatment plans, prescriptions and follow-up appointments.
BMS	Real-time Monitoring	Provide a real-time visual display of the most current bed census (i.e., instantaneous ward occupancy) to facilitate the process of allocating beds to patients.
	Easy Checking	Eliminate the need for multiple phone calls between BMU and Ward 13 just for checking bed availability and the booking of beds for patients from the DEM.
	Prompt Informing	Provide a means to inform housekeepers of the beds to be prepared for the next patient.

Table1. Functions of CDD & BMS

5 Case Analysis

Our analysis focuses on answering our research question: *how does organization align its IT strategy and business strategy to improve performance?* In line with our standpoint of examining alignment from the perspective of process, we divide the whole story into three phases based on the timeline of healthcare

systems implementation, which are alignment capability development (phase1), IT-driven implementation (phase2) and business-driven implementation (phase3).

5.1   Phase1: Alignment Capability Development (2000-2004)

The decision to implement healthcare information systems was driven by both of external pressure and internal pressure. AH lost its competitive advantages when it was handed over to the local government. It was challenged to create a hassle-free, patient-centric hospital. AH was in a coercive pressure to take actions to meet the requirements from its superiors. In addition, the fact that the health service provided by AH at that time had already been far behind its peers act as a catalyst to facilitate the decision of new system implementation. Learned from the experience of its peers, the top management of AH realized that one of the key factors that ensures successful transformation is the implementation of new healthcare information systems. As the CEO of AH explained:

> "A new drive to construct healthcare and information systems that could radiate the perspective of the patient, whereby the integration and coordination on the wealth of information assets possessed by the hospital is crucial."

Top management support had been demonstrated to be a critical factor of aligning IT plans with business plans. Besides the explicit supportive attitude from top management, their commitment to the strategic use of IT, confidence in the IT department as well as the knowledge of IT would create a conductive environment for implementation (Teo and Ang 1999). It was the CEO of AH who led the transformation. A new management team was also assigned to help AH move toward. Therefore AH had innovative culture and was ready for patient-centric initiative. As the Nursing Office 1 indicated:

> "He [the manager] will support you if you have visionary thoughts and ideas that can really help patient care; he will really go all the way to help you."

Support from top management greatly encouraged the staff to contribute ideas that may help to improve healthcare service quality, and support the implementation of the new ideas. The staff at AH generally participated and involved in the planning and designing the implementation of healthcare information systems. They were keen to learn and share their professional knowledge when new ideas came in. As project specialist commented:

> "We work together, and the doctors have a lot of knowledge to share which has greatly contributed to the planning and designing."

In a word, the culture of innovation served as a premise to create a hassle-free experience for patients. Top management and staff were two key components of embracing the new ideas. Top management created innovative ideas and past them down to the staff, which would deeply influence their thinking and behaviours. As the assistant director of project pointed out:

> "I think what is important is the management , the culture they want to cultivate, so that everybody can think alike and have the same goals and objectives......and everyone has a vision...that coming very strong from the top and from the ground. It is not just top-down."

5.2   Phase 2: IT Strategy-Driven Implementation (2005)

From some successful examples of US and Japan reputed hospitals, AH realized that initiating healthcare information systems plays a key role of integrating the workflow and improving the performance to establish its competitiveness, becoming a hassle-free, patient-centric hospital. After sensing healthcare information systems as a new technology that may help facilitate the development of hospital, AH decided to set up a new healthcare information system by adopting a benchmark using the best practices of US-Japanese Medicine/Healthcare Systems, as the CEO of AH explained:

"To advance the health system, we need to develop a new model of care to enhance and reformulate old ones so as to provide the care a patient needs. Information technology can make this vision a reality."

With the target of becoming a hassle-free and patient-centric hospital, while witnessing the great success of the implemented healthcare systems in reputed hospitals, the healthcare systems were expected to change the current workflow of AH. An improved workflow would take patients less time from their registration to pharmacy collection. The experience of patients at the AH would be also improved by reduced waiting time accordingly.

AH was aware of both its limited resource and potential capabilities in achieving its objective. For a start, AH just had limited IT staff to deploy in full-time technical development of the CDD at the DEM. Therefore, the solution laid in engaging external professionals to work in tandem with the operations team. At the DEM, a local polytechnic school was hired to bring in new ideas and solution to support the development of CDD. Later on, a professional company named Frontline Solutions was roped to play the role of system integrator. As explained by the Director of Projects:

"Scarce resources should be exploited more carefully for value-adding activities. We are a very small hospital, so [when implementing] changes cost is an important factor, because we don't have the financial arm to bring the big software players. So we invited the local polytechnic school…"

Implementation of CDD aimed to integrate patients' medical records and other related information into a single but connected system. It required deploying other resources such as high-end servers, wireless infrastructure, databases to capture and store patients' information, and large LCD screens where real-time patient queues can be displayed and monitored by staff. AH sought to work with these partners to test the use of various advanced technologies in its process of transforming into a hassle-free hospital.

The collaborations with the local polytechnic school and Frontline Solution received positive outcomes in terms of helping AH achieve its targets. The change of workflow had trimmed the average waiting time at the DEM from 40 to 20 minutes. The innovation embedded in the CDD system helped AH to shape their new workflow and improve their services. AH shaped their business strategy with the help of CDD system and correspondingly redesigned the physical layout at DEM. Table 2 shows a summary of IT strategy-driven implementation.

Sensing innovation	
Sensing new technology	Advanced US-Japanese Medicine/Healthcare Systems
Clarifying IT strategy	
Choosing technology	Choose the well established system to realize their vision
Defining functions	The system should reduce the waiting time and other administrative processing time
Selecting vendors	Cooperate with various vendors to implement the system
Shaping business strategy	
Modifying vision	Not only to reduce the waiting time, but also to benefit both patients and doctors
Redesigning workflow	Change the conventional process from registration to pharmacy collection until admitting or exiting
Transforming organization infrastructure	
Redesigning physical layout	A total of eight weeks were spent on renovating and redesigning the DEM to improve the physical layout of the various stations to match the functions of the system.
Training skills	Provide user training to help faculties better utilize the CDD system

Table2. Process of IT Strategy-Driven Implementation

5.3 Phase 3: Business Strategy-Driven Implementation (2006-Present)

The CDD system ran well in DEM and provided great improvement on previous workflow. However, similar to many other conventional hospitals, the AH's bed allocation systems was not able to provide prompt updates of the bed availability, resulting in poor bed turnover rate for patients in need of beds. In order to solve this problem and guided by its business strategy, thus become a hassle-free and patient centric hospital, AH decided to set up the second IT system, called Bed Management System (BMS).

Before the BMS was introduced, AH had tried various methods to propagate the latest updates of planned discharges and bed availability information through various means like a Lan system, cards, pneumatic tubes, fax machines, SMS and telephone calls. However, the efficiency and practicality of these methods were challenged and doubted by the feedbacks. The patients still had to wait long for a bed until the DEM manually check with the BMU whether the bed was available. At the same time, the nurses had to run around to answer the checking calls that make them upset especially when they were busy with planting a patient in ward. According to the Nursing Officer 2:

> "In the past where we have to run around to answer the phone calls and prepare for the patients, it is really frustrated because we also have to prepare drips, oxygen, all the things are required."

This new information system named a "just-in-time" BMS had bridged the communication gap between BMU and the wards. It was a comprehensive solution for bed management that consisted of several subsystems, such as Clinical Connection Suite (CCS) and a medical-grade network solution. The interface of BMS was characterized by a variety of colour codes to represent the actual status of a bed, such as "booked", "ready", and "discharge". Anyone accessing the BMS would be able to tell instantly the status and availability of beds. The "just-in-time" BMS had reduced the patient waiting times for bed by 30%, and increased the utilization of bed by minimizing the delay of phones calls and static displays. As the Nursing Officer indicated:

> "It takes away the nurse's frustration of having to answer a lot of calls on bed availability, which dispute her work. Rather than managing beds, nurses now have more time for their patients."

AH deployed external IT professionals to cooperatively work with the operations team with the strategy of getting the most out of partnership at the lowest cost. AH sought to work with different partners based on the advantages and cost of each IT company. Similar to implementation of CDD, AH first collaborated with the local polytechnic school to contribute to the design, development and deployment of innovative IT solutions for low cost. Later, Frontline Solution came into the scene and took over the system from the local polytechnic school for their professional expertise. Frontline Solutions took the main responsibility of merging the existing systems such as the Lab Information System (LIS) and the iPharm System for the pharmacy into an integrated system. The Assistant Director of Projects hinted that:

> "It is the financial consideration that we choose the local polytechnic school in the first stage, but in the long term, you can never ask it to maintain the system."

Both AH and its IT partners won according to their needs in the relationship of collaboration. AH got the technological support from its IT partners to deploy various advanced technologies in the process of transformation. For those who collaborate with AH, they were provided the opportunities to leverage on their technologies and expertise to achieve their own plans. For instance, while AH benefited from the technical expertise provided by Frontline Solutions, the latter had its own set of agenda to pursue, which included the commercialization of the "local developed patient care system to the rest of Asia". AH provided Cisco with a field to pilot their Cisco connection Suite (CSS) and GlobalStar ConnexAll software. In addition, Fujitsu Asia was brought to implement Cisco's CSS over the IP telephony and wireless network. As clarified by the Director of projects, the vendors may benefit from securing IP rights from the solution they provided to AH, and improving future versions of their systems based on the feedback provided by AH:

"The whole logic [of strategic partnerships] make sense, because the IP creation that the vendor needs to think about. That is their strategic investment. So that is what we have been doing. We explore, get feedback, and people who are interested to build the IP, then they contribute, enhance the next version, that is our collaboration model."

The implementation of BMS helped AH achieved the target of providing an efficient healthcare service and transforming into a patient-centric and hassle-free healthcare provider. The waiting time for a bed was reduced and the efficiency in bed utilization was increased. The process of "just-in-time" updating accelerated the process of allocating beds to patients who were waiting at DEM for ward admission. Staff at DEM accessed the BMS to check the availability of beds that freed the nurses from running around to answer the calls, enabling them to be more concentrated on preparing for coming patients. Table 3 provides a summary of business strategy-driven implementation.

Clarifying business strategy	
Modifying vision	To reduce the waiting time and improve the efficiency of bed utilization.
Modifying IT strategy	
Choosing technology	New "just-in-time" communication system
Defining functions	User-friendly Interface, ease of adoption
Selecting vendors	Strategic IT partnership: get most from IT partners at the lowest cost
Improving IT infrastructure and process	
Employing new architectures	Wired and wireless infrastructure , software, equipment
Changing work processes	Staff in DEM can check the bed availability information in BMS and make decision of inward admission. Nurse in wards don't need to run around to answer the calls
Training system-usage skills	Training was provided to make the BMS more easy to use.

Table3. Process of Business Strategy-Driven Implementation

6 Findings and Discussion

6.1 IT Strategy-Driven Model of Implementation

From the successful implementation of CDD, we can see that in order to achieve the alignment between business strategy and IT strategy, organization need to have the following capabilities of sensing new technologies, resource identification, top management support as well as an innovative organizational culture. The exploitation of emerging IT capabilities was proven to have an irreplaceable impact on defining the business scope of the AH, thus helped and facilitated the transformation of the entire workflow to achieve the aim of becoming a hassle free and patient-centric hospital. Information systems, or IT strategy here, actually shaped the organization's business strategy (Rackoff et al. 1985), during the aligning process. Henderson and Venkatraman (1993) in their study exploring various dynamic alignments have found that an effective IT positioning can be used to enhance or even create new business strategies. That is, this enabler will help organization to achieve the competences necessary to embark on their (business) strategy (Henderson and Venkatraman 1993). AH tried to clarify their IT strategy after assessing the new technology they preferred, including selecting the vendors, defining the functions and targets of applying this technology. Although AH did not have a well designed and detailed business strategy before the implementation, IT strategy did help to shape its own one and further achieve an infrastructure transformation. Hence, we propose: *IT strategy can be used to support or shape the organization's business strategy, especially when the organization is seeking to reap significant competitive advantage during its initial stage.* To sum up, the left part of figure 1 shows how IT strategy works as a driver to facilitate IT implementation to shape its business strategy, and further reach an alignment to actually transform the organization infrastructure.

6.2   Business Strategy-Driven Model of Implementation

Business strategy is monitored and introspected for any further potential implementation. In AH's case, the inefficient bed management which obviously deviated from AH's business strategy, led to the second IT implementation. To describe the whole process, AH's business strategy first defines the changes in the workflow and relevant IS infrastructures that are necessary to execute IT strategy. Actually, AH specified its business strategy by stating that an improvement of bed management is imperative to reduce the waiting time and benefit both patient and hospital staffs. Guided by this clarified business strategy, AH set out to modify its corresponding IT strategy, including vendor selection, technology exploration and functions specification. The followed up IT strategy defines the key technology scope and associated critical competencies of IT partnerships. In fact, due to the absence of relevant information technologies, a joint development venture is sought to collaborate together with external IT partners. The whole process highlights the impact of business strategy on IT strategy, and indicates the corresponding implications for IS infrastructure and processes (Henderson and Venkatraman 1993). All these factors and processes eventually led to a successful IT implementation whereby the bed management system was greatly improved. Hence, we propose: *In order to enhance the organizational competitiveness and achieve a better performance, one possible solution is that: modify corresponding IT strategy by inspecting the execution of business strategy frequently*. The right portion of Figure 1 illustrates the complete process of how business strategy-driven implementation was achieved, and further a new alignment was reached.
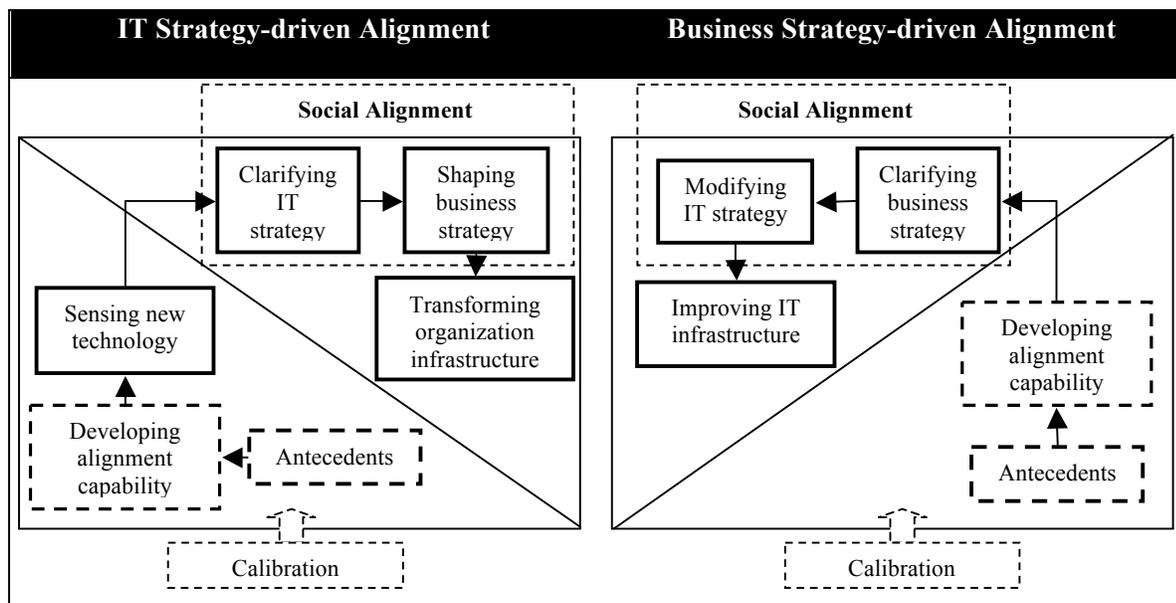

Figure 1.   The Process of Two Forms of Alignment

6.3   Calibration, An Indispensable Process

It is always tricky and demanding to achieve a one-time alignment for IT strategy and business strategy, let alone the dynamic alignment. In the case above, AH first implemented CDD, which was aimed to reduce waiting time and increase service efficiency. To a certain extent, CDD ran well and fulfilled AH's business strategy. However, as time passed by, the high turnover rate and the contradistinctive inefficient bed management in BMU was identified, which violated the spirit of AH's vision. Here came the misalignment between IT strategy and business strategy. By further introspecting and specifying its business strategy, AH determined to be able to monitor the actual status of a bed and forecast discharges more easily. Hence, AH adjusted its IT strategy accordingly and set up the BMS to achieve a new alignment. As the dynamic perspective of alignment suggested, one system may go through periods of

alignment and misalignment that starves for certain mechanism to detect any influential change happened in the environment promptly and precisely (Sabherwal et al, 2001). In this study, we found calibration is a practical and implicitly applied method to identify the misalignment happened in AH by examining organization performance. To sum up, through frequent calibration, organization could firstly sense low efficiency, mistake, negative feedback and other disharmonious phenomenon. With bearing these problems in mind, organization further seeks for required capabilities, which will direct to adjust relevant business strategy and IT strategy, to "re-achieve" a new alignment. Based on the argument above, we propose that *calibration enables and facilitates alignment as a dynamic process.* Figure 2 visualizes the general process of calibration.
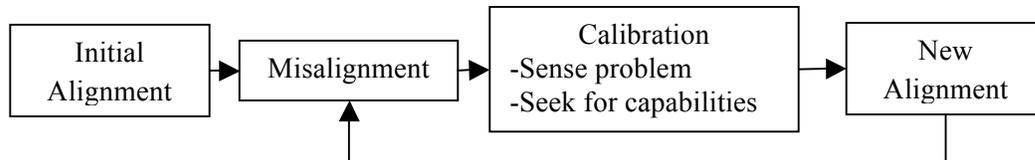

Figure 2. Process of calibration

6.4 Embeddedness of Social Alignment

Social alignment reflects on various perspectives (Reich and Benbasat 2000) and is embedded in the whole process of implementation. In AH's case, we identify two aspects of social alignment, namely communication, understanding between business executives (top management) and IT experts, and connection (relationship) between them, both of which are considered to play an important role in alignment (Reich and Benbasat 2000). Rockart et al (1996) found that communication led to successful integration of business and IT capabilities (Rockart et al. 1996). In our case, we found that IT executives (both internal IT staffs and external IT professionals) who were more involved in business planning process believed that they had a better understanding of the visions of top management. Similarly, business executives of AH who were tightly associated with the IT planning process and business details also had a more positive effect on controlling the implementation mechanism. As a result, this social alignment facilitated the achievement of final strategic alignment. Besides, the connection (relationship) between AH and its partners can be described as a strategic partnership, indicating that they were trying to achieve a win-win situation, and it was. Bridging by this strong connection, the whole implementation process went on smoothly with a seamless match, which in turn guaranteed a final success. To summarize, we propose that *social alignment is embedded in the whole process of IT implementation, and is crucial to the success of Business-IT alignment.*

6.5 The Full Process Model

Based on the analysis and discussion above, we synthesize a comprehensive model to illustrate the whole process of alignment to answer our research question, as illustrated in Figure 3. Paths 1 and 2 represent two different alignment processes in AH, initiated for different reasons. At the very beginning, in order to obtain competitiveness, AH spent four years to develop essential capabilities before trying to align its business and IT strategies which aims for improving organization performance. With the support of the data collected, we identified four factors that would potentially influence further aligning activities, namely normative pressure, top management support, domain knowledge sharing and the culture of innovation. When proceeding to the actual alignment process, it is interesting to distinguish the first alignment from the second one. Path 1shows the enabler of the process is IT strategy while path 2 indicates another story, thus the business strategy directs the whole process. Besides, the successful birth of alignment two, to a large extent, is due to the shift from alignment one to misalignment, which can be detected by another process called calibration. Finally, to smooth and facilitate each alignment process, a

social alignment is embedded as the cornerstone, including communication and connection between business and IT executives.
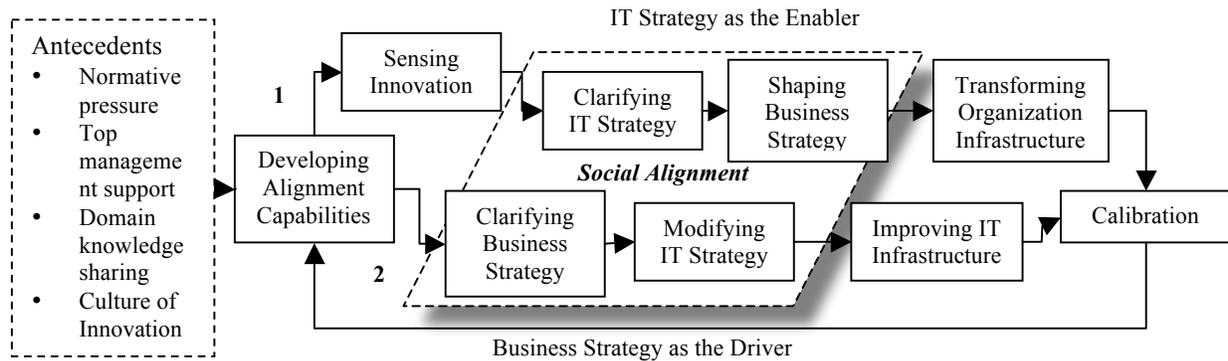

Figure 3. The Complete Process Model

7   Conclusion

By addressing the research question set out at the beginning of the paper, this study makes several important theoretical contributions. First, it fills the gap in the literature of dynamic view of strategic alignment. Up to now, most of research on dynamic alignment perspective has landed on the transition of alignment and misalignment (Rondinelli et al. 2001; Galliers 2004), thus the single system spread across different periods in an organization may experience alignment and misalignment (Ravishankar et al. 2009). This study sheds light on a new perspective, thus the dynamics of alignment actually reflects on both single aligning process in a short run, and the transition of alignment and misalignment in a long run. Second, although social alignment has long been identified as a potential factor that would influence strategic alignment (Reich and Benbasat 2000; Chan and Reich 2007), there are few researches that allocated these social factors into the dynamic alignment process, and explained their roles in a more fine-grained way. This study demonstrates that communication and connection between IT and business executives, as well as shared domain of knowledge during implementation process create conductive environment for alignment, and maintain the strategic and friendly IT partnership, which in turn facilitates the alignment process. Third, our findings suggest two directions of alignment which are highlighted in the different process of implementation, namely IT strategy driven alignment and business strategy driven alignment. This point may provide a far-reaching view for both academic researchers and practitioners that a re-consideration towards the role of IT strategy in organization could be helpful. Finally, we identify a misalignment detection mechanism which functions in a way of sensing for whether the locus of alignment is consistent with the goals of the organization. We name it as calibration. Through calibration process, an organization could keep agile and robust in a dynamic way. In a nutshell, this study contributes to the alignment literature, and also provides a guide for practitioners to develop necessary capabilities and design appropriate implementation plan to achieve strategic alignment.

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