28 ENTERPRISE SYSTEM AS AN ORCHESTRATOR OF DYNAMIC CAPABILITY DEVELOPMENT: A Case Study of the IRAS and TechCo

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Abstract   Corporations are perpetually hunting for ways to develop exclusive, sustainable, and competitive advantages that will enable them to leapfrog ahead of their industrial adversaries. Notably, the debut of enterprise systems (ES) during the recent decade has given rise to frequent talk of the utilization of integrative, IT-inspired business mechanisms to achieve the much sought-after but elusive competitive edge. Others, however, have argued that the search for sustainable competitiveness should instead be anchored in organizational efforts to cultivate and build up firm-specific dynamic capabilities. Cognizant of the various perspectives, this paper takes a holistic approach in proposing the achievement of sustainable competitive advantages by examining the manner in which ES adoption can contribute to the forging of dynamic capabilities. In particular, Montealegre's (2002) process model of capability development is adopted as the analytical framework to explore the strategization of ES development in two different organizations, with the main distinction being that one of them subscribes to commercially available SAP

applications while the other chooses to develop its ES in-house. Through comparing and contrasting evidence from both cases, this study attempts to decipher how ES adoption can be strategized to develop strategic capabilities and understand the implications between off-the-shelf and bespoke ES in affecting the process of dynamic capability development.

Keywords: Management information systems, enterprise systems, dynamic capability development, dynamic capabilities perspective

1   INTRODUCTION

Prized as the holy grail of modern competition, information integration has steered management information systems (MIS) design toward an integrative architecture (Kumar and Hillegersberg 2000). Particularly, the emergence of enterprise resource planning (ERP) systems as configurable software applications that integrate the complete range of business activities within an organization (Howcroft and Light 2002) has accelerated the rate of MIS diffusion across businesses (Adam and O'Doherty 2000).

Around the period when ERP systems were gaining prominence as replacements for obsolete legacy systems (Holland and Light 1999), Davenport (1998) revived the concept of enterprise systems (ES) as a more generic representation of an expanding MIS spectrum which provides real-time operating information to support rapid "sense-and-response" business models (Davenport 2000a; Rosemann and Watson 2002). Collectively, ES present a comprehensive and synchronous definition of integrated MIS and their advancements, including innovations such as supply chain management (Papazoglou et al. 2000), customer relationship management (Goodhue et al. 2002), and knowledge management (Alavi and Leidner 2001) systems.

Embedded within this broad range of ES are exemplary business paradigms devised for increasingly sophisticated business information requirements (Markus 2000), with Davenport (2000a) and Hayman (2000) predicting that future generations of ES would craft new capabilities for corporations to enhance their competitiveness through acute sensitivity to fluctuating market conditions (Davenport 1998, 2000b).

Contemporary management literature has popularized the perception of the firm's ability to manipulate distinctive internal competencies relative to environmental dynamics as the key determinant of its competitive sustainability (Ginsberg and Venkatraman 1985; Lieberman and Montgomery 1988). Specifically, Barney (1997) and Miyazaki (1995) advised companies to be proactive in developing distinct inherent abilities that are inimitable.

Based on the above, this article postulates a potential convergence between ES adoption and capability development, i.e., the holistic commitment associated with ES projects may compel enterprises to perform a thorough, systemic review of every aspect of business operations, which in turn bestows organizations with the perfect opportunity to sculpt their strategic capabilities. To analyze the contribution of ES development in forging dynamic capabilities, we adopt Montealegre's (2002) process model of capability development. This framework is applied to two different settings: a governmental

institution and a commercial establishment. The main distinction between these two enterprises hinges on the fact that the public agency designed and developed its ES in-house whereas the profit-oriented corporation relied on the off-the-shelf SAP system. Through comparing and contrasting evidence from these cases, this paper endeavors to address the following research question: How can ES adoption be strategized for the purpose of dynamic capability development and what are the differences, if any, between in-house and off-the-shelf ES?

2   THEORETICAL FOUNDATION

The strategization of information technology (IT) to attain a competitive edge is ritualistic among private institutions (Ives and Learmonth 1984; McFarlan 1984) and contributes to an extensive list of classical business applications (Clemons 1991). Notwithstanding these testimonial cases of successful MIS, the feasibility of IT-based competitive sustainability remains debatable within academia (see Mata et al. 1995; Mykytyn et al. 2002). Citing reasons such as the prevailing adoption of IT as a *strategic necessity* (Clemons 1986) and the possibility of generating even deadlier reactions from rivals through creative duplication (Kettinger et al. 1994; Vitale 1986), many have contested the viability of IT-derived competitiveness and emphasized that research in this domain should focus on "describing how, rather than systematically why" IT can deliver strategic benefits (Reich and Benbasat 1990, p. 326).

Unsurprisingly, in light of their copious organizational influence and the substantial implementation investments they require, ES are readily conceived by scholars as the next logical candidate for the reimbursement of competitive value (Ross and Vitale 2000). As IT-based business solutions, ES are touted as configurable software packages that purportedly enable the collation of transaction-oriented data and functional processes into a singular infrastructure (Lee and Lee 2000; Markus et al. 2000a; Markus and Tanis 2000). Nevertheless, despite the projected benefits of prepackaged ES (Markus et al. 2000b), there remain unresolved adoption hurdles.

Implicit within ES packages are business principles that emulate industry best practices (Everdingen et al. 2000). These posited business paradigms, as predefined by the vendor, serve as convenient templates for corporations to mirror competitive praxis, although in many instances the projected benefits of the implemented ES do not materialize (Markus and Tanis 2000). The failures have been attributed to a blend of socio-technical constraints surrounding ES, such as their complexities, their customization difficulties, and the presence of cultural misfits underlying their inherent business process assumptions and those of the adopting organization (Howcroft and Light 2002; Lee and Lee 2000; Soh et al. 2000). While we do not underestimate the aforementioned technological and organizational challenges of ES implementation, the purpose of this paper is to shed light on how competitive benefits can be manifested through ES adoption, rather than the reason why they can or cannot be realized.

As conceived by Rosemann (1999), the fundamental notion of ES is analogous to the developmental objective in mapping the entire array of enterprise business processes into an integrated infostructure. From this perspective, ES are predominantly operational commodities that double up as "the key element of an infrastructure" which conveys a

holistic business solution to adopters (Rosemann and Watson 2002, p. 201). Yet, despite the consensus among researchers of the strategic significance of ES, their exact business potential has not been exploited beyond the extrapolative predictions of existing MIS trends (Davenport 2000a; Hayman 2000; Markus et al. 2000b). Consequently, the question of how ES can deliver competitive qualities continues to evade answering in strategic MIS research and, specifically, ES literature.

One particular response to this theoretical and empirical challenge has approached the management of ES from the stance of strategic capability development (Davenport 2000a; Hayman 2000). Drawing from the resource-based view (Penrose 1959), where firms are presumed to possess specific, time-independent resource differences (Amit and Schoemaker 1993; Mahone and Pandian 1992), managerial theorists have stressed the need for businesses to exploit their unique attributes in shaping market positions (Priem and Butler 2000). Their call also resonates in the MIS arena where Kettinger et al. (1994) hinted at a normative relationship between IT and core competencies by suggesting that "the sustainability of competitive advantage may be achieved by leveraging unique firm attributes with information technology to realize long-term performance gains" (p. 31).

Developing this idea further, our research subscribes to the dynamic capabilities perspective (DCP) as a theoretical basis to evaluate the relationship between ES adoption and strategic capability development. Dynamic capabilities, as defined by Teece et al. (1997), reflect a "firm's ability to integrate, build and reconfigure internal and external competencies to address rapidly changing environments" (p. 516), i.e., they drive the creation, evolution, and assimilation of resources to formulate novel value-creating strategies (Grant 1996).

Following Eisenhardt and Martin (2000), this study understands dynamic capabilities to be the "firm's processes that use resources—specifically the processes to integrate, reconfigure, gain and release resources—to match and even create market change…[or] the organizational and strategic routines by which firms achieve new resource configurations" (p. 1107). We also take into account Wheeler's (2002) justification in a study on net enablement that DCP captures the essence of the "dynamic process of recreating and executing innovative options to gain and sustain competitive advantage" within organizations competing in digitally networked environments (p. 127). In short, DCP presumes a continuum of business competencies renewal to achieve congruence to ever-changing competitive circumstances, thus making it palatable to our proposed research objective.

Specifically, this study adopts the process model of capability development proposed by Montealegre (2002) for data analysis. In the model, the acquisition of dynamic capabilities is presented as an incremental sequence of phases that intuitively depict the patterned and evolutionary nature of their development. In addition, for each stage, the essential organizational capability is highlighted together with a prescribed course of action (see Figure 1).

Establishing strategic direction is imperative for any company to generate exclusive insights into future scenarios that are obscure to competitors (Amit and Schoemaker 1993). Therefore, the *capability to strategize* based on the in-depth appreciation of internal capacities versus external surroundings is decisive of a firm's competitiveness

Phase 1 Establishing Direction	Phase 2 Focusing on Strategy Development	Phase 3 Institutionalizing the Strategy
Key Capabilities Developed at Each Phase:		
Capability to Strategize	Capability to be Flexible	Capability to Integrate and Engender Trust
Global benchmarking and training	Integrating resources into core activities	Gaining internal commitment
Learning from past experience and history	Experimenting	Investing in complementary infrastructure
Absorbing knowledge as a unified group at the top of the organization	Investing in, leveraging and co-opting resources	Strengthening external relationships

Figure 1. Process Model of Capability Development (Montealegre 2002)

(Hamel and Prahalad 1994). To gain such abilities, Montealegre advocated that managers should (1) initiate global benchmarking and training exercises to expand corporate resources (Oliver 1997), (2) learn from past experiences and history in dealing with recurring problems (Maidique and Zirger 1985), and (3) ensure that the top management absorb knowledge as a unified group in order to consolidate knowledge capital (Alavi and Leidner 2001).

Once the strategic course is charted, Montealegre believed, the *capability to be flexible* is critical for the development and execution of supportive strategies that are highly adaptable to unanticipated disruptions (Jarvenpaa and Leidner 1998). To accomplish this, priorities must be assigned to (1) integrating resources into core activities to ensure that they are effectively channeled to support the strategic routines of the organization, (2) experimenting to optimize task performance (Dosi and Marengo 1992), and (3) investing in, leveraging, and co-opting resources to maximize the potential within imported assets and tacit competencies in fulfilling corporate objectives (Chakravarthy 1997).

Finally, a firm's business mission is dependent on the commitment and cooperation across a diversity of internal and external stakeholders (Freeman 1984). To shape a collaborative community, companies must possess the *capability to integrate and engender trust* (Teece et al. 1997) among different stakeholder categories. To serve this purpose, Montealegre expounded on the participation of corporations in (1) gaining internal commitment such that newly acquired abilities can be infused into the collective skill sets of employees or within special routines embedded in the organization's operations and knowledge base (Nelson and Winter 1982), (2) investing in complementary infrastructure which supplements the corporate strategy, and (3) strengthening external relationships in order to boost responsiveness to market variations.

Reflecting on previous discourses, it is not difficult to discern a casual link between the aptitudes of ES and the managerial issues to be tackled for dynamic capability

development. In effect, the portrayed business activities demand a cross-functional platform be forged through the integration of enterprise-wide processes. By virtue of their systemic properties, ES may perhaps be the integrative backbone necessary to orchestrate such an undertaking.

3   METHODOLOGY

This study adopts an in-depth case research method. According to Yin (1984), case research is "an empirical inquiry that investigates a contemporary phenomenon within its real-life context, when the boundaries between phenomenon and context are not clearly evident and in which multiple sources of evidence are used" (p. 23). It is appropriate in scenarios where the research question is exploratory (Yin 1984) and exists within a broader sociological context, necessitating rich descriptions of the social environment (Strauss and Corbin 1990). Moreover, case study offers an opportunity to engage in theory building for topics where there is relatively little prior knowledge (Eisenhardt 1991).

For this investigation, two case studies were conducted at two separate sites, each over a six-month period using several methods of data collection (Benbasat et al. 1987). At each location, focused interviews (Merton et al. 1990) were conducted with organizational members associated with the conceptualization, implementation, and post-implementation phases of the ES development life cycle (Ross and Vitale 2000). By soliciting information from representatives involved throughout these stages, the investigators were allowed a feel of the entire ES adoption experience. The gathered data was further triangulated with conversational evidence from external stakeholders (Orlikowski 1993). Through these exercises, a qualitative in-depth collation of data points was made within the study environments (Lacity and Janson 1994) that focused specifically on developmental and managerial issues pertaining to the ES with lesser emphasis on their technicalities (Eisenhardt 1991).

Given the prescribed methodology, objective data compilation was impossible as interactions between researchers and human subjects participating in the enquiry would inevitably alter the perceptions of both parties (Walsham 1995). This research thus accepts a more interpretivistic perspective (Walsham 1995) of the data gathered, i.e., that the contextual understanding of the investigators provides supplementary background information that influences evidence interpretation (Lacity and Janson 1994). Also, as part of data analysis, preliminary themes isolated in the earlier half of the study were incorporated into subsequent interview sessions to stimulate a deeper scrutiny of the emerging issues. Data collection concluded when the themes became repetitive and the information appeared to reach saturation (Glaser and Strauss 1967).

4   CASE DESCRIPTION

For this study, the Inland Revenue Authority of Singapore (IRAS) and TechCo were selected as appropriate venues to examine the functionality of ES in forging strategic capabilities.

4.1 IRAS: The Case of the Inland Revenue Integrated System (IRIS)

IRAS was inaugurated in 1992 to reengineer an outdated tax administration system marred with sluggish manual tax processing procedures and the excessive accumulation of paper tax-documents. IRAS was experiencing shortfalls in human resources that led to unproductive and lengthy tax cycles with an estimated discrepancy of 300 returns being left uncollected annually. Such red tape proved to be fatal to customer relations as taxpayers making enquiries became frustrated with the long delays at the tax agency in locating their personal tax folders.

To address such administrative backlogs, the Inland Revenue Integrated System (IRIS) was developed in-house to integrate tax processing functions into a unified infostructure. Designed as a modular system, IRIS comprises application components catering to specific tax processes

> *IRIS comes with different modules—or you can call them components: the pipeline to process tax returns, the enforcement module, the case management module, and then there is the payment module, data module, and another very specific module to handle property accounts....Basically, it is the integration of all these modules that makes up IRIS.* (Director, IRIS Design)

Besides, according to IRAS statistical approximation, 80 percent of tax returns are deemed to be normal and do not require intensive verification by tax officers. It is thus a waste of manpower to validate every case physically. Being implicitly fashioned, IRIS is equipped with inbuilt predefined evaluation criteria to process standard tax returns, with the remainder being routed to the respective tax officers with the appropriate domain knowledge. This routing is fully automated with the Workflow Management System (WMS).

Together with the launch of an Internet-based income declaration interface for taxpayers, IRIS was seamlessly assimilated into the range of tax processing activities to create the Electronic Filing (e-Filing) system, which has to date attracted 924,014 e-filers or approximately 50 percent of the entire taxpaying population. With the e-Filing system, the bureaucratic reputation of IRAS was reversed. In a recent 2001 survey, 94.1 percent of individual taxpayers, 89.6 percent of corporate taxpayers and 94.6 percent of goods and services taxpayers expressed satisfaction with the agency's services, which were found to be convenient, as well as competently and courteously provided.

From the description, IRIS represents an exemplification of the concept of ES and exhibits many characteristics of its commercial counterparts. Therefore, the case of IRAS presents a unique occasion to uncover how internally crafted ES can contribute to strategic capability development.

4.2 TechCo: The Case of the SAP System

In contrast to IRAS' governmental setting, TechCo resembles a textbook example of ES adoption. Being an international leader in electrical engineering and electronics,

TechCo employs a total of 447,000 people in over 190 countries. Given its geographically dispersed organizational structure, TechCo reckoned that it would benefit from fostering an accommodating environment for multi-regional collaborations. Moreover, the general proliferation of highly customizable products and services had contributed to the dissemination of specialized knowledge resources.

TechCo had also completed several acquisitions to expand its businesses which resulted in inconsistent IT infrastructures and incompatible business operations. In some extreme cases, the subsidiaries had progressed independently of corporate direction, thus prompting an urgent need to reconnect these disjointed business divisions. Taking stock of these restraints to company performance, TechCo decided to adopt ES as its core business strategy to manage the dynamism of its fast-expanding business empire. It selected the SAP/R3 package, which was based on the SAP AG system with the rollout being estimated at U.S. $32 billion.

TechCo's SAP implementation aimed to establish a shared service hub that would support cross-functional information sharing measures to complement the company's business competencies in the virtual sphere. Through exploiting SAP's technological faculties, TechCo hoped to incorporate its vast network of decentralized business systems into a homogeneous IT architecture that would enforce information transmission standards to promote collaboration among its business entities. Specifically, these reengineering efforts were tuned toward stimulating intra-organizational cooperation and manifested as restructured business processes coupled with revised policies for information standardization.

In sum, TechCo acknowledged the assembly of information and knowledge resources through the SAP system as being vital to the framing of a shared mission to manage its increasingly complex business functions. The case of TechCo, therefore, offers the alternative of examining the research topic from a commercialized angle.

5   CASE ANALYSIS AND FINDINGS

Based on Montealegre's (2002) framework, the findings from this study are analyzed as a chain of events corresponding to the model of dynamic capability development.

5.1 Phase 1: Establishing Direction

The articulation of a corporate vision is widely documented in the strategic management literature as the means for organizations to mitigate uncertainties in facing business challenges (Amit and Schoemaker 1993). To do that, managers must possess a tight grasp of the organization's internalized capacities with respect to environmental inconsistencies (Alchian and Demsetz 1972; Hamel and Prahalad 1994). This *capability to strategize* requires the fostering of "conditions that will let management capture and exploit the knowledge that already exists throughout the organization" (Montealegre 2002).

The installation of ES in both IRAS and TechCo led to business renewal aimed at revitalizing core competencies. At IRAS, the stigma of a governmental tax collector

coupled with administrative inefficiencies had stifled positive taxpayer relationships. To repair its image, IRAS' management resolved to revamp the taxation experience through implementing IRIS to integrate the various tax processing functions.

> *We visualized a very efficient tax [processing] system and we started examining our existing business processes. We concluded that a majority of the tax returns were processed by tax officers who only required a short duration of approximately 20 minutes to complete each of them. We believed that this process could be automated....We would get the machine to perform 80 percent and leave 20 percent to be handled by tax officers whenever necessary and without compromising accuracy as in the manual system. It is our objective to ease all these jams and bottlenecks in the rear [back-end tax processing] by moving the tasks into the system.* (CIO, IRAS)

Similarly, TechCo faced a situation where the disconnected IT infrastructures and corporate plans prompted the need to reunify the autonomous business subsidiaries under a single umbrella. To prepare for SAP migration, TechCo established a cross-cultural implementation team to engineer a network of social linkages to encourage communication among divisional managers.

> *The familiarization effort provided the team with better knowledge and appreciation of the organization's culture, practices and systems, which proved, later, to be very useful in the implementation of the SAP system.* (Manager, TechCo)

It is plausible, from the preceding examples, that the knowledge momentum accompanying ES conceptualization was the prime motivator for these organizations to perform rigorous assessments of their hidden proficiencies. Through cross-functional knowledge-sharing arrangements, the managers in both cases demonstrated improved operational awareness, derived from greater transparency in the business routines which spanned functional boundaries. In other words, ES adoption enhanced the capability of both organizations to strategize by providing a premeditated environment for managers to thoroughly reflect upon ritualistic procedures in order to identify and extract core competencies that would uphold the corporate mission. Particularly, this auxiliary power of ES can be considered in relation to the three managerial issues raised by Montealegre in conjunction with the development of strategizing abilities.

Global Benchmarking and Training: Global benchmarking is a handy instrument for gauging an organization's competitive status and the effectiveness of its resource configuration (Oliver 1997). Unfortunately, it is usually tedious to embark on such an extensive evaluation campaign. ES, however, conveniently overcome this predicament with the inclusion of the best business practices predominant in the industry (Soh et al. 2000). TechCo, for instance, employed the SAP system as the key element of its business strategy to simulate an intra-organizational knowledge-sharing network on par with the prevailing standards.

Despite the convenience, commercialized ES do occasionally suffer from incompatibilities with specialized business needs. Indeed, the evidence suggests that ES should

not be blindly accepted as definitive yardsticks, but rather assessed objectively based on corporate requirements. For instance, the configuration of preexisting taxation systems was not a viable option for IRAS.

> *There are actually systems being implemented in the States, but when we brought over such a system, we discovered that 80 percent [of it] was different from our functions. It would require wholesale customization for our purpose—basically, rewriting.* (IRIS System Manager)

Learning from Past Experiences and History: One common issue in ES adoption for developing dynamic capabilities is the preservation of the knowledge accumulated from specialization in current work processes and legacy systems (Pan et al. 2001). These tacit knowledge assets are frequently entrenched within operating procedures that are seldom stand-alone (Blacker 1995). Often, such firm-specific expertise is invaluable in keeping enterprises afloat in competitive tides (Grant 1996). For TechCo, the SAP system served as the beacon directing knowledge extraction, and the task at hand became one of soliciting tacit wisdom through relationship building across divisional borders. This contributed to the convergence of organizational knowledge resources (Baskerville et al. 2000).

> *The documentation and participative discussion between the team and various business units have helped us understand the different work practices and identify processes which the business units have in common….With so many [business] processes being supported and developed through the [SAP] system, it is important to know the level of impact on cross-functional operations.* (Respondent, TechCo)

Conversely, for the bespoke ES, without the restrictions of an embedded knowledge base, the immediate concern in knowledge retention is to ensure a fair user representation during system conceptualization.

> *Before it [the development of IRIS] began, each user branch would have already identified their core users or experts. They were very experienced users, so they represented their functional group and any decision with regard to the system would be made by these people.* (IRIS System Engineer)

To summarize, tacit knowledge was archived in both institutions as an indispensable record of an organization's historical proficiencies. This indicates that the development of ES grants the ideal opportunity for firms to ascertain their dispersed knowledge competencies for fusion into the system.

Absorbing Knowledge as a Unified Group at the Top of the Organization: Top management endorsement has always been a deterministic priority in ES adoption, due to the systems' immense appetite for corporate resources and their prerequisite of cross-functional participative commitment (Martin et al. 1999; Ross 1999). Nonetheless, for ES adoption to induce dynamic capability development, managerial enthusiasm must go beyond political and budgetary sponsorship to proactively redefine the firm's underlying business philosophy.

In both cases, the senior management displayed keen interest and passion in knowledge sharing during ES conceptualization. This strategic involvement offered valuable insights that might otherwise have been imperceptible at the operational level.

I think the management played a big part in deciding policy issues….There were certain things which might infringe on certain policies, so whether to have them or not, the management had to decide. (IRIS System Engineer)

5.2 Phase 2: Focusing on Strategy Development

Chakravarthy (1997) stressed that the development of a strategy to operationalize business objectives should conform to principles of flexibility for institutions to remain vigilant and responsive toward unpredictable circumstances (Jarvenpaa and Leidner 1998). This management philosophy, as maintained by Montealegre, pivots on the extent of managerial control versus the changeability of the organization (Eisenhardt and Martin 2000).

The assimilation and manipulation of information flow through ES adoption assisted IRAS and TechCo to not only enforce better control of all aspects of their business activities, but also reconstruct their knowledge distribution channels for prospective growth. The implementation of IRIS, for example, enabled IRAS to maintain a profile of every taxpayer, and to associate each transaction with a specific customer for efficient tracking. Moreover, the chronological classification and consolidation of transaction data into individual digital folders facilitated sharing between tax officers on knowledge such as the most effective manner in which to serve a particular taxpayer.

Whenever a taxpayer approaches us, the first thing we do is to retrieve his record. Using IRIS, a click on their identity card number will get us a record of their last conversation with us, and whom they have spoken to; everything is there. In the past, we wouldn't know who the last person to handle the case was, unless the taxpayer himself had taken down the name of the officer he had contacted. (IRIS System Engineer)

The situation was identical in TechCo, where a Shared Service Center (SSC) was initiated to coordinate the ES initiative and manage centralized SAP services. This included administering information and knowledge connections among multiple business units.

The SAP control forces business units to transfer information management to the SSC….Most of the business units want the SAP to integrate their business processes. They depend on the SSC to manage the information exchanges and know-how for cross-functional integration. (Manager, TechCo)

From the evidence, it is clear that ES allowed each of the organizations to tackle problems as a cohesive entity through dynamic and systematic information management. ES can thus be seen as an integrative platform for enterprises to incorporate and

reconfigure resources flexibly as a metamorphic architectural response to external stimuli, i.e., an ES package is analogous to a jigsaw puzzle in which companies piece together their competitive strategies. The exploitation of the integration technology of ES thus amplifies a firm's capability to be flexible by crafting an adaptable infrastructure for continuous organizational renewal. Specifically, this correlation can be examined in terms of the three managerial components identified by Montealegre.

Integrating Resources into Core Activities: The introduction of ES redefines the resource configuration of an organization through seamless integration across core operational activities. However, in coping with prepackaged ES integration, the prime concern is the probability of a mismatch between the business processes and resource requirements of the application and those of the adopter (Howcroft and Light 2002).

> *There are certain logistic practices being adopted in the SAP system that differ from our legacy logistic system. The sales and distribution module in the SAP system has made database implementation different from what we used to have in our distribution channels….Since the SAP system is new, we are unsure if it can adapt to changes*. (Distribution Manager, TechCo)

Conversely, integration poses less of a hassle for in-house developed ES; they are closer to the organization's projected techno-structure.

> *When we designed IRIS, we didn't even think about what the current process was. We did everything from scratch; it didn't even match the existing work processes. Basically, it's a total revamp.* (IRAS Interviewee)

Experimenting: Experimentation is a familiar managerial tool for stimulating progressive improvements in operational routines (Dosi and Marengo 1992). With respect to ES adoption, experimentation was evident in both companies as they struggled to find ways to merge resources into a sophisticated modular architecture for optimal flexibility. For both cases, this was achieved through a phased approach to implementation. This allowed each organization to evaluate the system at consecutive stages so as to fine-tune it for cross-functional performance.

> *Due to the complexity of IRIS, we decided to divide its implementation into phases. This gave us a chance to look at how each module was performing and make changes to accommodate the users, if necessary.* (IRIS System Engineer)

Investing in, Leveraging and Co-opting Resources: In both IRAS and TechCo, the implementation of ES was only a preliminary step toward an integrated value chain, and was complemented by expenditure on technological extensions. As described earlier, to achieve full automation of the taxation system, IRAS virtually expanded IRIS' competencies by connecting the system to a Web-based tax declaration interface for direct data entry. This satisfies Hayman's (2000) vision of ES as a bridge between front-end transactions and back-end processes. Similarly, by relying on the SAP system to facilitate information integration, TechCo was able to encourage its various subunits to cooperate in knowledge sharing. In sum, ES provided the necessary socio-technical foundation for

both organizations to leverage and co-opt resources in fulfilling their strategic goals.

5.3 Phase 3: Institutionalizing the Strategy

It is common to express the achievement of business missions within corporations as a product of underlying commitment and cooperation across the multiplicity of stakeholders (Freeman 1984). Therefore, companies must build a united community to integrate knowledge (Nonaka 1994) and engender trust (Teece et al. 1997) among diverse stakeholders.

Naturally, with ES implementation as a vehicle for organizational reinvention, the remaining challenge lies in the institutionalization of these systems as parallel-running complements to the corporate strategy, especially in light of the resulting revolution in functional paradigms concomitant with reengineered business processes. For instance, the adoption of IRIS altered conventional thinking on tax processing by placing the onus of information authentication on the taxpayer. Initially, many tax officers were against these modifications.

> *The principal concept was that we must accept the new tax filing model [80/20 rule] contained in IRIS and, therefore, there must be a change in mindset. Of course, there were many obstacles....A number of tax officers would argue: "No, this [manual tax return verification process] is the right way. We must still check..." and things like that.* (CIO, IRAS)

Similar resistance was apparent in TechCo where most users were reluctant to take on new responsibilities or contribute during conferences for fear of being ostracized. Compounding this problem, some of the employees were apprehensive about the SAP system.

> *By the structuring of SAP in the department, it seems like there will be less work to handle. And what I am concerned with is that I will be made redundant since I have been relieved of certain duties. I feel that I am being replaced.* (System User, TechCo)

It is vital for stakeholders to identify with the renewed business vision encapsulated within the implemented ES package that serves as the cornerstone to an organization's competitive strategy (Pan et al. 2001). In both IRAS and TechCo, it is clear that this alignment was hampered by technical and psychological barriers, which hindered the efforts of both organizations to cultivate trust with their stakeholders and to integrate their knowledge.

To eliminate the impediments, change management was carried out to mollify physical and mental resistance. Moreover, the evidence suggested that the ES in the two establishments were serving as the centerpiece to an extended enterprise solution. Through process integration across corporate hierarchies, the ES in IRAS and TechCo acted as a technological platform for establishing symmetrical communication with external associates to formalize strategic partnerships that would invariably boost the capability of the organization to integrate stakeholders and engender trust with them.

Gaining Internal Commitment: From the above, it may be perceived that both technical and sociological reservations against the ES being implemented had obstructed the reception of the ES within both organizations (Pan et al. 2001). In response, IRAS created a change management team to palliate the restructuring process through tailored courses and continuous training for system users. With repeated efforts in familiarizing tax officers with IRIS' functions, the resistance was eventually broken down.

> *Some are common applications such as the workflow imaging system, which everybody uses. However, there are certain applications which only affect specific user modules....The change management team had to tailor-make training sessions for these other users....Moreover, it's not just one-time training; it's retraining, retraining and retraining.* (Tax Officer, IRAS)

At TechCo, a participative policy was initiated to nurture understanding and trust among system users.

> *After the participative policy was introduced, I noticed that personal responsibility was emphasized, employees were not blamed when things went wrong, but rather, they were often offered help. Mistakes made were taken as "lessons learnt" and viewed as opportunities for learning. Most people [now] take it upon themselves to solve problems and ensure things are smooth flowing, even if it [the problem] does not arise within their sphere of work. The ownership and responsibility for failures have been reduced to a minimum.* (System Engineer, TechCo)

The case findings suggest that ES adoption is a sophisticated socio-technical ordeal, with resistance being rooted in both systemic functionalities and psychological dispositions. Our study of the two cases also shows that change management may proceed with a two-pronged approach: developing customized training programs to inject functional familiarity into users and introducing reinforcing policies to empower stakeholders through relationship building to eradicate anxieties toward the refined business model (Ross 1999). Although the complexities of ES adoption have often been accredited with the creation of overwhelming internal resistance, the evidence from our study indicates that redefined business processes together with proper change management may actually bridge the mental distance among employees and promote congenial intra-organizational cooperation.

Investing in Complementary Infrastructure: The acquisition of complementary resources helps in directing the evolutionary path of corporate proficiency (Teece et al. 1997), especially at the stage of capability development where a logical extension could translate into the integration of knowledge-sharing cum diffusion mechanisms into the fabric of the ES to allow coworkers to share experiences on the business processes reengineered to cut across divisional perimeters. As remarked by an SAP system user,

> *We depended on individual colleagues when problems shifted out of our job scope. There were organizational changes within the functionality of the SAP system, which made it difficult to know sufficiently to support all aspects of the system.*

In TechCo, the knowledge management gizmo was the newly-established e-Business Center that catered to the creation and sales of knowledge products synthesized through cross-functional collaborations.

Strengthening External Relationships: With their respective cohesive infostructures, IRAS and TechCo set out to consolidate their relationships with external stakeholders. IRAS managed to link up many employers to have the relevant tax information of individual workers transferred directly into IRIS during each tax cycle. To its credit, IRAS has to date clinched data transfer agreements under the auto-inclusion scheme for approximately 46 percent of all employees in the country.

The direct transmission of tax information relieves IRAS of intensive data capturing efforts and permits controls to be incorporated into the system to validate data accuracy.

> *The question of concern when we adopted the 80/20 rule was that only 20 percent of all the data being pumped through would be checked. Where was the control? How would we know we were getting all the [necessary] information? This gave birth to another idea of getting the information directly from the employer and automatically into the system. [Now] we have no worries about whether income is understated because we source it [the information] directly from a third party. Moreover, having auto-inclusion means we can reduce our tremendous efforts in data capturing.* (CIO, IRAS)

The case of IRAS demonstrates how ES can facilitate extended enterprise solutions (Markus et al. 2000b). The increased interorganizational connectivity underscores the competitive value of recognizing shared partnerships as a dynamic competency. In fact, the adoption of ES superimposes technological extendibility on collaborative ideology to tender business options that are otherwise impermissible.

Based on the above analysis, the interdependencies between ES and dynamic capability development may be mapped into a process model for ES adoption (see Figure 2).

6   CONCLUSION

Inevitably, given the popularity of ES, much has been deliberated on their worthiness as competitive weapons (Markus et al. 2000b; Ross and Vitale 2000). Critics, for example, have queried the absence of the concept of *enterprise* in ES (Davenport 1998; Hayman 2000). Through a pilot study of how ES adoption can contribute to dynamic capability development, this paper attempts to provide a prefatory answer to this theoretical and empirical question.

Based on a comparison of two cases, we conclude that ES can be strategic compatriots in the capability development process of organizations. The process model of ES adoption proposed in this paper captures the essence of this relationship. Through the model, we argue that the conceptualization of an ES initiative increases a firm's capability to strategize by providing a premeditated structure that aids the identification and extraction of knowledge assets embedded within business routines. This is succeeded by the implementation of the ES as an integrative backbone to assimilate and reconfigure isolated core competencies for optimal flexibility, effectively enhancing the

Phase 1 Establishing Direction	Phase 2 Focusing on Strategy Development	Phase 3 Institutionalizing the Strategy
Conceptualization	**Implementation**	**Strategization**
Key Capabilities Developed at Each Phase:		
Capability to Strategize	Capability to be Flexible	Capability to Integrate and Engender Trust
Provides a premeditated structure for the identification and extraction of core competencies	Provides the integrative technological platform for resource configuration	Provides the centerpiece of an extended enterprise solution
Deciding the best approach to system development	Customizing the system for optimal resource adaptability	Training and empowerment to remove technical and psychological barriers within stakeholders
Retaining and codifying the tacit knowledge embedded within legacy systems	Phased approach to system implementation	Expanding knowledge management capabilities on sharing and diffusion.
Proactive participation by the top management during system design	Technological extensions supported by an integrated infostructure	Leveraging on a homogeneous infostructure to virtually integrate stakeholders

Figure 2. Process Model of ES Adoption for Dynamic Capability Development

firm's capability to be flexible. Finally, the strategization of an ES investment as the centerpiece of an extended enterprise solution becomes an essential maestro to a firm's capability to integrate and engender trust among its stakeholder groupings. Also included within the proposed framework are pragmatic suggestions for practitioners to consider in adopting ES. These propositions correspond to Montealegre's (2002) prescription of managerial actions to be undertaken in developing dynamic capabilities. The model thus offers practitioners a methodical approach for the strategization of ES investments to recover competitive value.

Furthermore, the contrasting approaches to ES adoption in IRAS and TechCo offer unique insights into the management of ES-inspired dynamic capabilities development. Strikingly, the integration of prior knowledge is a more tedious process with commercial ES packages than systems developed in-house because the underlying business models embedded within off-the-shelf ES may be incompatible with the existing operational procedures of an organization. Resistance also poses more of a hassle for off-the-shelf ES as in-house development allows users to formulate the perimeters of the ES, making them more accepting of the systems.

Apart from practical implications, the framework raises a number of questions which may be considered as future research directions. First, generalization is a definite liability of case studies, and as such, follow-up studies should be conducted to validate the preliminary findings of this study. Second, the contrast between in-house and off-the-shelf ES opens up unexplored territory for further investigation. Third, the discrepancies

in knowledge retention, resource integration, and stakeholder management point to significant variations within the broad notion of ES, which in turn warrant further investigations to establish their implications for capability development.

In sum, the role of ES adoption is tantamount to that of an *orchestrator* in deciding the rhythm of capability development, i.e., ES serve as nerve centers that coordinate the operational manifestation of the capability development process.

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