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8-2010

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ABSTRACT

Enterprise Systems (ES) or Enterprise Resource Planning (ERP) Systems have been widely adopted by organizations around the world with the global market revenue estimated by AMR Research (2009) at 37.5 billion US dollars in 2008 and is expected to continue growing. Given the huge investments made by organizations for their ES implementations, many organizations have found it difficult to realize all the benefits expected from their ES implementations. Organizational learning and organizational innovation are crucial factors that help organizations to further achieve ES benefits after implementation. However, literature review suggests there is a lack of research done to provide insight on what ES benefits are influenced by organizational learning and innovation. This study is guided by the Competing Value Framework (CVF) to explore the impacts of organizational learning and innovation on the ES benefits. It includes a review on literature for organizational learning and organizational innovation, findings and analysis of research accomplished by multi-case study of eight large Australian organizations.

Keywords (Required)

Enterprise Resource Planning, Enterprise System, ERP System, Organizational learning, Organizational innovation, Enterprise System Benefits, Competing Value Framework

INTRODUCTION

Enterprise Systems (ES) is a software package that allows modules to exchange information and processes through a centralized database leading to the integration of business functions within an organization (Davenport, 2000). ES have gradually become the foundation of IT infrastructure for many large organizations (Hawking et al., 2004). Based on figures given by AMR Research (2009) ES vendor, SAP, currently dominates the ES market with revenue of 1,580 USD million in 2008. Given the enormous amount of investments in ES implementations (AMR, 2009), it is considered essential for organizations to achieve the benefits obtained from ES.

Existing research has demonstrated that ES implementation is often complex (Somers and Nelson, 2004) and difficult (Scott and Vessey, 2002). Previous research focused strongly on implementation issues but few have explored post-implementation issues (Ifinedo and Nahar, 2009). One suggested approach (Nicolaou and Bhattacharya, 2006; Marabelli and Newell, 2009), as such taken in this paper, was to investigate the issues that may affect the implementation process which contribute to ES success and the benefits achieved.

LITERATURE REVIEW

Implementation of an ES imposes standardized business process embedded in the software within the organization resulting in an integrated business process oriented structure (Davenport, 2000; Al-Mashari, 2003). While such moves may be beneficial to many organizations, it may not for all organizations (Morton and Hu, 2008). A successful ES implementation will bring about various intangible or tangible benefits (Murphy and Simon, 2002) which may impact on operational, managerial, strategic, technological and organizational level (Shang and Seddon, 2000). However, companies have been revisiting and attempting to optimize the benefits from ES implementations due to the lack of benefits achieved (Deloitte, 1999; Hawking et al., 2004). Ifinedo and Nahar (2009) argue that existing research focuses strongly on IS or ES success/benefits from a deterministic perspective. Researchers (Weill and Olson, 1989) have long critiqued the use of financial measures (Poston and Grabski, 2000; Murphy and Simon, 2002) purely to access the performance and benefits of IS. Other researchers (Ifinedo and Nahar, 2009) have also argued that existing studies have not fully addressed the issues that have implications on evaluating information systems (in this instance ES benefits).

Implementation of a technical innovation such as ES is a dynamic cycle of mutual adaptation between technology and organization (Marabelli and Newell, 2009). Organizational learning and innovation are benefits that are derived from ES implementations (Shang and Seddon, 2000). Limited efforts (Chou and Chang, 2008; Koh et al., 2008; Esteves, 2009) have been made to address various factors that may have an influence on ES benefits realization. Markus et al. (2000a) argues that evaluation of ES success should include organization learning. Knowing how well the ES performs (i.e. accuracy, reliability, less redundancies) is equally important as knowing how well the organization adapt, use, maintain and upgrade the system (Markus et al., 2000a). The knowledge gained through organizational learning can provide ES adopters with the potential to enhance the organizations' capabilities via sustaining business process innovations (Srivardhana and Pawlowski, 2007).

Organizational Learning

Implementation and assimilation of a complex new technology such as ES requires organizational learning (Attewell, 1992; Fichman and Kemerer, 1997). The organization learns and improves only when individual insights and skills become embodied in the routines, practices and beliefs (Attewell, 1992). The process of organizational learning is essential for organizations to achieve the benefits from their IT project implementations (Brynjolfsson and Hitt, 2000).

ES benefits may be naturally inherent to the process of implementation itself. The most obvious ones are the elimination of redundancy or unnecessary processes, improved resource allocations and system-wide standardizations (Bendoly and Schoenherr, 2005). Depending on strategy and utilization, an organization may be able to gain considerable benefits from the increases in knowledge base of its personnel and from the overall organizational awareness of the system (Bendoly and Schoenherr, 2005). Gattiker & Goodhue (2004, 2005) have also demonstrated that interdependencies between the organizational subunits contribute to benefits due to ES's ability to coordinate and facilitate information flows. Wieder et al.'s (2006) study demonstrates there was a correlation between the experience of usage of the ERP system and overall organizational performance – the longer the experience of usage, the higher the overall performance

The value of ES can be effectively evaluated when the organization captures actual business results but these results only happen when the systems are already successfully implemented, integrated into business operations and allow organizational learning to take place (Shang and Seddon, 2007) - a phase which is called the "on and upward phase" by Markus et al. (2000b). Holland and Light (2001) suggest that the business benefits of ERP occur in the third stage of evolution which is the

period of high penetration of ERP system usage leading to strategic benefits. Such viewpoints have also been voiced by Brynjolfsson and Hitt (1998) who are of the opinion that due to "lag and learning" there is a lack of productivity benefit from IT/IS investments.

Wang et al. (2007) and Marabelli and Newell (2009) suggest that organizations differ in their abilities to absorb and assimilate knowledge of ES implementations. And it is necessary for organizations to build up their own internal knowledge to stimulate the flow of information exchange which will lead to further ES benefits such as competitive advantages (Wang et al., 2007) and enhanced innovation (Newell et al., 2003). This is supported by a study conducted by Koh et al. (2008) that demonstrated that ES adopting organizations are initiating collaboration with partners to facilitate e-commerce. The use of the organizational knowledge is viewed as an important key in enabling organizational innovation (Sedera, 2007) which will be elaborated in the next section.

Organizational Innovation

Organizational creativity (i.e. innovation) is defined (Legare, 2002) as the creation of a useful and novel product, service, procedure or process as a result of individuals cooperating in a complex social system on heuristics. Legare (2002) also suggests that creativity is necessary for overcoming organizational resistance that prevents the significant changes required for full realization of benefits associated with the ES implementation. Individual, group and organizational characteristics affect the creative process and situation resulting in a creative output or product (e.g. business processes). In the context of ES, innovations can be the enabling of new market strategies, building new process chains, or creating new business (Shang and Seddon, 2000).

A study conducted by Deloitte Consulting (1999) found that 49% of ES enabled organizations considered that ES implementations is a continuous process due to the need to constantly achieve value from the ES known as "second wave". Davenport (2004) explains the continuous process in three stages:

1. Integrate – unification of database and processes with the organization's environment and allowing better communication between organizational units, process, customers and suppliers.
2. Optimize – standardization of processes using best practices embedded in the ES, business process reengineering to fit the unique or strategic needs of the business.
3. Informate – Transformation of ES data into useful and relevant information and knowledge to support decision making processes and business analysis.

Deloitte (1999) also has its own defined stages of the continuous process and suggests:

1. Stabilize phase – Familiarization with ES implementation and organizational changes.
2. Synthesis phase – Business improvement via streamlining business processes, complimentary solutions and motivation of workforce.
3. Synergize phase – Optimization of business processes is achieved.

The Optimization (Davenport et al., 2004) and Synergize (1999) stage can be explained by Srivardhana and Pawlowski (2007) who suggest that the implementation of an ES gives the adopting organization opportunities to "acquire knowledge from external sources, develop common cognitive structures among employees from different functional areas and implement new routines and processes to significantly increase the level of a firm's absorptive capacity related to business process innovation" (p. 55). Such innovation-related benefits can be explained with the use of a causal (i.e. cause and effect) interpretation of the sources of ES benefits (Koh et al., 2008). Researchers (Srivardhana and Pawlowski, 2007; Marabelli and Newell, 2009) have also suggested that organizational innovation plays a key role in helping organizations optimize their benefits achieved from ES implementations.

In summary, the review of the existing ES literature has identified that existing studies on ES focused strongly on implementation issues (Hong and Kim, 2002; Davenport et al., 2004), critical success factors (Finney and Corbett, 2007; Dezdar and Sulaiman, 2009), risk/failure factors (Scott and Vessey, 2002) and deterministic evaluation of ES benefits (Shang and Seddon, 2000). It is clear that there is a lack of attention given to the organization factors (Chou and Chang, 2008; Esteves, 2009) that may influence the benefits or success of ES after implementation, particularly organizational learning and innovation.

Motivation for this Study

Although ES are now considered mature in their use (Hawking et al., 2004), organizations have been using them for several years now (Chou and Chang, 2008), many early adopting organizations have yet to fully optimize the potential of their ES implementations (Liang et al., 2007). Benefits that are derived from organizational learning and innovation play an important

role for ES adopting organizations and hence it is important for practitioners and researchers alike to understand the impact of learning and innovation (Koh et al., 2008) and its causal effects (Srivardhana and Pawlowski, 2007; Marabelli and Newell, 2009) on ES benefits.

Therefore this paper addresses the following questions which attempt to investigate the impacts of organizational learning and innovation on the benefits realized by ES:

1. How does organizational learning influence the process of benefits realization for Enterprise Systems?
2. How does organizational innovation affect an organization from achieving ES benefits?

The findings of this study is part of a bigger research that attempts to analyze the ES benefits achieved under the effects of organizational learning and innovation guided by the Competing Value Framework (CVF) (Quinn and Rohrbaugh, 1981) for evaluation of ES effectiveness from an internal/external and flexibility/structural perspective.

RESEARCH METHOD & APPROACH

To address the research questions, the use of an exploratory multi-case study (Eisenhardt, 1989) guided by interpretivism (Walsham, 2006) and qualitative methods was utilized for this study. Case studies are used in many situations to contribute knowledge of individual, group, organizational, social, political and related phenomena. Case studies are necessary to understand complex social phenomena (Yin, 1993). The use of interpretivism approach for this study allows the researcher to investigate a phenomenon by studying it from the perspectives of the participants in its natural context without any restrictions (Wynekoop and Russo, 1997). It also helps the researcher to understand phenomena through the meanings that people assign to them (Klein and Myers, 1999). The use of an interpretivism approach is also supported by Koh et al.'s (2008) suggestion that it is important to understand the causal effects (i.e. cause and effect) of organizational learning and innovation.

Eight large Australia-based organizations were approached using an SAP system conference contact database. The managers were selectively chosen for this research due to their primary role as the manager responsible for the ES implementation as they are still responsible for overseeing the post-implementation and optimization process of the SAP project in their organizations. All the managers interviewed have worked from the initiation phase of the ES implementation and managed the ES project for at least 3 years. The primary reason for the selection criteria of participants is to allow the researcher to understand the impact of organizational learning and innovation on mature, 3 years or more (Nolan and Norton, 2000), ES adopting organizations. Given that the nature of this study was exploratory, the researchers found that the number of case studies conducted was satisfactory.

The case studies utilized semi-structured questions that were presented to every interviewee to gain their views and comments on organizational learning and organizational innovation and other issues related to ES benefits realization. Each interview lasted about two hours and was audio-recorded and later transcribed. Theme coding (Miles and Huberman, 1994) was used to analyze the data collected. The coding technique allows for the identification of themes (factors and their impact) relevant to SAP benefits realization. Data containing descriptive or inferential information were labeled and categorized accordingly. Labeled data was sorted and organized to identify similar themes (factors) to understand the impact of the contingency variables on the SAP system benefit realization.

FINDINGS

The main impacts and key findings addressing organizational learning and innovation in the organizations that participated in this research were analyzed and have been summarized and presented in the following Table 1.

Organization	Background	Organizational Learning / Innovation (Cause)	ES Benefits (Effect)
A	• US owned • Manufacturing • 5000 Employees • Annual Turnover 400 million AUD	• Operational users have to undergo rigorous training and education as part of the change management process.	• Improved individual's performance.
		• Middle management use of the system improved and reporting tools were customized for their special needs.	• Improved decision making.
		• Experience gained from first rollout results in faster subsequent ES project rollout in other offices and subsidiaries.	• Faster rollout across subsidiaries.
		• IT department had increased knowledge of SAP systems. Management keen to build on its existing infrastructure to gain more productivity by using SAP to interact with other offices and subsidiaries via Electronic Data Interchange (EDI)	• Extension linkages to other organizations (via system integration).

		capability to improve supply chain management.	
B	• French owned • Waste Management • 3800 Employees • Annual Revenue 800 million AUD	• Operational users have to undergo rigorous training and education as part of the change management process.	• Improved individual's (e.g. truck drivers and workers) performance
		• Development of third party application, geographical information system, that interacts with the SAP system to manage the trucks assignment • Incorporating third party solutions to help weigh waste collected from clients	• Improved logistics and fleet management through third party application.
		• Knowledge obtained from initial projects leads to more efficient use of resources for newer projects for other states across Australia	• More efficient ES project management.
		• Utilizing the existing database of SAP system to create a new web / telephone interface which allows customers to track jobs • Web-based CRM implementation in the near future to improve customer services	• Improved Customer Relationship Management (CRM) systems
C	• Australian government organization • Environmental policy and controls • 3000 Employees • Annual Budget 700,000 AUD	• Operation users become more knowledgeable leading to more demands and functions • Formal channel for users to put in change requests for new functionalities	• Improved individual performance • Flexible knowledgeable workforce. • Creation of new workflows.
		• Increase usage of third party travel management system and user base	• Improved individual's performance • Improved productivity
		• Creation of third party application to manage real estate assets	• Improved CRM systems.
		• Shared financial and SAP support services across state government institutions	• Shared services resulting in less operation costs
D	• Australian owned Entertainment and Media • 5000 Employees • Annual Revenue 240 million AUD	• Use of shared services to support SAP for different divisions e.g. theme park management, media leasing division and cinemas management	• SAP expertise readily available to all divisions. • Shared services resulting in less operation costs
		• Implementation of EDI to communicate with partners for procurement, distribution and licensing of assets / products	• Improved CRM
		• Adopting SAP service oriented architecture (SOA) to extend capabilities e.g. use of SOA to integrate various assets into SAP system	• Greater IT flexibility for organizational changes • Ease of integration with other partners • Increased functionalities for the ES
E	• Australian owned • Manufacturing and Recycling • 7500 Employees • Annual Revenue 2.5 billion AUD	• Constant review and optimization of business processes by IT steering committee and business teams	• Improved business processes • Improved overall productivity • Improved operation costs
		• Creation of a proper channel for users to put in change requests for additional functionalities.	• Creation of new workflows. • Improved business processes. • Better reporting tools.
		• Upgrading to ECC6.0 planned for improved functionalities and support	• Increased functionalities and capabilities for growth.
F	• European owned • Manufacturing / Consumer Goods • 1000 Employees • Annual Revenue 1.8 billion AUD	• Learning and development of system resulted in KPI and bench-marking metrics created to measure efficiency	• Increased individual's performance • Increased productivity.
		• Integration and interaction of information between departments provides useful and meaningful information for operations.	• Increased communication between departments • Improvement in productivity e.g. promotion / advertising management, sales and operation planning • Improved decision making.
		• Current EDI capabilities are limited to simple information exchanges with intention to extend the capability. • Upgrading to ECC6.0 planned in the next upgrade for improved functionalities, updates and support.	• Increased functionalities and capabilities for meeting customer's demands • Increased CRM systems. • Improved Supply Chain Management (SCM) systems.
		• Specialization of personnel and workforce due to familiarity with use of ES resulting in "silos of knowledge".	• Personnel reorganization (new positions).
G	• Australian	• Upgrade to ECC6.0 completed in 2008 sponsored by top	• New business alliances.

	owned • 2500 Employees • Manufacturing / Consumer Goods • Annual Revenue 2.5 billion AUD	management that understands and wants system compatibility with partners.	
		• Adopting SOA architecture to liaise with financial institutions for funds related transactions.	• External linkages with other organizations (via system integration). • Reduced operation costs.
		• Middle management experienced with the use of the ES leads to active push for change requests for better functions.	• Improved functionalities. • Better reporting (customizable) tools. • Improved decision making.
		• Knowledge of ES use resulted in the introduction of relevant KPIs to evaluate individual performance and optimize existing business workflows	• Improved individual's performance.
H	• German owned • Manufacturing • 400 Employees • Annual Revenue 100 million USD	• Multisite IT department made redundant and creation of a shared SAP support department that oversees all sites.	• Shared services resulting in less operation costs
		• Labor efficiency from better manpower utilization in plants improved over time resulting in fewer hours required to build products.	• Improved productivity
		• Creation of a third party EDI that communicates with suppliers and other plants / factories after the ES implementation to fully utilize the processing power and information of the ES.	• External linkages with other organizations (via system integration). • Improved CRM systems. • Improved SCM systems.
		• Knowledge management in the form of yearly examination of key users and refreshment workshop. • Workshops allows key-users to propose business process changes and improvements	• Improved business processes

Table 1. Summary of key findings

IMPACT OF ORGANIZATIONAL LEARNING ON ES BENEFITS

From the findings presented in Table 1, the impacts of organization learning and maturity were observed to vary in different organizations. However, it is clear that all organizations involved in the study have shown a certain degree of performance or efficiency improvements over time. The impacts on ES improvements from organizational learning are found to be:

Improved individual performance: Greater familiarity with the use of the system leading to fewer errors associated with manual inputs. Organization C reported a drop in productivity when the system first went live due to the lack of familiarity of the system usage. Operational users took about one month to learn from their initial mistakes and use the system properly.

Improved productivity: Part of the experience and knowledge gained from organizational learning has resulted in some organizations producing Key Performance Indicators (KPI) or performance metrics allowing them to assess the efficiency or productivity gains from the use of the ES in order to i) benchmark against industry standards; or ii) determine if the modules or business processes have been optimized as suggested by the manager of Organization F:

"Setting your benchmark within the system is probably one of the key things. So if you suddenly got visibility of what's going on in any particular business process or business system, you can then from the management perspective track and manage against that. Just people using the system alone doesn't get it. Whether you use a purchasing pad's that's a chunk of paper or putting it into the system, the same basic thing happens. You create a purchase order. The difference is the tracking of that and the management of that."

Improved decision making: Middle and top management of organization A and G have shown that increased familiarity with the system capabilities leads to increased understanding of the interaction of information between business units or departments resulting in useful and meaningful information for them to carry out their tasks.

Reduction in operations costs from shared services: A degree of organization change and restructuring took place in three of the mature organizations (organizations C, D and H). Matured organizations that have a history of SAP rollouts across different divisions in the same organization tend to have shared business unit which handles that particular business function for the whole organization e.g. financial or SAP support. The manager of Organization C commented:

"Shared services functions have been created which was, it was probably well, centralizing accounts to be accounts payable function. So that's been using the SAP as a springboard, so the cost that we, instead of having every, every little group, having resorted to do accounts to accounts payable, that's all been centralized and that's, SAP would support that sort of capability to reduce costs."

Improved ES project management: Increased knowledge of ES project implementations leading to better project management and faster rollouts of SAP implemented in other sites, factories or plants. Managers of organizations (A, B and H) have all expressed that time and resources required for subsequent ES implementations after the initial one are generally lesser.

IMPACT OF ORGANIZATION INNOVATION ON ES BENEFITS

Organizational innovation has been found to be closely related to the level of organizational learning capabilities. The ability to learn and adapt to ES gives rise to new applications being developed to maximize the potential of SAP modules. Initiatives were created by users, middle management or steering group committees to improve the existing system performance and the benefits are discussed below. One manager (Organization D) elaborated:

"We're currently implementing a CRM 7.0. What we have is a product that's just been approved to implement, a thing called IPM, Intellectual Property Management, into SAP, which basically handles the intellectual rights, contracts, to determine things like royalty payments to producers. So we buy the distribution rights to a film, we manage that contract right within IPM and then sales of that film expended to, related to that film and so forth is only material based items, and it passes into the CRM system and determines royalty calculations and payments and contract management through CRM." – Manager of Organization D

Improved CRM and SCM: Innovative third party applications for SAP systems e.g. EDI between suppliers (organization H) are seen as crucial strategic planning and use of the SAP systems. An example of such an application would be the post-implementation invention of a licensing and royalties management for a film and music distribution module that is not part of the default SAP modules and is only unique to that particular organization's business model (organizations A, B & D). This is explained by the manager of Organization B:

"In parallel with doing SAP implementation, we were also running a project to install on-board systems like waste and recycling collection vehicles. And that's a custom-built application. The two are highly integrated. And it's really both of them put together that most of our benefits accrued. The needs of an on-board solution influence that we say SAP design many, many ways and the way SAP works."

Improved business processes: Organizations C, E, G and H had formalized channels which allow users or middle management to suggest or put in change requests for functionalities changes or business process improvements. This allows, encourages or builds up a culture of innovation and creativity. Organization E also had a business IT steering committee that constantly reviews and removes redundancies in the existing processes as described by the manager:

"The more mature the user base is, they themselves will look for improvements. Two ways, one is a change request, it's more common, I guess. The other is also we have a team that I guess, engages with the business to work with the business to come up with new initiatives. So the change request, if it comes in from the business, it's, I guess, is business-driven or business-initiated, whereas if my team is working with the business, it's IT-driven. IT-driven business owned. Like a business improvement team".

External linkages with other organizations and IT flexibility: Managers (organizations D, E, F & G) interviewed in this study have expressed understanding that innovation plays an important role in optimizing in the ES implemented and that their organizations have intentions to upgrade their ES to the latest version or adopt service-oriented architecture (SOA). SOA will allow their organizations to have increased capabilities, functionalities and compatibility for establishing electronic linkages with partners or other divisions. An example of such innovation oriented initiative was organization G's use of SAP vendor's new concept of SOA for their ES infrastructure allowing it to interact with financial institutions e.g. banks.

CONCLUSION

The findings from the research have shown that it is clear that organizational learning and innovation do have an impact on how benefits are derived from ES. ES benefits found in these studies that are influenced by organizational learning are: i) *improved individual performance*; ii) *improved productivity* iii) *improved decision making*; iv) *reduction in operation costs from shared services*; and v) *improved ES project management*. On the other hand, organizational innovation results in: i) *improved CRM and SCM*; ii) *improved business processes* and iii) *external linkages as well as IT flexibility*.

All organizations that have been investigated demonstrated that via organizational learning and maturity of system use, further improvements to the benefits from their ES implementations can be achieved. The findings of this paper support existing ES literature that organizational learning (Sedera, 2007; Marabelli and Newell, 2009) and organizational innovation (Srivardhana and Pawlowski, 2007) do affect the outcome of ES success and the benefits achieved from the implementation

and attempts to explore what ES may be influenced. The paper also supports that the ES implementation knowledge (Newell et al., 2003; Srivardhana and Pawlowski, 2007) of the organization does play an important role in fostering organizational learning and innovation. This paper makes a valuable contribution to ES literature by studying the impacts of the organizational learning and innovation on ES implementations, particularly on identifying the ES benefits affected.

In conclusion, this paper provides an exploratory insight to the complex relationship between organizational learning and innovation on the realization of ES benefits. ES implementations are complex, challenging and expensive, and this makes optimization of the ES benefits difficult. As organizations seek to find ways to optimize the benefits from their ES implementations, the findings will provide practitioners and ES managers practical insights pertaining to the impact of organizational learning and innovation on the ES benefits.

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