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ABSTRACT

Organizations invest substantial resources in Enterprise Systems (ES) expecting positive outcomes for the organization. Implementing an ES is a lengthy-costly undertaking, with general upheaval for many of the organizations. Many organizations therefore are seriously considering rapid implementations of ES to reduce related resources. A rapid ES implementation requires effective management of knowledge (KM) as the extent of the engagement of external and internal parties (consultants and vendors with the client) is limited. This research paper introduces a theoretical model to assess the impact of KM in a rapid implementation of SAP R/3 that had completed in a record time of three weeks. Using the Adaptive Structuration Theory (AST) this paper proposes a theoretical model 1) to identify the KM enablers and KM strategies of an rapid ES implementation that facilitate knowledge creation, retention and transfer and 2) to determine the importance of knowledge transfer modes in a rapid ES implementation.

KEYWORDS: Enterprise Systems, Knowledge Management, Adaptive Structuration Theory, Rapid Implementation, IS Success.

INTRODUCTION

Enterprise System[1] (ES) implementations are an extensive, lengthy and costly process that is typically measured in millions of dollars (Pan, Newell et al. 2001). Organizations in recent years have embraced rapid implementation methodologies as means of reducing the resources related to ES implementations. Compared to traditional ES implementation projects, which take an average of two years, rapid implementations often completed within three to six months (Cameron 1998). The strong demand for rapid ES implementation has lead ES vendors and consultants to introduce new implementation methodologies (e.g. Accelerated SAP) to assist client organizations reduce implementation resources. Unlike in traditional ES implementations, the rapid ES implementations require organizations be extra cautious on the management of ES related knowledge[2]. Such organizations have a limited time to absorb the knowledge 'brought-to-bear' by the external consultants and the ES vendor. Retaining this knowledge of ES within the organization is paramount for maintenance and future upgrades, regardless of the implementation approach (Steadman 1998; Al-Mashari and Zairi 2000; Jones and Price (2001; 2004); McNurlin 2001; Pan et al. (2001).

The purpose of this study is to analyse the constructs of ES related knowledge management using the Adaptive Structuration Theory (AST) (DeSanctis and Poole 1994) derive a research model to adequately explain the impact of effective knowledge management on ES success. The theoretical model is tested in a large finance and large insurance company that had implemented SAP R/3 in a record-time of three weeks. The time taken for the implementation makes it the fastest SAP implementation to-date. Focusing on the knowledge management[3] processes of the SAP rapid implementation, this study seeks to achieve three main objectives. First, the study seeks to develop a theoretical model to explain relationship between the KM processes (knowledge creation, knowledge retention, and knowledge transfer) in a rapid ES implementation. Secondly, the study attempts to investigate the structures and processes (Alavi & Leidner (2001) that facilitate knowledge creation, retention and transfer. Some examples of structures of knowledge according to the Adaptive Structuration Theory

1 See Klaus, H., M. Rosemann, et al. (2000). "What Is ERP?" for in depth discussion on 'What is ERP?'
2 A fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information (Davenport and Prusak 1998)
3 Davenport and Prusak (1998) defines knowledge management as "a process consisting of generation, codification, transfer, and application of knowledge".

include 1) knowledge management strategy of the organization (Ponelis and Fairer-Wessels (1998), Hansen et al. (1999), 2) organizational culture (Davenport and Prusak 1998), 3) employee reward programs and 4) the corporate leadership (Skyrme and Amidon 1998). Since there are no prior empirical studies to test the existence of the knowledge structures and their influence on the knowledge management process, this study makes a substantial knowledge contribution to the body of knowledge in Information Systems.

The paper begins with a concise literature review on the theoretical considerations of the study, mainly focusing on the application of the Adaptive Structuration Theory (AST) and the knowledge management process. The research context is next described, followed by the theoretical model for ES Knowledge Management (ESKM). The main constructs of the ESKM include 1) knowledge management structures, 2) knowledge management processes, 3) knowledge appropriation and the 4) Enterprise Systems Success. Due to the exploratory nature of the study, the case study methodology is suggested and presented next. The paper concludes with the study implications with an outlook of the future directions.

LITERATURE REVIEW

The main focus of this literature review is to provide sufficient theoretical background of the derivation of the Enterprise Systems Knowledge Management (ESKM) model. The review of literature begins with a brief description of the Adaptive Structuration Model (AST) followed by a discussion of the the KM processes.

Adaptive Structuration Theory

In articulating AST for the ESKM context, the ES success, rather than resulting directly from managing Enterprise Systems related knowledge, reflect the manner in which employees appropriate the KM structures and the context of KM its use. Though the theory (AST) is predominantly applied in understanding social outcomes, it is often used to understand Information Technology Innovations employing perceptual measures. (DeSanctis and Poole 1994) explain **structures** by making the following distinction: "A system is a social entity such as a group, pursuing various practices that give rise to observable patterns of relations [such as the pecking order often seen in groups or organizations]. Structures are the rules and resources actors use to generate and support this system". **Appropriation** is the manner through which technology and social structures are adapted by an organization for its own use through a process called Structuration (Gopal, Bostrom et al. 1992). In the context of this study, *appropriation* refers to the manner in which KM structures are adapted for the ES its own use through a process called structuration, wherein KM structures are continuously produced and reproduced /or confirmed as the ES's interaction process occurs. Appropriation of the software essentially entails (1) adapting the software and (2) adapting to the software through an evolving understanding of knowledge management and Enterprise Systems. To the extent that the knowledge structure is managed effectively, effective appropriation will be facilitated (effective knowledge management). Appropriation is the manner through which technology and social structures are adapted by an organization for its own use through a process called structuration (Gopal et al 1992). In the context of this study, *appropriation* refers to the manner in which KM structures are adapted for the ES its own use through a process called structuration, wherein KM structures are continuously produced and reproduced /or confirmed as the ES's interaction process occurs. Appropriation of the software essentially entails (1) adapting the software and (2) adapting to the software through an evolving understanding of knowledge management and Enterprise Systems. To the extent that the knowledge structure is managed effectively, effective appropriation will be facilitated (effective knowledge management). AST further posits that the mode in which structures are appropriated is determined along three dimensions: (1) the faithfulness of that appropriation, (2) the group's attitudes toward the knowledge management structure adequacy, and (3) the group's level of consensus on the appropriation. In the context of this research, faithfulness refers to the extent to which the employees use existing ES related knowledge in keeping with the spirit in which it is meant to be used. A faithful appropriation involves adhering to the spirit, while an ironic appropriation entails violation of the spirit. Attitudes include the level of comfort that employees feel with the use of the KM structures, and the degree of respect they have for it. Level of consensus refers to the extent to which employees agree on how a KM structures should be appropriated.

Knowledge management process

Based on the framework of sociology of knowledge, knowledge management involves (1) development of knowledge, (2) distribution of knowledge, (3) retention of knowledge and (4) usage of knowledge ((Berger and Luckmann 1967; Gurvitch 1971; Holzner and Marx 1979; Boekhoff 1996; Alavi and Leidner 2001)). The development phase (knowledge creation) of the knowledge management process corresponds with the planning and implementation stages of the ES lifecycle. In the context of ES, this phase entails all three key players identified by Gable et al. (1998): consultant, vendor and client organization. It involves developing new content and replacing existing content within the organization's tacit and explicit knowledge (Pentland 1995; Alavi and Leidner 2001). The external players bring in new knowledge on the software, and business processes (Davenport and Prusak 2000) to the client organization and the client organization shares organizational

knowledge with the external parties. Gupta and Govindarajan (2000) conceptualized knowledge transfer in terms of five elements and emphasized the importance and the richness of the channels of knowledge transfer[4]. Knowledge transfer channels can be informal or formal (Holtham and Courtney 1998). Unscheduled meetings, informal gatherings and coffee break conversations are some examples for the informal transfer of ES related knowledge. Although the informal transfer promotes socialization and could be beneficial in small organizations, it precludes wide dissemination (Alavi and Leidner 2001; Holtham and Courtney 1998). Formal transfer, such as training programs may ensure wider distribution of knowledge and suits highly context specific knowledge. Knowledge retention constitutes organizational and personal knowledge retention. The individual knowledge retention is developed based on person's observations, experiences and actions (Sanderlands and Stablein 1987). Organizational knowledge retention, which can be classified into semantic or episodic (Stein and Zwass 1995), includes articulated knowledge, context-specific knowledge and situated knowledge. An important aspect of the knowledge-based theory is that the source of competitive advantage resides not in the knowledge it self, but in the application (re-use/re-use). In the context of ES, knowledge re-use plays a vital role in every phase of the ES lifecycle, especially in maintenances and upgrades.(Sedera, Gable et al. 2004) made empeical observations of the existance of the four dimensions of KM processes and their adequacy of explaining the KM process.

THEORETICAL MODEL

The AST, the four KM processes (Alavi and Leidner 2001; Sedera, Gable et al. 2004) combined with the ES success model of (Sedera and Gable 2004) derive the theoretical model depicted in figure 1. KM effectiveness is measured by the 3 dimensions of KM: 1) creation, 2) transfer and 3) retention. The Appropriation process can be characterized by the modes of appropriation defined in AST: 1) faithfulness of appropriation, 2) attitudes toward the KM structures, and 3) level of consensus amongst and within groups on appropriation.

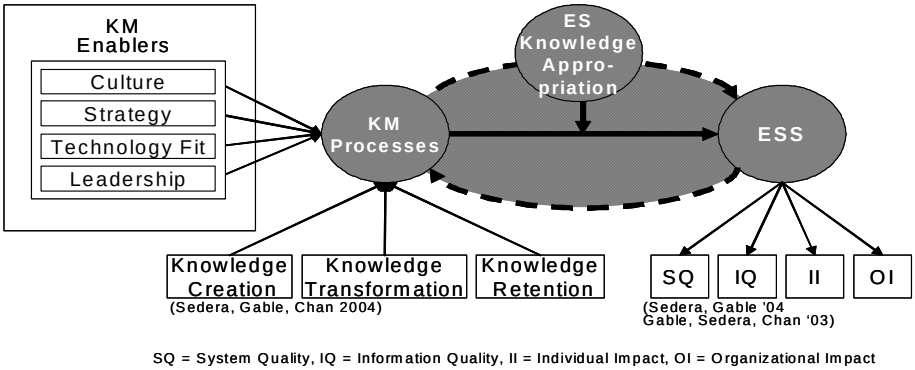

Figure 1: The Theoretical Model

RESEARCH METHODOLOGY

The purposes of the initial phase of the study, as stated above, are to 1) identify the KM structures employed, 2) document the modes of knowledge transfer and 3) to understand the KM strategies employed in a rapid ES implementation. The exploratory nature and the novelty of the research problem warranted to employ the case study methodology. While a single case approach is generally not recommended, Yin (1994) argues that one of the rationale for a single case "… is one in which the case represents an extreme or unique case" (Ibid: p. 39). A sample of the four employee cohorts (i.e. strategic managers, managers, operational and technical staff) of the organization interviewed using semi-structured interviews. Each interview lasted approximately two hours[5]. In order to minimize biasness that might be introduced by the researchers into the analysis of the findings, various approaches as suggested by Yin (1994) and Lee (1989) were undertaken. This includes having each interview being taped and notes written down. The taped interviews and notes will be transcribe by a third party, the results which will be then reviewed by the researchers, and respondents will be asked for clarification on vague or missing data. A

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[4] The other elements discussed by Gupta and Govindarajan (2000) include (1) perceived value of the source unit's knowledge, (2) motivational disposition of the source (i.e. their willingness to share knowledge), (3) motivational disposition of the receiving unit, (4) the absorptive capacity of the receiving unit

[5] Though not centrally important to the study findings, attempts are also being made to conduct interviews with respondents from Sathyam Computer Services in order to understand the implementation partner's perspective of knowledge creation, transfer and retention in a rapid ES implementation.

Case Study Database, containing the taped interview, interview notes, transcribed data, is also maintained. To triangulate the findings of the case study transcripts, we follow the guidelines of Yin (1994) and Lee (1989) by gathering data from multiple sources.

STUDY FINDINGS

Table 1 illustrates the importance given by each of the employment cohorts in relation to 25 KM enablers identified in the review of literature. The respondents on the sample organization agree upon most of the enablers of ESKM giving a high importance to the aspects such as 1) leadership, 2) organizational KM culture and 3) technical and organizational infrastructure. However, unlike in standard KM initiatives, respondents provide a lower level of importance to 1) fluctuation and creative chaos 2) redundancy and 3) requisite variety. No specific observations were made in relation to the employment cohorts of the sample organization.

		Importance given by the ES employment cohorts			
Author/s	**Enablers**	**Strategic**	**Mgmt**	**Operational**	**Tech**
(Ayas 1996)	Leadership	High	High	High	High
	Teambuilding	High	Medium	High	Medium
	Co-location (networking)	Medium	Low	High	Medium
	Human resource management	High	Medium	Medium	Low
	Management support	High	High	High	Low
(Bartezzaghi , Corso et al. 1997)	Managing project feedback	High	Medium	High	Low
	Use vehicles for embodying and disseminating improvements	Low	Low	Low	Low
	Adopt project classification schemes (to improve identification)	Low	Medium	Medium	High
(Davenport and Prusak 1998)	Knowledge oriented culture	High	High	High	High
	Technical and organizational infrastructure	High	High	High	High
	Senior management support	High	High	High	High
	A link to economics or industry value	High	High	Medium	Medium
	A modicum of process orientation	Low	Medium	Medium	Medium
	Clarity of vision and language	Low	High	High	Medium
	Nontrivial motivational aids	High	High	High	High
	Some level of knowledge structure	High	High	High	High
	Multiple channels for knowledge transfer	High	High	High	High
(Nonaka and Takeuchi 1995)	Organizational intention	High	High	Medium	High
	Autonomy	High	High	High	High
	Fluctuation and creative chaos	Low	Low	Low	Medium
	Redundancy	Low	Low	Low	Medium

	Requisite variety	Low	Low	Low	Medium
(O'Dell and Grayson 1998)	Culture	High	High	High	High
	Technology	High	High	High	High
	Infrastructure	High	High	High	High
	Measurement	Medium	Medium	Low	Low

Table 1: KM enablers of an ES rapid implementation approach

Gupta and Govindarajan (2000) suggest that knowledge transfer can be conceptualized in terms of five elements: (1) perceived value of the source unit's knowledge, (2) motivational disposition of the source, (3) existence and richness of transmission channels, (4) motivational disposition of the receiving unit, and (5) absorptive capacity of the receiving unit. To assess the knowledge transfer of a rapid ES implementation (Dixon 1992) knowledge transfer taxonomy is employed (See results in Table 2).

		Importance given by the ES employment cohorts			
Method of Transfer		**Strategic**	**Mgmt**	**Operational**	**Tech**
Intentional	Individual Written Communication	High	High	High	High
	Training	High	High	High	High
	Internal Conferences	Medium	Medium	Low	Medium
	Briefings	High	Medium	Medium	Medium
	Internal Publications	Medium	Medium	Medium	Low
Unintentional	Job Rotation	Low	Low	Low	High
	Stories and Myths	Low	Low	Low	Low
	Task Forces	Low	Medium	Medium	High
	Informal Networks	High	High	High	High

Table 2: KM transfer of an ES rapid implementation approach

Analysing the values of table 2, it is clearly visible the higher importance of 'intentional' knowledge transfer modes of ES. We argue that given the shorter time period from system selection, system implemntation and usage, the intentional KM transfer strategies deemed appropriate. Analyses of interview transcripts and tables above confirm the Ponelis and Fairer-Wessels (1998) arguement of giving importance to people-centered KM strategy over the technology-centered strategies of KM. People-centered approaches primarily involve assessing, changing, and improving individual skills and behavior. Technology-centered approaches are mostly involved in the construction or implementation of Management Information Systems (MIS), artificial intelligence systems, and groupware solutions.

CONCLUSION

The preliminary results discussed in this paper pertained to a larger study designed to understand the ES knowldge management process of a rapid ES implementation. The research data was collected from a large insurance and finance company that had implemented SAP R/3 in a record-time of three weeks, making it the fastes SAP installation to-date. The study employed the Adaptive Structuration Theory to develop and partially test a theoretical model. Initial data was gathered from a series of semi-structured interviews where the responses received from strategic managers, managers, operational staff and technical staff. The theoretical model composed of three important concepts of ES knolwdge management 1)KM structures and enblers, 2) KM strategies and 3) KM transfer. The initial findings identified the perceived importance of formal knowldge tranfer modes and the key enablers of KM. Emprical testing is planned to be conducted with a larger sample to assess the impact of effective KM on ES success. Emperical data will also assist the testing of the AST and the existence of the knowledge management processes.

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