Business Process Changes for ERP Upgrades: Impact on organizational capabilities and improvements

Research-in-Progress

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Abstract

This research in progress paper aims to explore ERP upgrades, required process changes for successfully aligning upgraded ERP modules to business functions and resulting organizational capabilities for improved productivity. The research is guided by the theories of Dynamic Capabilities and Benefits Dependency Network. It is an interpretive study to be accomplished via online expert panel discussions and case studies. The findings of this qualitative study are expected to add to the knowledge on ERP upgrades and to productivity improvements achieved from IT (ERP).

Keywords: ERP upgrades, process changes for ERP upgrades, dynamic capabilities, online expert panels, ERP upgrade productivity network
Introduction

ERP systems are packaged suites of business application software which organizations use to manage, integrate and share information across and from all organizational units, business functions, and geographical locations (Imtihan et al. 2008; Schatz et al. 2011). ERP systems comprise of a whole suite of business modules such as financials and accounting, procurement, human resources, operations and logistics, production planning and control, inventory management, sales and distribution, and project management (Davenport 1998; McKendrick 2012a).

Since their release, which was in the late 90’s, ERP systems are now undergoing rigorous upgrade for improvements in capability, capacity and increased performance to be able to support the changing business demands (Worrall 2007), to manage global operations (Ghosh and Ghosh 2003), online business backend systems (Ash and Burn 2003), and to integrate large volumes of data from numerous technologies and sources used by organizations (Hamerman et al. 2010; McKendrick 2012a; Olson and Zhao 2007; Oracle 2013a; SAP 2010a). However, upgraded ERP systems are replacing the old ERP systems in organizations, which in turn require changes to existing organizational business processes (McKendrick 2012a) to achieve enhanced organizational capabilities and improvements.

ERP implementations have been widely researched in the last 20 years, addressing issues of implementation and management (Nordheim 2009), success factors (Nah and Delgado 2006; Nah et al. 2003), problems (Kaur and Aggrawal 2012; Tsai et al. 2005; Wong et al. 2005), and Business Process Reengineering (Martin and Cheung 2005; Subramoniam et al. 2009; Tsai et al. 2010). ERP upgrades, however, are new with enhanced capabilities of the system (Ghosh and Ghosh 2003) and requirements for ERP upgrades are different from initial ERP implementation (Whang et al. 2003). Research on ERP upgrade to date is sparse. Therefore research described in this paper attempts to fill this void by exploring ERP upgrade requirements, process changes for the alignment of upgraded ERP modules to business functions to achieve enhanced improved organizational capabilities and productivity.

This research in progress paper entails a critical review of literature on ERP upgrades, types of ERP upgrades, requirements and business process changes needed for ERP upgrades. It provides a description of the research design to accomplish business process change requirements for ERP upgrades which in turn result in improved organizational capabilities (Anand et al. 2009; Chen et al. 2008; Schwarz et al. 2010) for organizational productivity.

The next section entails a review of literature on ERP upgrades, theories used to guide this research, and the methodology to accomplish the proposed research.

Literature Review

ERP upgrades

ERP system upgrade is a process required periodically, such as every two years to enhance capabilities of the already installed ERP system (Nah and Delgado 2006). Although ERP upgrades are organization initiated to meet new business demands, they are also ERP vendor (SAP, ORACLE, MICROSOFT, and custom providers) led for improved business process management (Hamerman et al. 2010), continued technical and functional support for quality management, system security, and end-to-end operation integration (Sufi 2008). Markus and Tanis (2000) suggest that ERP upgrade is warranted, each time a new version of the system is released. This view is supported by Ng et al. (2003) who define ERP upgrade as the implementation of a new ERP version from the same vendor (as the current installed version). Earlier research (Markus and Tanis 2000; Nah and Delgado 2006; Ng 2001; Nicolaou and Bhattacharya 2006; Shi and Zhao 2009; Sullivan and Bozeman 2010) describe ERP upgrade as a post-implementation phase of the ERP life-cycle, which is generally an “onward and upward” phase of ERP implementation. However, Ng (2001) and Nicolaou and Bhattacharya (2006) argue that all post-implementation improvements to ERP systems are upgrades. Worrall (2007) supports the need for transformation of business processes across the enterprise for the upgraded ERP systems to improve the capability to integrate and manage data, information and business functions (McKendrick 2012a).

ERP system upgrades are therefore improvements to the current ERP system modules and associate business process changes for meeting new business needs.
Types of ERP upgrade

Types of ERP upgrades can be technical (changing the technology platform), functional (addition of new business functions to existing modules), and full system upgrade (increased capacity and capability of the whole ERP system) (Schäumer 2007).

Literature sometimes refers to ERP maintenance and modification, which are also post-implementation processes as upgrades. ERP maintenance is an activity which occurs soon after organizations implement an ERP system (Ng et al. 2002; Salmeron and Lopez 2010) to keep the ERP system up-to-date with the vendors’ standard (Ng et al. 2002), to ensure software is operational and responsive to business requirements, and to reduce system complexity (Hirt and Swanson 2001). ERP modifications are required to align organizational processes with ERP modules (Chou and Chang 2008), and to improve system capability (Oseni et al. 2013).

The modification of the system can take place during or immediately after implementation, whereas maintenance and support are ongoing to keep the system functional. ERP upgrade is replacement of the old ERP system or a periodical change to improve processes, enhance ERP modules for improved capabilities. It is important to note that even an ERP upgrade may require modification to align the upgraded system to business requirements, and require maintenance and support on an ongoing basis. To further understand the type of ERP upgrades, reasons for upgrades and the impact of ERP upgrades on organizational capabilities are explored in the next section.

Reasons for ERP upgrades

Organizations adopt upgraded ERP modules to support their changing business needs (Greenbaum 2009; Hamerman et al. 2010; Khoo and Robey 2007; McKendrick 2012a; Otieno 2010), to be able to meet new legal and compliance policies (Panaya 2012; SAP 2008), to improve business performance with reduced costs (Greenbaum 2009; SAP 2008), to support process bottlenecks with better information management (Bendoly and Schoenherr 2005), effectively manage outsourced processes (Ifinedo 2008), support telework (Ghosh and Ghosh 2003), and to have state of the art technology for business function management (Hamerman et al. 2010; McKendrick 2012a). Organizations upgrade ERP systems because upgraded ERP modules support better integration of data and information from different business functions (Bendoly & Schoenherr 2005), and organizational processes supported with customised modules (Beatty and Williams 2006; Dempsey et al. 2013; Hamerman et al. 2010; Riis 2012a).

Other reasons for organizations to upgrade ERP systems are improved productivity (Bjorlin 2008b; Hamerman et al. 2010), elimination of operational redundancies and to achieve improved operational efficiencies (KPMG LLP 2009), ability to process large volumes of data (Greenbaum 2009), ability to integrate data from mobile technology (Werth and Makuch 2011) and improved connectivity with new technologies the organization adopts (Hamerman et al. 2010; McKendrick 2012a; Olson and Zhao 2007; Oracle 2013a; Ostrom 2004; SAP 2010a).

Improved security of data supported by the upgraded ERP modules (Hamerman et al. 2010), improved decision making with better access to data and data management (Caserio 2011; KPMG LLP 2009), greater user satisfaction (Whang et al. 2003), better alignment of technology to business requirements (Beatty and Williams 2006; Martin and Cheung 2005; Riis and Schubert 2012b), strengthened relationship with business partners and increased customer satisfaction (Infor 2011), increased revenue and profitability (Infor 2011) are also reasons for upgrade.

Reasons for ERP upgrades are numerous, which are easily classified as business as well as technical. Business reasons require ERP upgrades to improve business functions for better performance, improve organizational efficiencies, to support data management, and improve productivity. On the other hand, technical reasons are for IT infrastructure improvement, enhanced database management, and a better alignment of ERP systems to business requirements.

Requirements for ERP upgrades

It is important to establish the requirements for ERP upgrades to avoid additional costs (Olson and Zhao 2006) and to be able complete the project in time (Scanlon 2012). Whang et al. (2003) emphasize that the
implementation of ERP upgrades require a well-documented plan with a clear upgrade goal statement, methods of coordination, communication and documentation of discussions with upgrade partners, as well as clearly defined roles and responsibilities of individuals and departments to achieve upgrades in a timely manner (McKendrick 2012b). The above views are supported by KPMG LLP (2009) and Kimberling (2012) who suggest that for ERP upgrades, a strategy, a plan, human resource and time for the project are also required. An organizational understanding of why ERP needs to be upgraded is an essential requirement (Olson and Zhao 2006; Olson and Zhao 2007). Clear communication of the scope of the upgrade project (Jacobson et al. 2005; McKendrick 2012b; SAP 2010a; Zarotsky et al. 2006) with an estimation of the cost (Jacobson et al. 2005; McKendrick 2012b; SAP 2010a) are also important.

The new hardware design, landscape, operating systems, management of business downtime (IT-Online 2011; Oracle 2011; SAP 2010a), database capacity and capability (IT-Online 2011; Oracle 2011), user participation (Collins 1999; Nordheim 2009; Wagner and Newell 2007), services of ERP upgrade experts (IT-Online 2011), and risk management (Zarotsky et al. 2006) have also been identified to be requirements for ERP upgrades. Project management (Caserio 2011) with budget and milestones (Avram 2010; Olson and Zhao 2006) are equally important. Wagner et al. (2012) and Wenrich and Ahmad (2009) emphasize that a crucial requirement for ERP upgrade is the need to change business processes to align them to the enhanced ERP module capabilities.

Requirements for ERP upgrades discussed above range from strategy to technology, and people, project management, financial support, human resource and technical support. As mentioned above, business process change is an important requirement for ERP upgrades.

**Business Process Change (BPC) for ERP upgrades**

Business processes are a set of logically related tasks that use resources of an organization to achieve a defined business outcome (Kettinger and Grover 1995). Business process reengineering (Hammer and Champy 1993), process improvement (Harrington 1991), process innovation (Davenport 1993) and business process redesign (Davenport and Short 1990) are terms usually used interchangeably to represent the phenomenon “business process change”. According to Kettinger and Grover (1995) business process change refers to overhauling of business processes and organization structures that limit competitiveness, effectiveness, and efficiency of the organization, to achieve improvements, with a process view of innovation of processes. Kettinger and Grover also advocate that effective business process changes increase core business capabilities and lead to an achievement of competitive advantages. Business process change components comprise of strategic initiatives, learning, cultural readiness, IT leveragability for knowledge-sharing capability, balancing network relationships, change management and process management (Kettinger and Grover 1995). These components of business processes change led capabilities enhance organizational performance and productivity (Guha et al. 1997). These are also referred to as organizational capabilities achieve from IT (Aral and Weill 2007; Bhatt and Grover 2005; Dale Stoel and Muhanna 2009) described with the theory of Dynamic Capabilities.

In order to manage the implementation of ERP upgrades successfully, business process change management is an essential requirement (Wenrich and Ahmad 2009; Yachin 2009), also supported by Silvennoinen (2011). Since the initial implementation of the ERP systems, business processes need to change to accommodate business growth, new production lines, consolidated business operations, divestiture of businesses, and regulatory or compliance change requirements (Greenbaum 2009) to meet new business demands. Organizations upgrade their ERP systems to meet new business demands (Dempsey et al. 2013; Greenbaum 2009; Ng and Chang 2009) which in turn offer new functionalities for which organizations need to change their existing business processes (Beatty and Williams 2006; Riis and Schubert 2012b).

Productivity improvements achieved from business process reengineering (BPR) are improved business process efficiencies and reduced operation and staff support cost (Martin and Cheung 2005). Business growth and competitive advantages are some other outcomes of the changed organizational processes achieved from upgraded Enterprise Systems (Wagner and Newell 2007). Siemens’s, a large IT organization, during their multisite ERP upgrade project changed their business processes to correspond to the ERP upgrade, achieving standardized business processes (Brege et al. 2012). TechTarget (2013) recommends that with ERP upgrades and redesigned business processes organizations remove inefficient business functions, save costs, and increase process efficiencies. Telaro (cited in Hans 2013) advocates...
that with ERP system upgrade, organizations should re-define business processes to fit the new system. From the above discussion, it is clear that for ERP upgrades, business process changes (BPC) are an important requirement.

**Organizational capabilities**

Organizational capabilities are a combination of people, people’s skills, organizational processes, cultures, structure, systems, technology and assets (Australian Public Service Commission 2011; Zhu 2013). According to Australian Public Service Commission (2011), organizational capabilities also include leadership, stakeholder engagement, citizen engagement, innovation, policy development, strategic planning, program delivery and implementation, project management, governance, risk management, change management, workforce planning, and staff performance management.

Organizational capabilities from earlier IT focused studies include knowledge management (Sher and Lee 2004), alignment of business process and IT (Chen et al. 2008), alignment of IT infrastructure capabilities and IT-enable business capabilities (El Sawy and Pavlou 2008), effective management of changing technologies and customer needs (Stratman 2008), innovation and substantial competitive advantages in a rapidly changing environment (Wu and Hisa 2008), organizational performance improvement (Anand et al. 2009; Schwarz et al. 2010), process improvement (Anand et al. 2009), successful ERP implementation (Hwang 2011), knowledge sharing (Iris and Vikas 2011), organizational agility (Trinh et al. 2012), and organizational process efficiencies, product quality and innovation (Pavlou 2013).

The above literature discussion indicates that ERP upgrades can be for technical or business reasons, which are either partial or whole system upgrade. Requirements for ERP upgrades entail management, budget, human resource, project management and outsourcing management. An important requirement for ERP upgrades is business process changes for improved capabilities of decision making, management, productivity improvements, process efficiencies, reduced cost, business growth and competitive advantage. With these capabilities, organizations will better meet the new business demands of globalisation, digitisation e-business, and large volumes of data management (Greenbaum 2009).

Although types and reasons for ERP upgrades are well established, little is known on how ERP upgrade led process changes result in improved capabilities for enhanced organizational performance.

Therefore the research question for this study is: “With ERP upgrades and process changes how do organizations improve capabilities for enhanced productivity?”

**Theories**

Since this research will explore business process changes due to ERP upgrades for enhanced organizational capabilities and improved productivity achieved from ERP upgrades, it will be guided by the theories of dynamic capability (Teece and Pisano 1994; Teece et al. 1997). Dynamic capabilities theory according to Teece, Pisano & Shuen (1997) is a firm’s ability to integrate, build, and reconfigure internal and external competences to address the rapidly changing environment, from a set of learned processes and activities that enable an organization to produce a particular outcome. Eisenhardt and Martin (2000) on the other hand explain that dynamic capabilities include integrate resources, strategic decision making, reconfiguration of resources within firms, changed processes such as routines as replicated processes, knowledge creation for effective strategy and performance, and new alliances and acquisitions of new resources from external sources.

From the synthesis of the literature above, it is seen that ERP is an important IS resource that organizations depend on to operate and manage business in a rapidly changing environment. ERP upgrades, whether partial or whole result in process changes that improve management decision making (Bjorlin 2008b), provide a better access to larger volumes of data (Greenbaum 2009), integration of data from disparate technologies used in the organization (Ostrom 2004) for improved business insights, better security management of information (Hamerman et al. 2010), improved knowledge for service and production planning (KPMG LLP 2009), better customer and partner relationship management (Infor 2011), which are improved organizational capabilities achieved by changing the routine processes that existed with the old system. This study will therefore establish the dynamic capabilities achieved in the organization as an outcome of the changed processes resulting from ERP upgrades.
Improved organizational capabilities result in productivity improvement, better data management, globalization, efficient decision making, and increased business partners satisfaction. Therefore to establish the relationship between process changes for ERP upgrades, improved capabilities and resulting productivity improvements, this relationship analysis will be guided by the theory of Dynamic Capabilities (Eisenhardt and Martin 2000; Teece and Pisano 1994; Teece et al. 1997) and to establish Benefits Dependency Network (Peppard et al. 2007) will be used. Organizational productivity improvements achieved from organizational capabilities include e-business support, increased market share, and improved security of data management, big data management and global markets. This relationship between ERP upgrade (IT enabler), process changes (enabling changes), organizational capabilities (capabilities) and improvements (improved productivity) are depicted in the ERP upgrade productivity network (Figure 1) guided by the Benefits Dependency Network.

Arrows, in Figure 1, indicate that one or more process changes will lead to one or more organizational capabilities, and one or more capabilities will lead to one or more productivity improvements, which will be confirmed by research, which is yet to take place.

**Research Methods**

Since ERP upgrades are a new post ERP implementation activity, and research on this topic is sparse, this is an exploratory qualitative study to be guided by the interpretive paradigm (Collis and Hussey 2009). Exploratory studies help comprehend little understood phenomena, discover and gain information and an understanding of the subject area to establish issues and variables for further rigorous investigation (Collis and Hussey 2009; Saunders et al. 2009). Research strategy used will be qualitative, based on Yin’s (2014) view that qualitative studies are more appropriate for exploring under-researched phenomena for establishing complex socio-psychological mechanisms in real life context such as business process changes for ERP upgrades and resulting organizational capabilities and enhanced productivity.

Interpretive studies help understand phenomena through assessing meanings that participants assign to them (Orlikowski and Baroudi 1991). Since this research intends to attain a deeper understanding of ERP upgrades and related issues for the development of organizational capabilities via process changes, generalization from a setting to a population is not sought, instead, a deeper understanding of the relationship between process changes for enhanced capabilities are required with the intent to inform
other settings (Johnson and Christensen 2008; Orlikowski and Baroudi 1991). Therefore, for this research the interpretive paradigm is most appropriate.

**Methodologies**

This qualitative research will be conducted in the following two phases:

**Phase one – an online expert panel discussion**

Since ERP upgrades are new and recent, with pockets of upgrade knowledge lying with ERP vendors (Cisco 2007; Foo 2008; Oracle 2011; SAP 2008; SAP 2010a), ERP champions in organizations that upgraded their ERP systems (Cisco 2007; Foo 2008), consultants involved in ERP upgrades (Alsuami et al. 2013; Olson 2009) and a few researchers around this world (Ng and Chang 2011; Olson and Zhao 2007; Rauff and Hufgard 2013; Whang et al. 2003; Zarotsky et al. 2006), it is pertinent to gather insights from a sample that is representative of all that are involved with ERP upgrades. Therefore the best way to capture this information from ERP upgrade stakeholders, who are from different parts of the world, is to conduct online expert panel discussions.

Online expert panel discussions will be used to establish ERP upgrade related process changes, and the impact of these process changes on organizational capabilities that lead to improved productivity. Benefits of online expert panels are cost saving and time effective (Snyder-Halpern et al. 2000), provides the ability to engage more diverse and representative panelists including experts from other countries, has the ability to make online discussions anonymous and thus reduces possible biases based on particular status or personality, and the benefit of contributing at the time convenience of panelists (Khodyakov et al. 2011). The online expert panel technique will help simplify consensus from geographically distributed participants (Khodyakov et al. 2011). In addition, this technique enables involvement of a wide group of people who are learned in the topic area (Saunders et al. 2009).

The Online Expert Panel discussion is Internet–based, although similar to online focus group research (Gaiser 2008). While potentially useful, the online expert panels can suffer from variable participation rates, information overload, difficulties in following discussion threads, and the best panelists for online discussion is unknown (Khodyakov et al. 2011). However, online expert panels are being widely adopted in Information Systems research (Abu Abid 2013; Alsuami et al. 2013; Singh and Burgess 2007), and have proved to be useful.

**Online expert panel method**

Data collection method from the online expert panel is described in the following section.

From an extensive review of literature I will establish business process changes for ERP upgrades and ERP upgrade related organizational capabilities. Then I will identify ERP upgrade stakeholders to form the panel of experts. I will carefully recruit panelists who have knowledge and skills on ERP upgrades from publications, web sites, industry reports, case studies, ERP upgrade providers such as SAP and Oracle sites, academic publications, Linkedin pages and recommendation by peers. I will then invite the stakeholders to participate, by sending them an e-mail, briefly explaining the aim and expected outcomes of this research and how important their input in this project will be for the success of this research. They will be assured of anonymity, and a brief explanation of how the online expert panel will be conducted will also be included in the email. This research will employ a web posting technology "Wordpress discussion blog" on which the expert panelist accounts for those who will agree to participate will be created.

**Wordpress** is an open source for publishing and can be used for basic content management ([http://wordpress.com](http://wordpress.com)) which allows participants to remain anonymous.

The expert panelists will be presented with clear instructions and guidelines on how to post their comments before conducting the first round of discussion. For each discussion round, I will present questions and ask all participants to comment and share their opinions on each of the issues as well as give them the opportunity to add more in order to gain further information on each of the ERP upgrade issues.

For each round of discussion, the panelists will be given a week to respond. Within the following week, I will summarize all responses and post this summary of issues on Wordpress for the panel members to
confirm, agree or disagree, and provide any further insights on the issues. For online expert panel discussions, earlier studies (Abu Abid 2013; Alghamdi and Rahim 2013) emphasize that it is absolutely essential to respond within a week to keep the panelists engaged. All participants will remain anonymous at all times and allowed to change their response as a reaction to the summary. Although initially all those who agree to participate (up to 20) will be included, Alghamdi and Rahim (2013) suggest that 6 to 10 participants are adequate. The online expert panel discussion will entail 4 rounds.

**Analysis of online expert panel responses**

Subjective responses from the panel members will be interpretively analyzed using Miles et al. (2013) analysis process. For each set of responses, data will be processed, coded (descriptive coding) to summarize in a word or a short phrase for indexing and categorizing; as well as In Vivo coding in my words or phrases for leads to particular patterns in the setting). This will continue until no further new issues will arise (Landeta et al. 2011) for process changes, capabilities and productivity improvements. Then based on Peppard et al. (2007) Benefits dependency network, a relationship between the process changes, resulting organizational capabilities and improvements will be determined, by relating these to IT capabilities and organizational improvements.

**Phase two: case studies to validate the findings of phase one**

At least three detailed case studies with three large organizations that upgraded ERP systems within the last 5 years will be undertaken to confirm and validate the process changes for ERP upgrades, capabilities and improvements as well as the relationship between these entities established from online expert panel discussion. These participating organizations will be large organizations that use most of the ERP modules and entail a large number of business processes. The case study research strategy will enable focusing on understanding the process changes, capabilities and improvements within a real setting (Eisenhardt 1989), with data from multiple sources (archives, reports and interviews) (Yin 1984).

The cases will be identified from ERP vendor announcements and/or organizational announcements on ERP upgrades. Based on the size of the organization determined from the web site, a senior manager in the organization will be approached to get access to data and interviews in the organization. Data will be collected from organizational documents such as ERP upgrade reports and interviews with three to five middle and senior managers who were involved in the ERP upgrade implementation and management. For the interviews a semi-structured interview tool will be developed to collect data. With permission from the respondents, responses to interviews will be tape recorded and later transcribed for analysis.

**Data analysis**

Case study data will be interpretively analyzed using similar codes as in phase one for categorization and pattern matching. Findings from case studies will be used to corroborate the findings from the online expert panels. With ERP upgrade being the enabler, process changes being enabling changes in the organizations, it is expected that a set of new ERP (IT) based capabilities will be achieved, which will lead to enhanced organizational productivity.
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