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Abstract

More than two decades of research on information technology (IT) value still leaves the issue of IT value in an organization a less understood concept. The issue of IT value is particularly important in case of systems such as Enterprise Resource Planning (ERP) because these systems involve significant financial investments. Evidence from the current literature indicates that a high number of ERP implementations fail to deliver the anticipated benefits. While successful implementation of ERP systems is essential before any benefit can be expected from them, success of the implementation itself cannot ensure that ERP systems will add value to the organization subsequently. Extant literature on ERP systems is overly focused on capabilities that help an organization to successfully implement an ERP system and lacks studies that focus on capabilities required to derive benefits from ERP systems in the post-implementation stage. To address this gap in the literature, in this research in progress study, we develop a theoretical model and related hypotheses to examine the effect of post-ERP implementation capabilities on value delivered by ERP systems. In this paper, we also outline the methodology to validate the theoretical model using the data that would be collected in the next step. Broadly, the research suggests that value of ERP systems after successful implementation is impacted by three sets of capabilities, end users' capability to use ERP system functionalities, managerial capability to use information generated through ERP systems to achieve organizational objectives, and overall organizational IT capability.

Keywords: ERP value, ERP system, RBV, Dynamic capability, IT value, Post-implementation.

1 INTRODUCTION

Over the years, organizations have continued increasingly to invest in information technologies (IT). The 1990s witnessed an unprecedented increase in investments made by organizations in building information technologies and associated systems. According to the U.S. Department of Commerce (2004), the ratio of IT investments to total business investments has grown from 19% in 1980 to 35% in 2003. However, prior research provides mixed evidence regarding the value of IT investments to organizations, especially in case of complex application such as ERP systems (Brynjolfsson and Hitt, 1996; Loveman, 1990; Roach, 1991; Tam, 1998). Despite a significant body of research, the issue of IT value remains complicated and poorly understood partly because of the lack of understanding of the process through which such benefits are realized. The issue of IT value is rendered even more complex when a specific technology has the potential to provide value across multiple dimensions and over extended period of time. The Enterprise Resource Planning (ERP) systems represent one such set of technologies. They are not only complex but can also impact various business processes within an organization at differential rates.

The ERP systems are integrated software packages that automate core corporate activities such as financial and cost accounting, human resources, inventory control, manufacturing scheduling and production, sales support, customer relationship management, and supply chain management (Hitt et al., 2002). Implementing an ERP system not only requires substantial effort, time, and investment (Bailey, 1999; White et al., 1997) but is also accompanied by technical and business risks (Austin and Cotteleer, 1999). For instance, an ERP installation may cost about \$15 million (O'Leary, 2000, p. 6) with an associated cost of implementation as high as 2-3% of revenues (Escalle et al., 1999). A typical ERP implementation can take between 1 and 3 years (21 months on average), with benefits starting to accrue in an average of 31 months (McAfee, 1999; O'Leary, 2000). Despite the significant investments in ERP systems, the issue of how much value ERP systems bring to an organization remains largely unaddressed. The past research indicates that many ERP system implementations were either abandoned later or failed to deliver the anticipated benefits. For instance, current literature on ERP provides evidence of a loss in sales or a drop in functional productivity at companies such as Hershey (Stedman, 1999), Nike (Konicki, 2001), and Foxmeyer (Kalakota and Robinson, 2001) during and/or after ERP implementation. A high proportion of ERP installations (about 70%) have been reported to deliver benefits significantly lower than those anticipated (Majed, 2000). Considering the past evidence on the success or failure rate of ERP implementations and the technical/business risk associated with any ERP implementation, questions that merit special attention are: what is the nature of value an ERP system brings to an organization? how does one measure the value of an ERP system? and how can an organization create value from its ERP systems?

From the ERP value standpoint, two primary issues remain largely unaddressed in the current literature. The first issue pertains to defining ERP value and consequently measuring it. While there is a significant body of research on what kind of value ERP systems bring to an organization (see for example, Hitt et al., 2002; Nicolaou, 2004; Shang and Seddon, 2000), there is no consensus on a comprehensive measure of ERP value. For instance, in one of the earliest studies of actual benefits from ERP, Deloitte Consulting (1998) studied 85 global companies, 90% of which had revenues over US\$1 billion. It reported both tangible benefits and intangible benefits from ERP systems. The tangible benefits included cost savings (34% of organizations) and faster processing (19%), and the intangible benefits included improved information visibility (63% of organizations), new/improved processes (31%), and improved customer responsiveness (20%). Although organizations derive multiple benefits, it is clear from Deloitte's study that not all organizations experience similar benefits. The current literature on ERP value lacks a comprehensive empirical measure for ERP value which takes into account contribution of ERP systems across different performance dimensions of an organization.

The second issue pertains to identification of capabilities required to create ERP value in post-implementation stage. The current ERP systems literature abounds with studies and models that provide insights on how to implement ERP systems successfully (see for example, Allen et al., 2002; Nah et al., 2001) but lacks studies and research models incorporating capabilities that help create ERP value in post-implementation situations. This paper aims to address these two gaps in the current literature through development of a framework for ERP value that incorporates capabilities in post-implementation phase. Therefore, the primary research question being addressed in this study is: How can ERP value be created in an organization after it has been successfully implemented? As a corollary, a comprehensive measure for ERP value will be developed in this research. In the next section, we provide a review of current literature and theoretical development for the proposed research framework. This is followed by hypotheses development and an outline of proposed research methodology. We conclude the paper by identifying current status of data collection and expected contributions of the research.

2 LITERATURE REVIEW AND THEORETICAL DEVELOPMENT

The basic purpose of ERP systems is to integrate operations throughout an organization. Due to the infrastructural and multidimensional nature of ERP investments, it can be difficult for organizations to determine which aspects of the organization are affected by ERP investments and which effects can be attributed to ERP systems. With this in mind, it may be difficult to specify precisely the benefits of an ERP system for a single business unit or a division (Hitt et al., 2002). In their classification of ERP benefits, Gattiker and Goodhue (2000) underline the multifaceted nature of ERP benefits. They identify ERP benefits as belonging to one of four major categories: 1) improving information flow across sub-units, standardizing and integrating to facilitate communication and better coordination; 2) enabling the centralization of administrative activities such as accounts payable and payroll; 3) reducing IT maintenance costs and increasing the ability to deploy new IS functionality; 4) moving an organization away from inefficient business processes and towards accepted best practices. From this standpoint, the benefits of an ERP system in an organization can be realized across multiple dimensions – operational, tactical, and strategic.

Poston and Grabsky (2001), in their analysis of the impact of ERP systems on organizational performance, found that while organizations adopting ERP systems reported a decrease in the ratio of employees to revenue and an improvement in the cost of goods sold, there was little or no improvement in residual income or ratio of general and administrative expenses to revenue. From this standpoint, the value of ERP systems can be seen in the reduction in the number of employees or in the reduction in cost of goods sold. In one of the most comprehensive studies of ERP impacts on organizational level financial indicators, Nicolaou (2004) reported significant differences in overall differential measures of return on assets (ROA) for ERP-adopting organizations than for the matched control organizations four years after ERP installation. However, differential ROA performance was significantly worse for ERP-adopting organizations as the year of installation ended.

In another study by Hitt et al. (2002), ERP adopters were found to exhibit better performance in terms of sales per employee, profit margins, return on assets, inventory turnover (lower inventory/sales), asset utilization (sales/assets), and accounts receivable turnover. Prior research also provides evidence of other types of benefits from the implementation of ERP systems such as labor, process and inventory cost savings, improved decision-making, and savings from dismantling legacy systems (Davenport et al., 2002; Ross 1999). Shang and Seddon (2000) provide a comprehensive classification of ERP benefits by analyzing 233 ERP-vendor success stories published on the Internet. They also used 34 follow-up interviews to confirm the content of their analysis. Shang and Seddon classify ERP benefits into five categories: operational, managerial, strategic, IT infrastructural and organizational. The operational benefits are described as those that arise from automating basic and repetitive operations, and from streamlining business and information processes.

The review of ERP value literature indicates lack of comprehensive measure for ERP value and therefore, points to a need for it. We now provide review of the literature on capabilities required to create value from ERP systems.

Considering that ERP systems are complex systems and require a significant period of time to implement (Bailey, 1999; White et al., 1997), the success of ERP implementation itself is critical before ERP systems can be expected to deliver any visible value to an organization. Once an ERP implementation is successful, ERP value depends on exploiting functionalities of the system in the post-implementation phase (Boudreau, 2003; Clark et al., 2006) and on the wide use of information generated through the ERP systems for decision-making within an organization (Davenport, 2000; Lorenzo, 2001). Therefore, the creation of ERP value requires both the capabilities to manage ERP implementation successfully and the capabilities to effectively use the ERP system in the post-implementation phase.

The capabilities that influence an organization's ability to manage ERP systems, and subsequently the value from them, can be broadly classified into three sets. The first set of capabilities pertains to the successful management of ERP system implementation (Allen et al., 2002; Nah et al., 2001). The second set of capabilities pertains to exploiting functionalities of the ERP systems during the post-implementation phase (Boudreau, 2003; Clark et al., 2006). The third set of capabilities includes those required to use the information generated through ERP systems effectively to support business objectives (Marchand et al., 2000). Since the focus of this study is on post-implementation phase of ERP, the review of capabilities required for successful management of ERP implementation is excluded.

The first capability that is critical for ERP systems to deliver value relates to organizational IT capability. Grant and Chen (2005) provide evidence that organizational IT capability impacts ERP value in post-implementation phase. IT capability has been conceptualized in many different ways in earlier research. For instance, terms such as IT capability (Bharadwaj, 2000) and IS capability (Feeny and Willcocks, 1998; Grant and Liebenau, 1997) have been used interchangeably to refer to both the technological and managerial capabilities required to manage information systems. Bharadwaj (2000) defines IT capability as "a firm's ability to mobilize and deploy IT-based resources in combination or co-present with other resources and capabilities (p. 171)." Bharadwaj (2000) divides IT-based resources into three categories, IT infrastructure, human IT resources, and IT-enabled intangibles. Subsequently, along the same lines, Bhatt and Grover (2005) identify specific capabilities under the rubric of IT capability, such as quality of IT infrastructure, IT business experience, and relationship infrastructure. On a similar note, Feeny and Willcocks (1998) identify nine dimensions of IS capability which include leadership, business systems thinking, relationship building, architecture planning, making technology work, informed buying, contract facilitation, contract monitoring, and vendor development. These capabilities are critical for long term management of ERP systems and not just for successful implementation of ERP systems.

The second capability which has been identified in the current literature relates to post-implementation IT use behavior. Considering that ERP systems have the potential to be appropriated in multiple ways by organizations, the post-implementation ERP usage behavior of an organization can significantly influence the value an organization derives from ERP systems (Clark et al., 2006, Moon, 2007). The post-implementation IT use behavior and its effect on value delivered by IT systems has been studied in number of earlier studies (Soh and Markus, 1995; Jain and Kanungo, 2005; Boudreau, 2003). In specific context of ERP systems, Boudreau (2003) reports limited use and extended use as two key dimensions that differentiate ERP use across different users in an organization. Limited use refers to the superficial use of application features, displaying a limited understanding of the ERP system's functionality, whereas extended use refers to experimenting and creating alternate ways of using the system's functionalities (Boudreau, 2003). ERP systems hold great promise for integrating business

processes. However, this potential can be realized only if ERP system users understand what they can do with the system. While not all organizations implement all modules of an ERP system and sometimes, not all functionalities in a module are implemented (Jones, 2001), a typical ERP system still has more features than those are typically mandated for use in an organization. Therefore, ERP systems provide a degree of flexibility to users who can appropriate system functionality in different ways. While ERP systems hold great potential to deliver value to an organization, the realization of this potential is likely to be constrained by how users use the system once it is implemented. While the notion of post-implementation IT use is increasingly the topic of IS literature, its impact on value derived from information systems has received limited attention in current IT value literature.

The third capability that is particularly important in context of ERP systems is the ability to use information generated through the use of ERP systems. ERP systems not only allow system features to be appropriated differently, but also allow information produced by the ERP systems to be used differently by different organizations. The role of ERP systems in providing valuable information to an organization has been recognized in prior literature (Davenport, 2000; Lorenzo, 2001; Shang and Seddon, 2002). Many organizations today compete more on information than on their products (Kaplan and Norton, 1996). Better information about markets, business trends, competitors, and customers is likely to give an organization a competitive edge over its competitors. However, it is not just about having better information — how business managers use such information helps organizations respond effectively to market opportunities and threats (Day and Nedungadi, 1994; Kaplan and Norton, 1996; Li and Calantone, 1998; Marchand et al., 2000). ERP systems have significant potential to generate highly useful information related to internal processes such as workflow, in addition to providing opportunities to improve current processes (Shang and Seddon, 2002). Earlier research indicates that the role of ERP systems for informational purposes is undervalued. For example, Lorenzo (2001) reports in a case study of an ERP installation: “Interviewees argued that ES is being used only as transactional systems. They considered that the informing role (Zuboff, 1988) for making decision and the work integration role (Davenport, 1998) are not being carried out completely (p. 1118).” Considering that the primary objective of ERP systems is to integrate processes across an organization and provide better information for control and decision purposes, how managers use the information provided by an ERP system is likely to impact the value that such systems provide (O’Grady, 2002).

While implementation of ERP can help improve operational control, its value lies in providing management with data for operational planning, better decision-making, and improving customer-facing processes. Therefore, ERP value is likely to be higher if management can effectively use the information provided by ERP systems for operational and strategic purposes. Based on the preceding discussion, the existing literature identifies three sets of capabilities that help in deriving value from ERP systems. These relate to organizational IT capability, exploiting ERP systems’ functionalities during post-implementation use, and using information generated through ERP systems effectively. The proposed research model based on these three sets of capabilities is presented in Figure 1. Quality of ERP System Use refers to how an organization exploits the capabilities of an ERP system (Boudreau, 2003). Quality of ERP information use refers to an organization’s ability to effectively use information from the ERP systems for operational and strategic purposes (Marchand et al., 2000). Organizational IT capability consists of technological and managerial capabilities associated with IT and include quality of IT infrastructure (Ravichandran and Lertwongsatien, 2002) and capabilities related to strategic IT planning (Bharadwaj et al., 1999) and IT management (Grant and Liebenau, 1997).

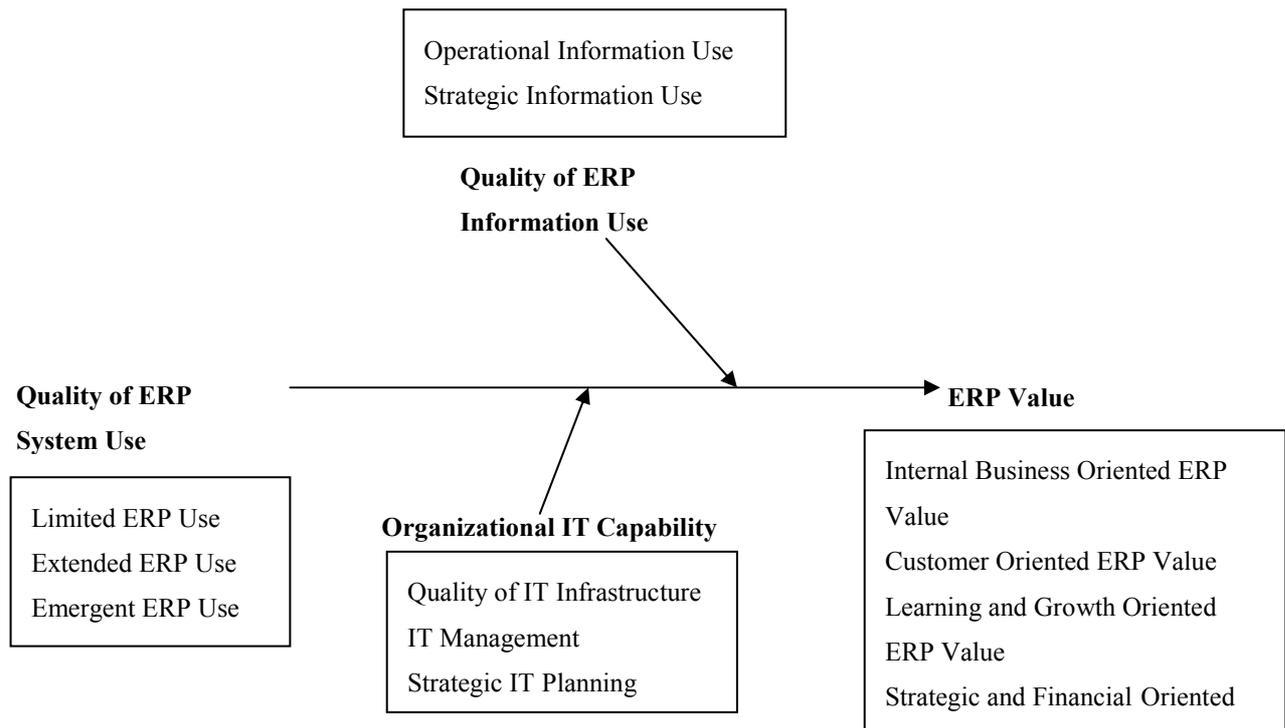


Figure 1. Research Model

As an initial step, in the proposed research model, the focus is on examining the effect of post-implementation capabilities on ERP value and not on antecedents of these capabilities. The subsequent research will focus on extending the model by incorporating antecedents for some of these capabilities. Also, the role of organizational IT capability has been conceptualized as a moderating one for the reasons explained later in the hypotheses development section.

3 HYPOTHESES DEVELOPMENT

3.1 *Quality of ERP System Use and ERP Value*

Complex software applications, such as ERP systems, embed multiple features that can be exploited differently by ERP users in an organization. Prior research provides evidence that ERP users in organizations that implement ERP tend to display a variety of usage behavior (Boudreau, 2003; Clark et al., 2006). Hence, the quality of ERP system use is likely to differ across ERP users not only within an organization, but also across organizations. To realize value from ERP systems in a post-implementation setting, ERP systems not only have to be used but also have to be used effectively. Merely implementing an ERP system is not likely to generate significant value for an organization if the system is not used meaningfully. For example, how extensively the system is used within the organization, which features of ERP system are used, or how ERP users exploit the system's functionalities to complete their jobs more efficiently could all affect the degree to which an organization benefits from an ERP implementation. An organization in which ERP users are engaged in exploratory behavior might identify new ways of accomplishing an ERP-enabled task faster, or it might discover more efficient workarounds. During this process of exploration, ERP users can learn to

use the ERP system creatively, identify ways to complete the task more efficiently, or learn to exploit the system features and functionalities to improve the quality of their task performance. Consequently, the following hypothesis is proposed:

H1: Quality of ERP system use has a positive relationship with ERP value

3.2 Moderating Role of Quality of ERP Information Use

Prior research reports that a lack of information about business operations is one of the key incentives for organizations to implement integrated systems such as ERP systems (Shang and Seddon, 2000). In order to generate relevant information from a complex and multifunctional system such as ERP, the system's functionalities need to be exploited first. For example, any ERP application supports hundreds of standard reports for historical and summary data. But to generate a customized or ad-hoc report to obtain a specific piece of information, ERP users need to know how to exploit the technical functionalities of the ERP system first. From that standpoint, the quality of ERP system use is important. While the quality of ERP system use results in better information for an organization, the quality of ERP information use results in enhancing the impact of available information in meeting organizational objectives. The availability of information by itself is no guarantee that it is being used effectively by managers. Additional value from ERP systems arises from effectively using the data and information capabilities of the system, rather than purely relying on its technical capabilities. Based on the above arguments, the quality of ERP information use is likely to enhance the impact of quality of ERP system use on overall ERP value. Therefore, the following hypothesis is proposed:

H2: The relationship between the quality of ERP system use and ERP value will be stronger for organizations that have better quality of ERP information use than those with poor quality of ERP information use

3.3 Moderating Role of Organizational IT capability

Organizational IT capability is conceptualized as consisting of technological and managerial capabilities associated with IT. Technological capabilities, such as the ability to connect different business units seamlessly using IT or the ability to connect disparate systems to facilitate better exchange of business information reflect the quality of IT infrastructure. The quality of IT infrastructure could potentially contribute to organizational performance (Ravichandran and Lertwongsatien, 2002). The managerial capability associated with IT is defined as an organization's ability to harness and leverage complementary organizational resources in designing, acquiring, and deploying computer-based information systems to create value for the organization (Feeny and Willcokcs, 1998; Grant and Liebenau, 1997). Managerial capabilities include capabilities related to strategic IT planning (Bharadwaj et al., 1999) and IT management (Grant and Liebenau, 1997).

The adoption and implementation of an ERP system is often driven by the need to replace an outdated legacy infrastructure or to support long-term organizational growth (Davenport, 2000). Multiple skills such as those related to technology and business as well as skills in process design and IT infrastructure reconstruction are required to implement ERP systems successfully. Considering that ERP systems evolve over time through the implementation of additional modules or integration with other technologies, an organization's IT capability in terms of adding, modifying, removing, and integrating application systems and other aspects of IT infrastructure is likely to influence the flexibility of long-term ERP deployment and exploitation (Grant and Chen, 2005).

An organization's IT capability impacts the relationship between quality of ERP system use and ERP value in multiple ways. An organization with strong IT capability can not only help ERP users transition smoothly to an integrated environment, but can also create additional opportunities for ERP users to exploit the functionalities of the system in the post-implementation phase. Because most ERP applications are based on best practices, organizations usually alter their work processes to fit ERP

software (Robey, et al., 2002). The ERP users must gain knowledge about the business rules and processes embedded in ERP software (Lee and Lee, 2000) to appropriate the functionalities of an ERP system. An organization's ability to effectively impart knowledge to users about business rules and processes embedded in an ERP system as part of IT-enabled change both during and after ERP implementation can make ERP users to be aware of potential of the system. If an organization does not have a strong IT capability, there will be fewer opportunities for end users to exploit the functionalities of an ERP system. In other words, in the absence of a strong IT capability, ERP users' ability to exploit the functionalities of ERP system is likely to be negatively affected. This, in turn, is expected to have an impact on the ERP value realized by an organization. Based on the above arguments, the following moderator hypothesis is proposed:

H3: The relationship between quality of ERP system use and ERP value will be stronger for organizations with strong organizational IT capability than those with weak organizational IT capability.

4 RESEARCH METHODOLOGY

A survey methodology is proposed for data collection to validate the research model. It will follow a three step approach: (i) develop a survey instrument consisting of items derived or adapted from the current literature (ii) a preliminary "pilot" study designed to test validity and reliability of the various constructs such as quality of ERP system use, quality of ERP information use, organizational IT capability, and ERP value and, (iii) a survey of organizations to test the proposed research framework.

In the pilot phase of the study, chief information officers (CIOs) from at least 10 organizations that have implemented ERP would be interviewed to assess the content validity of the survey items. In the final step, it is proposed to survey about 150 ERP organizations to validate the research hypotheses.

One of the key challenges in this research is the development of the instrument. The survey instrument is being developed based on current literature. For example, items for measuring quality of ERP system use are being developed using the dimensions of limited use (Boudreau, 2003), extended use and emergent use (Saga and Zmud, 1994). These dimensions indicate how ERP users can exploit the ERP system functionalities. Similarly, quality of ERP information use is based on dimensions of operational use and strategic use proposed by Marchand et al. (2000) while organizational IT capability is based on items adapted from Byrd and Turner (2000), Bhatt and Grover (2005), Bharadwaj et al. (1999), and Grant and Liebnau (1997). ERP value is one of the most challenging constructs in terms of operationalization. Considering the multidimensional nature of ERP value (Shang and Seddon, 2000), it is proposed to use balanced score card (BSC) approach to assess ERP value (Kaplan and Norton, 1992; Jain and Ramesh, 2005). The BSC approach integrates values across different perspectives such as internal business value, customer related value, learning and growth related value, and strategic and financial value. The BSC approach is well suited for assessing contribution of ERP systems in an organization (Edwards, 2001; Sedera et al., 2001; Markus and Tanis, 2000) because multiple perspectives employed under BSC approach are synergistic with multidimensional contribution of ERP systems. An initial set of items for ERP value has been tested through a pilot survey and preliminary results indicate the robustness of the measures. Detailed results will be available for presentation during the conference. These items are presented in appendix.

It is proposed to control for confounding effect of host of variables. These variables include organization size, industry sector, extent of ERP implementation (as measured in terms of number of ERP sites and number of implemented ERP modules), ERP vendor, time taken to implement ERP, and total time of usage of ERP system since initial implementation. The data will be analyzed using Partial Least Square (PLS) component based structural equation modelling (SEM) technique.

5 CURRENT DATA COLLECTION STATUS

The pilot phase of the study involving interviewing chief information officers (CIOs) from at least 10 organizations that have implemented ERP has been completed. Based on the results of the pilot phase, a sample of about 1000 ERP implementation sites has been identified with a target of achieving a respondent sample of 150 ERP implementation sites. Currently, responses from 55 implementation sites have been received and survey is expected to be completed later this year.

6 EXPECTED CONTRIBUTIONS

From an IS perspective, this research contributes in multiple ways to current literature on IT value and ERP value. This study integrates capabilities from many dimensions associated with organizational ERP use and management, comprehensively analyzing these capabilities' impact on ERP value. Given the complex nature of ERP systems and the multiple ways such systems can be used by an organization (Clark et al., 2006), the value of an ERP system is a result not only of its successful deployment, but also its effective and efficient usage in the post-implementation phase (Moon, 2007). Current research frameworks available in IS literature focus on capabilities associated with either the pre-implementation phase or implementation phase of an organization's ERP system. Few frameworks integrate capabilities across the pre-implementation, implementation, and post-implementation phases of ERP systems and analyze how such capabilities influence ERP value. From this standpoint, this study contributes significantly to current literature on ERP value.

A review of current IS literature reveals that not many studies that have analyzed the impact of quality of ERP system use on ERP value. Majority of studies are overly concerned with factors affecting the pre-implementation and implementation phases of ERP (Nah et al., 2001; Allen et al., 2002) but very few studies focus on how ERP systems deliver value in the post-implementation phase. While the quality of ERP system use has been studied earlier (see for example, Boudreau, 2003; Clark et al., 2006), its effect on ERP value has not been studied in prior research on ERP. By incorporating quality of ERP system use into the research model, this study has attempted to redirect the focus on ERP end-users to highlight how ERP use behavior of end users can influence the value realized from ERP systems. From this standpoint, this study makes a significant contribution to ERP literature. On the same note, the quality of information use has been studied in generic IT contexts, but not in an ERP context.

This research makes multiple methodological contributions to IS research in general and ERP value research in particular. This study's most important methodological contribution is in its operationalizing the notion of ERP value comprehensively. Very few studies in ERP value literature have focused on operationalizing measures across multiple dimensions of ERP value and validating them in a nomological net. Using the Balanced Scorecard (BSC) approach, this study will be able to conceptualize and validate measures of ERP value across these dimensions: internal business oriented ERP value, customer-oriented ERP value, learning and growth-oriented ERP value, strategic and financial-oriented ERP value.

The measures for quality of ERP system use are proposed to be operationalized for the first time in this study, even though current ERP literature does include case studies about how end users in an organization interact with ERP systems. The measures and their subsequent validation in a nomological net will provide a set of validated measures to researchers focusing on the post-implementation usage behaviour of ERP end users in organizations.

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Appendix:

Instrument items: Quality of ERP System Use

End users interact with ERP application in a very superficial way
End users stick to an initial set of learned commands without attempting to find better ways of using ERP application
End users tend to master a particular sequence of steps they have to follow to do their job rather than attempting to understand the rationale
End users are capable of using the majority of features available in their ERP application
Users are capable of tweaking their use of ERP application when faced with constraints
End users are comfortable enough with the ERP to experiment with it and create alternative ways of using it
End users try to identify new ways of using the ERP application that may optimize task performance or organizational processes
End users apply the ERP system in an innovative manner to support new tasks or existing tasks
End users are able to suggest and enhance ERP application to provide better support for organizational processes

Quality of ERP Information Use:

Dimension	Item Description
Operational Use of ERP Information	The extent to which the organization uses information provided by ERP systems to coordinate activities across different business units
	The extent to which the organization monitors information provided by ERP systems about processes to cut costs
	The extent to which the organization uses information provided by ERP systems to delegate decision-making to the lowest levels of the organization
	The extent to which the organization uses information provided by ERP systems for better management of human resources throughout the organization
	The extent to which the organization uses information provided by ERP systems to better manage resources allocated to various business units
	The extent to which the organization uses information provided by ERP systems to improve communication across business units
Strategic Use of ERP Information	The extent to which the organization uses information provided by ERP systems to shape business strategies
	The extent to which the organization uses information provided by ERP systems to ensure business partner loyalty
	The extent to which the organization uses information provided by ERP systems to explore new product markets and business opportunities
	The extent to which the organization uses information provided by ERP systems to manage relationships with suppliers
	The extent to which the organization can explicitly identify and plan exploitation of information provided by ERP systems

ERP Value:

Dimension	Item Description
Internal Business Oriented ERP Value	The extent to which ERP has provided better coordination between functional and business units within the organization
	The extent to which ERP has helped in monitoring performance
	The extent to which ERP has helped in improving the quality of decisions
Customer Oriented ERP Value	The extent to which ERP has helped in improving service response time to customers
	The extent to which ERP has helped in anticipating customer needs better
Learning and Growth Oriented	The extent to which ERP has helped employees in gaining insights into organizational working

	The extent to which ERP has provided support to continuously improve core business processes
Strategic and Financial Oriented ERP Value	The extent to which ERP has contributed to sales growth for the organization
	The extent to which ERP has provided advantage over competitors
	The extent to which ERP has facilitated business innovation in market strategy or creating new businesses