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Exploring ERP post-implementation modifications and their influence on business process outcomes: a theory driven model

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Abstract

The objective of this research in progress paper is to develop a theory-driven model to categorise post-implementation modifications to ERP systems and to understand the relationship between the identified categories and business process outcomes that are generated as a result of the modifications. While ERP systems can improve the efficiency, effectiveness and flexibility of business processes, the relationship between these outcomes and post-implementation modifications is not understood adequately. The model proposed here provides a theoretical foundation for research into the impact of modifications on business process performance, and brings clarity to the definition of an ERP modification by developing a typology of modifications.

Keywords: ERP, post-implementation, modification, business process outcome, model development

INTRODUCTION

Enterprise Resource Planning (ERP) systems are packaged suites of application software, capable of fully integrating business processes, and are adopted for enterprise management (Grabski et al. 2011). Once implemented into organisations, these systems require maintenance, enhancements and/or version upgrades. Consequently, many organisations find the need to undertake selective post-implementation modifications to maintain, update, and further align the system with the organisation's functions and strategies (Ng 2001). Post-implementation modifications include all forms of maintenance, enhancements and upgrades, and are necessary for the stability of the system and to align the system with business requirements (Ng et al. 2002). To date, modifications have received scant attention in comparison with matters that concern initial adoption and implementation of ERP systems (Law et al. 2010). Nonetheless, with enhancement and upgrade releases provided by ERP vendors, organisations decide whether to implement the change, even though they may not know how that change will influence organisational performance (Cao et al. 2010; Kraemmergaard et al. 2012). This research in progress paper describes the development of a theory-driven model to understand how ERP post-implementation modifications influence ERP capability and business process outcomes. The model presents a typology of post-implementation ERP modifications, with propositions of how different types of modifications influence business process outcomes. As a contribution to the theoretical body of knowledge, the model is expected to extend the applicability of organisational motivation, organisational learning and resource-based theory to ERP post-implementation context. To information systems management practice, the model could: (a) provide a rich understanding of post-implementation ERP modifications and, (b) inform the development of principles about how to design a modification project. The paper is organised as follows. First, the relevant theoretical perspectives are reviewed. Next, the model and propositions are presented, followed by a discussion of the methodological approach adopted to evaluate the model and propositions. Afterwards, the current status of this in-progress research is described and conclusions drawn. Throughout the paper, *modifications* are used to refer to ERP post-implementation modifications.

THEORETICAL PERSPECTIVES

Arguments underpinning the influence of ERP modifications on business process outcomes are based on theories of organisational motivation, organisational learning and the resource-based view of the firm.

Organisational Motivation: In the information systems (IS) literature, organisational motivation refers to high-level objectives of the organisation to initiate a particular project (Smith et al. 2008), and organisational needs/desires that prompt initiation of an innovative IT system (Rahim et al. 2011). For example, several studies (Rahim et al. 2007; Rahim et al. 2011; Smith et al. 2008) have relied on organisational motivation as a construct

to evaluate inter-organisational systems. The two major motivations to implement an ERP system are business and technical (Markus and Tanis 2000; Velcu 2007). Business motivation refers to an organisational intention to gain benefits that gear the organisation towards customer focus and overall productivity and profitability (Themistocleous et al. 2001; Tomblin 2010). A technical motivation, on the other hand, is an organisational intention to attain benefits by exploiting the technical capabilities within the system. Although organisational motivation as a construct has been used in the broader IS literature, only a few ERP post-implementation studies have made explicit reference to organisational motivation; and the concept of organisational motivation has not been adopted as a theoretical construct to clarify how or why ERP modifications are initiated.

Organisational Learning: Organisational learning theories have the potential to explain how organisations approach post-implementation modifications to their ERP systems. Organisational learning concerns the active use of data in guiding organisational behaviour (Edmondson and Moingeon 1998). It describes the efficient application of captured and assimilated knowledge to achieve positive influences on organisations' IT infrastructure as well as business experience (Tomblin 2010; Kane and Alavi 2007). While there are several organisational learning lenses, we adopt the exploitation and exploration organisational learning theory to further understand modifications. March (1995) argues that learning to improve firm performance involves a trade-off between exploration and exploitation, defining exploration organisational learning as discovery and innovation, and exploitation organisational learning as refinement and extension of existing competencies. In other words, the utilisation, refinement and extension of existing capabilities is considered to be exploitation organisational learning, whereas, the search for alternative capabilities that are able to strengthen future exploitative potential is exploration organisational learning (Yamin and Sinkovics 2007; Kraemmerand et al. 2003). Based on the different features that characterise each learning type, we argue that ERP modifications can be classified using exploitation and exploration organisational learning concepts.

Business Process Outcomes - A Resource-Based View (RBV): We adopt an operational approach to modifications by seeking to understand the impact of ERP modifications on business process outcomes. Business processes are a sequence of activities for the creation of goods and services by the conversion of input to output, and consist of physical and information flows, which can be affected by IT systems (Dutta and Roy 2004). This approach permits process-oriented assessment of the value of modifications and is supported by the resource-based view (RBV), where the effect of an organisation's resources on business processes can be measured (Porter and Millar 1985; Wade and Hulland 2004). RBV, championed by Barney (1991), and refined by Mata et al. (1995) suggest that organisations compete with one another based on their resources, where firm resources include assets and capabilities utilised in implementing strategies. Assets are defined as anything tangible or intangible that can be used in creating or offering products, and capabilities as repeatable patterns of actions that are used to create and offer products to the market (Amit & Schoemaker, 1993; Wade & Hulland, 2004). As such, an ERP system is considered to be an organisational resource, and ERP capability is understood as routines within an ERP system, that enables the system to deliver functions and services to organisations (Karimi et al. 2007b). Classifications of ERP capability are based on three separate but related operational-level effects driving business benefits from ERP systems: automational, arising from ERP capability to integrate and derive value by substituting capital asset for labour and reducing cost, leading to process efficiency; informational, arising from ERP capability to collect, store, process and disseminate information, leading to process effectiveness; transformational, arising from ERP capability to facilitate and support process innovation and transformation, leading to process flexibility (Karimi et al. 2007b; Mooney et al. 1996; Uwizeyemungu and Raymond 2012). We refer to these effects as automational, informational and transformational ERP capabilities, which respectively translate to three business process outcomes: efficiency, effectiveness and flexibility.

RESEARCH MODEL AND PROPOSITIONS

We acknowledge the existence of several other theoretical perspectives (contingency theory (Dempsey et al. 2013; Otieno 2010), agency theory (Basu and Lederer 2004) and critical theory (Pozzebone, Titah, and Pinsonneault 2006)) that could be applied to help explain ERP post-implementation modifications. However, other theories were not considered for inclusion in our research model because our aim is to develop a parsimonious model for understanding post-implementation modifications to ERP systems. We believe that the inclusion of several other theoretical perspectives would make it complex to understand the phenomenon of interest. In addition, the use of more theoretical perspectives (than we have adopted) in a single model is likely to make the model difficult to operationalize due to practical reasons such as the need for large research instruments and large sample size.

Drawing on the notions of organisational motivation, organisational learning and RBV, our research model identifies four distinct categories of ERP modifications linking to three types of business process outcomes. The

argument underlying the formulation of the model is embedded in the idea that the variation in business process outcomes from ERP systems can be explained by a corresponding variation within ERP modifications initiatives. Therefore, not all modifications initiatives are expected to produce similar business process outcomes because of the diversity in their ability to increase ERP capability. The model is expressed in two parts: a typology of ERP modification initiatives; and a set of propositions linking types of ERP modifications to business process outcomes (measured in terms of efficiency, effectiveness and flexibility). Figure 1 presents the theory driven model linking ERP modifications with business process outcomes.
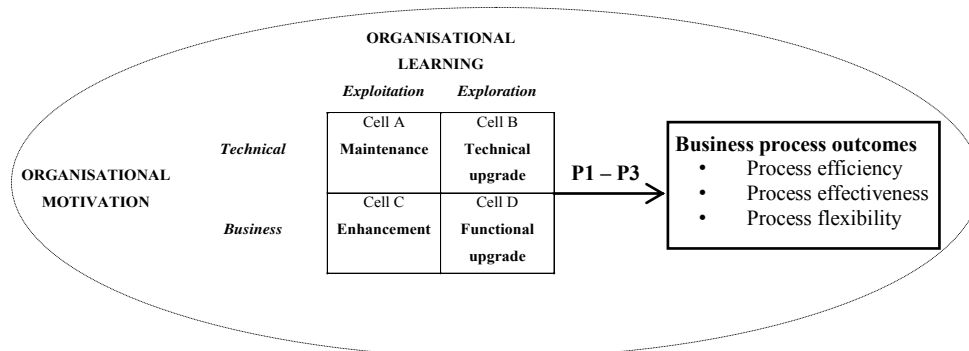

Figure 1   A model linking ERP modifications with business process outcomes

Based on the theoretical discussion on organisational motivation and organisational learning, we propose a typology of ERP modification initiatives as presented in the left hand side of Figure 1. ERP modifications include maintenance, enhancements, technical upgrade and function upgrade. These are discussed as follows:

Maintenance (Cell A): Cell A represents a category in which organisations undertaking ERP modifications are driven by a technical organisational motivation and a desire to use the 'exploitation' organisational learning approach to support modification initiatives. In this category, organisations would typically be interested in minor corrections and further adjustments made in the ERP system due to technical bugs (requiring support packages or patches, on-going system support, help desk support and bug fixes (Ng 2001;Worrell 2007)). As maintenance modifications are driven by issues that concern the technicality of the ERP system, organisations, when undertaking maintenance modifications are considered to demonstrate a technical motivation. Therefore, it is proposed that organisations undertaking maintenance modifications are unlikely to demand any business process outcome from the modification initiative. In fact, an instance of maintenance modification may be compulsory, demanding urgent attention (Law et al. 2010). From an organisational learning perspective, maintenance modifications can facilitate better utilisation of the technical capability of an ERP system. Maintenance modifications are not intended to provide or develop new technical capability, and as such do not illustrate a search for alternate capability, which exemplifies explorative organisational learning. Rather maintenance modifications characterize exploitative organisational learning because they are likely undertaken as routine activities to stabilise and maintain an efficient system, with no indications of new strategies or technologies, innovation or risk-taking.

Technical upgrade (Cell B): Cell B represents a category in which organisations undertaking ERP modifications are driven by a technical organisational motivation and a desire to use the 'exploration' organisational learning approach to support modification initiatives. A technical upgrade is an upgrade undertaken to move an implemented system onto the latest technology platform, without implementing new functionality capable of changing user behaviour or business processes (Greenbaum 2009). We argue that organisations embark on a technical upgrade of their ERP system when there is a desire for an enhanced technical infrastructure to further support their operations. As the underlying motive is technical infrastructure and not to initiate business features, it is reasoned that technical upgrade modifications will be guided by a technical motivation alone. Concerning organisational learning in the ERP post-implementation context, technical upgrades represent a form of exploration because though they only enhance the technology platform and not the organisation's business functions and processes, they involve the implementation of key emerging and established technologies. Technical upgrade modifications lead to the development of new knowledge, thereby unleashing new technical capabilities. Furthermore, undertaking a technical upgrade modification is risky since the process of upgrade requires thorough analysis of IT infrastructure, modifications and customisations to the ERP source code. For instance, Khoo et al. (2011) found that technical upgrades can disrupt the equilibrium of the information system, requiring extensive staff training efforts. In summary, organisations undertaking technical upgrades do not merely seek to build on the existing technology platform, but wish to embrace new technological platforms, thus employing exploration learning. This reasoning is

supported by Tomblin (2010), who argues that in the ERP post-implementation phase, exploitation describes the use and maintenance of existing capabilities and exploration describes the search for alternate capabilities.

Enhancement (Cell C): Cell C represents a category in which organisations undertaking ERP modifications are driven by a business organisational motivation and a desire to use the 'exploitation' organisational learning approach to support modifications initiatives. It is argued that with enhancement modifications, organisations will seek the inclusion of new business functionality within their ERP modification initiatives and will request bolt-on functionalities, new modules, design and implementation of customizations, as well as creation or modification of user interfaces. All these requests are made in order to facilitate enhanced business objectives and strategies. This view of inclusion of the above mentioned features as a characteristic of enhancement type ERP modification is consistent with suggestions that the consideration of a modification as enhancive should be based on the measure to which it contributes to business objectives (Nicolaou and Bhattacharya 2006). For instance to accommodate business growth, and improve data use. Enhancement modifications appear not to be technically motivated as the existing technical platform forms the basis on which new functionality is pursued. In terms of organisational learning, enhancement modifications, similar to maintenance modifications (Cell A), exemplify refinements and better use of capability, and are considered to be a form of exploitation learning. Enhancement modifications do not represent exploration learning because organisations only seek additional features and functionalities on an existing technical platform. Additionally, modifications in this category usually result in predictable changes, with no indications of innovation, thus typifying exploitation learning. This notion follows Kraemmerand et al. (2003) who suggest that as organisations learn to exploit software in a state in which it currently exists, their desire for exploration is lessened; hence enhancements are sought, not with novel functionalities in mind, but with the underlying goal of refining current functionalities.

Functional upgrade (Cell D): Cell D represents a modification category in which organisations are driven by a business organisational motivation and a desire to use the 'exploration' organisational learning approach to support modification initiatives. It is argued that a functional upgrade is generally undertaken to extend the business process functions of an existing ERP system, and to gain new business functionality on a new technical platform. It is thus more complex than a technical upgrade and involves the adoption of new business processes as well as automation of previously un-automated processes. This view is consistent with Fryling (2010). In agreement, Beatty and Williams (2006) recommend functional upgrades to reflect business expansion and strategy change. Thus, like enhancement (Cell C), functional upgrade modifications (Cell D) are considered to be driven by a business motivation. Unlike technical upgrade modifications (Cell B), which are initiated by the IT department, functional upgrades are largely initiated as part of a line-of-business initiative and enhance both business and IT functions of the ERP system. In terms of organisational learning, functional upgrade modifications represent new knowledge development, problem solving mechanisms, strategies and technologies; all indicative of exploration. As a result, a functional upgrade is likened to an initial implementation, which improves IT infrastructure quality as well as business operations, and is considered to be an explorative learning effort (Kraemmerand et al. 2003). In agreement, Zarotsky et al. (2006) suggest that cross-functional changes to business processes as well as new business processes are initiated during functional upgrades, as is the case with initial implementations. Furthermore, undertaking a functional upgrade involves new ideas, technologies, strategies, and high risk (Nah and Delgado 2006); characteristics which typify exploration learning.

In the next section, propositions are derived to reflect modifications as influencing business process outcomes.

Propositions: The propositions reveal the influence of modification categories on business process outcomes: efficiency, effectiveness and flexibility. The propositions are presented after the explanation of each business process outcome:

Business process efficiency: Most organisations wish to attain business process efficiency when they implement an ERP system (Gunasekaran and McGaughey 2007; Nicolaou and Bhattacharya 2008). Thus, after implementing ERP, organisations continue to undertake modifications to increase the ERP system's ability to business process efficiency by increasing automational and integrative ERP capability (Harris and Davenport 2006; Karimi et al. 2007b). However, although it is likely that some modification categories would help improve the ability of the ERP system to provide the desired process efficiency, some others may not have a direct impact on efficiency because they may not deliver the necessary changes required for improved efficiency. Rather, they may improve the capability for information processing and dissemination. As such, it is reasoned that technically motivated modifications (Cells A & B), which focus on correcting, refining existing technical capabilities and incorporating new technical capability, may only correct and update the ERP system but are likely to have no impact on automational and integrative efficiency-related ERP capability. This is because technically motivated modifications do not include new or improved functions that may permit an increase in

efficiency-related capability. On the other hand, business motivated modifications (Cells C & D), which are accompanied by new business functions and capabilities, may initiate changes that improve automational and integrative ERP capability. However, the realisation of improved process efficiency from modifications would depend on whether or not the modification improves automational and integrative ERP capability.

Following the RBV's position that the possession of non-valuable resources puts an organisation in a position of competitive disadvantage (Beard and Sumner 2004; Mata et al. 1995), we argue that all categories of modifications are likely to increase the value of an ERP system. However, technically motivated modifications, though able to ensure a stable well performing system, are not directed towards new or improved integration of business, and are unlikely to emphasize cost minimisation or increase in productivity gains. As such, only modifications that include new business functionality will provide capabilities for more cost-effective business operations (Ng 2006). Thus, the following are proposed:

Proposition 1a: *Maintenance and Technical Upgrade modifications (Cells A and B) have no impact on process efficiency.*
Proposition 1b: *Enhancement and Functional Upgrade modifications (Cells C and D) that increase automational ERP capability improve process efficiency.*
Proposition 1c: *Enhancement and Functional Upgrade modifications (Cells C and D) that do not increase automational ERP capability do not improve process efficiency.*

Business process effectiveness: Operational effectiveness from ERP systems goes beyond cost and time savings; it includes increased resource utilisation, improved decision making, reduced waste, increased responsiveness, improved product or service quality (Beheshti and Beheshti 2010; Karimi et al. 2007b). As such, it appears that only modifications that present advances in information and communication technologies and/or business processes are likely to increase informational effects required to attain ERP-based operational effectiveness. For instance, explorative modifications potentially deliver new functions and/or technologies, and are not only focused on the internal functioning of the ERP system within organisation to deliver process efficiency, but also on the ability of the firm to process and disseminate information. New user interface, better reporting structures and add-on products supported by new versions are able to facilitate increased use of information (Kremers and Dissel 2000; Ng 2006), thereby improving informational ERP capability. Likewise, business motivated modifications, which are undertaken in response to business needs and aimed at attaining a greater fit between the organisation and the ERP system, have the potential to deliver capabilities that enhance ERP capability for resource utilisation and increased responsiveness (Karimi et al. 2007b). These categories of modifications are likely to improve the capability of an ERP system to use data created as a result of ERP automation, and as such improve informational ERP capability. Thus, both business and technical motivated modifications may have the ability to generate improved process effectiveness. As suggested by Harris and Davenport (2006), organisations can commit resources to tailoring the ERP system to meet business needs and undertake version upgrades to increase ERP capability to optimise business processes and achieve effectiveness.

However, unlike the explorative technically motivated modifications (technical upgrade), which at the least provide new user interfaces, the exploitative technically motivated modifications (maintenance) do not deliver new features or new technology capabilities, and are unlikely to improve informational ERP capability. For instance, though maintenance modifications may eradicate bugs, they are incapable of delivering technologies/functionalities that enhance ERP-based process effectiveness. This is because maintenance modifications only seek to ensure that the ERP system is technically stable and free of errors. By contrast, modifications in categories of business motivation and explorative organisational learning prospectively possess the potential to improve process effectiveness by delivering functionalities that extend ERP capability to deliver complete and consistent information for improved decision making (Harris and Davenport 2006). With faster and more efficient technology platform delivered by technical upgrades, and additional functions for improved business processes delivered by enhancements and functional upgrades, an organisation may gain not only automational ERP benefits for process efficiency, but also informational benefits for process effectiveness. Therefore, the following are proposed:

Proposition 2a: *Maintenance modifications (Cell A) have no impact on process effectiveness*
Proposition 2b: *Technical Upgrade, Enhancement, and Functional Upgrade modifications (Cells B, C and D) that increase informational ERP capability improve process efficiency*
Proposition 2c: *Technical Upgrade, Enhancement, and Functional Upgrade modifications (Cells B, C and D) that do not increase informational ERP capability do not improve process effectiveness.*

Business process flexibility: For an ERP system to be a source of competitive advantage, it must deliver much more than operational efficiency and operational effectiveness; it must also be designed innovatively, be unique and allow differentiation from competitors (Beard and Sumner 2004; Seddon 2005). The capability of an ERP system to facilitate innovation and differentiation is described as ERP's transformative effect, facilitating process flexibility (Karimi et al. 2007a; Karimi et al. 2007b; Uwizeyemungu and Raymond 2012). We argue that a functional upgrade modification (Cell D), due to its characteristics (new business functionality and new technology platform), will increase process flexibility.

Following the RBV, we argue that an ERP system is a source of competitive advantage only if it is valuable, rare, inimitable and non-substitutable. ERP systems are unquestionably of great value to many organisations, but it is debatable whether many of such systems are rare, inimitable or non-substitutable. Beard and Sumner (2004), and Ng and Chang (2009) argue that rarity can only come from the implementation of upgrades in a faster and more economical fashion than competitors. Inimitability, Kalling (2003) argues, proceeds from efforts to iteratively develop the system as it is used to ensure that it always meets operational needs. As the system becomes better aligned with operational needs, it is likely that the system will become unique and increasingly difficult to imitate (Ragowsky and Gefen 2008).

Technically motivated modifications, which are simply concerned with correcting, adapting, updating and enhancing the technology platform of the ERP system, may have no direct effect on transformational ERP capability. Likewise, enhancement modifications, which provide new business functions for old technology platforms, may not permit innovation and differentiation because they are fundamentally the original technology with some new operational features, but are unlikely to deliver any substantial improvement in transformative capability. Thus we argue that only an explorative business motivated modification (functional upgrade) improves ERP based process flexibility. It presents new technology platform and new business functions, thus permitting strategic use of data to improve product/service innovation and differentiation, as well as improved customer and supplier relationships. Hence we propose:

Proposition 3a: *Maintenance, Technical Upgrade, and Enhancement modifications (Cells A, B, and C) have no impact on process flexibility.*

Proposition 3b: *Functional Upgrade modifications (Cell D) that increase transformational ERP capability improve process flexibility.*

Proposition 3c: *Functional Upgrade modifications (Cell D) that do not increase transformational ERP capability do not improve process flexibility.*

RESEARCH METHODOLOGY

Given that there is currently no theoretical framework that explains the association between ERP modifications and business process outcomes, our study represents a theory-building endeavour. It follows a critical realist ontological perspective and involves three distinct phases: exploratory case study, multiple case study and a domain expert panel. This research can be considered to be a realist information systems evaluation research as it: (a) attends to how and why post-implementation modifications to ERP systems have the potential to impact business process outcomes and, (b) aims to understand what circumstances promote or inhibit such outcomes (Carlsson 2009). A critical realist approach to IS evaluation research views outcomes of an information system implementation as a result of mechanisms and context, and examines the causal factors underlying particular outcomes; seeking to answer the "how" and "why" questions in IS research by providing empirically supported statements about causation (Smith 2006). Although a realist IS evaluation research seeks to explain rather than predict; it aims to develop theories for practitioners by examining outcomes of information system implementations using a theory-testing pattern (Carlsson 2003;Dobson et al. 2007). With this approach, we seek, not simply to verify the propositions per se, but to understand why and how modifications to ERP systems have the potential to influence process efficiency, effectiveness and flexibility. In other words, we aim to understand the business process outcomes of ERP modifications by analysing context and mechanisms, with an objective to develop transferrable and cumulative lessons that facilitate theory generation.

While the critical realist study can be conducted using a mix of quantitative and qualitative data, case study is commonly used because it is ideal for capturing context, which represents a major aspect of critical realism. A realist case approach, as it is termed, is well suited to relatively bounded complex phenomena like organisations, and as such enterprise systems evaluation (Dobson et al. 2007). Other than the fact that it is entirely consistent with the realist ontology, we adopt a qualitative case study research strategy for the following two reasons:

- Our goal is to understand 'what' ways ERP post-implementation modifications can be classified, and 'how' these modifications influence business process performance; Yin (2009) suggests that such questions are better addressed using qualitative methods.

- Our research is exploratory in nature and a qualitative research approach facilitates rich insight from participants. These insights can be used in refining the proposed typology and in exploring the association between identified modifications categories and business process outcomes. Such insights are difficult to capture from the use of quantitative methods like surveys.

The first empirical phase is an exploratory case study to find out whether instances of ERP modifications in an organisation can be neatly classified into one of the cells shown in our research model, and to discover whether the propositions associated with each category can be evaluated. The research propositions will be evaluated using pattern matching (Yin 2009), and comparing the capabilities and business process outcomes of post-implementation modification categories predicted in the research model with those identified from the case study data. The outcomes that differ from predictions will be further analysed to pinpoint explanations for the divergence.

In summary, the exploratory case study will help us in two specific ways: (a) to partially assess the suitability of our proposed modifications categories and its associated propositions, linking with three types of business process outcomes and; (b) to refine the interview protocol so that we have greater confidence in its application during the subsequent multiple case study. To fully evaluate the model, four organisational case studies will be conducted within the next empirical phase; organisations' experiences with different modifications and the resulting effect of modifications on business process outcomes will be captured. Analysis of four case organisations and contexts will provide opportunity for knowledge development and causal explanations. The outcome will be the generation of a theory that provides an analytical framework to interpret similarities and differences between different modification initiatives and business process outcomes. As the final phase, a domain expert panel will validate findings.

CURRENT RESEARCH STATUS

The exploratory phase of this research is currently in progress. As part of this phase, we have interviewed a business analyst and an IS project manager at a large manufacturing company in New South Wales. Interviews are currently being transcribed, after which data will be analysed to classify the ERP modifications experience of the company in terms of one of the four cells included in the model (Figure 1). For the exploratory case study, our goal is to identify the presence of organisational motivation and organisational learning concepts in classifying the ERP modifications initiatives of this company. Next, the propositions associated with the modification categories in which the company's modification initiatives lay will be evaluated based on the data. A multiple case study will then be initiated.

CONCLUSION

In this paper, we have presented: (a) a theory-driven model that links ERP post-implementation modifications with business process outcomes; efficiency, effectiveness and flexibility; (b) a typology of ERP post-implementation modifications based on the concepts of organisational motivation and organisational learning; and (c) a set of propositions predicting the influence of modifications on business process outcomes, drawing on a rigorous review of the ERP literature and the resource-based view (RBV). The model is currently being evaluated using an exploratory case study approach, the findings of which will be reported in future publications. The model, when fully validated is expected to make contributions to theory and practice alike. To the theoretical body of knowledge, a typology of ERP modifications based on organisational motivation and organisational learning concepts (described in the broader IT and ERP literature streams) enriches the ERP literature and extends the applicability of specific organisation theories (motivation and learning) to ERP post-implementation context. Improved understanding facilitated by the model creates a foundation for theory development in future ERP post-implementation research. The practical contribution of the model to organisations is expected to be a method for classifying ERP post-implementation modifications. In addition to this, we anticipate that the model will provide better knowledge of how business process efficiency, effectiveness and flexibility may be obtained from a modification initiative; for instance, knowledge of business process outcomes as dependent on ERP capabilities enhanced by modifications. Particularly for senior managers, the model will serve as a tool for guiding modification initiatives to enhance ERP capability. As an ERP system embodies an organisation's business processes, increasing ERP capability enhances business process optimisation, an important area for achieving competitive advantage.

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