Abstract

To date we are still unclear how ERP client-organizations make their ERP upgrade decision. In this research-in-progress, we (1) review literature on issues surrounding ERP upgrade decision-making, (2) formulate and postulate a conceptual model of ERP upgrade decision based on both the empirical research paper and trade press literature, and (3) empirically validate and modify the proposed conceptual model of ERP upgrade decision. To achieve this, multiple interpretative case studies will be conducted. Participant observations, interviews, documentations and archival records will be used in the data collection. Various qualitative methods including pattern-matching technique are used to analyze the cause-effect between various factors (such as business benefits of a new ERP version, new ERP version's fit with organization’s way of doing business, organization’s cultural norms and political support from top management) and ERP upgrade decision. In addition, symbolic interactionism is used as a theoretical lens to identify the intrinsic symbols attached to an ERP system. Institutional theory and incentive theory are applied to explain how organizational factors and business benefits factors (which are extrinsic in nature) impact on ERP upgrade decision. The expected main contribution from this study is to propose a unified theory that can comprehensively conceptualize and explain how ERP client-organization made their ERP upgrade decision.

Keywords: enterprise resource planning, institutional theory, software upgrade, upgrade decision, incentive theory, symbolic interactionism.
1 INTRODUCTION

The top three ERP vendors are still SAP, Oracle and Microsoft Dynamics (Panorama 2010a). SAP is reporting having more than 100,000 customers worldwide (SAP AG 2010), assuming that SAP possesses 31% of ERP software system’s market share (Panorama 2010a), then the installed base of ERP software system worldwide is approximately 322,581 customers. This figure also implies the potential numbers of companies planning for ERP upgrades in the future. According to Acumatica (2010), the typical ERP upgrade cycle is between 5 to 7 years. And, the average age of a midsize company’s ERP implementation is approximately seven years (Wailgum 2009).

ERP maintenance and upgrade topic is important as it is part of the ‘Global IT Debt’ – “The cost of clearing the backlog of maintenance that would be required to bring the corporate applications portfolio to a fully supported current release state”, according to a Gartner research group’s press release (Gartner 2010). As per the report, IT dept is estimated to be $500 billion in 2010, with potential to grow to $1 trillion by 2015. The main reasons for this are driven by “a combination of application sprawl, poor portfolio management and Sisyphean-like spending requirements” (Wailgum 2010a). The ERP upgrade is one of the major activities in ERP maintenance ‘iceberg’, which can be costly, risky and disruptive to business operations. The issues of maintenance and upgrade, from the ERP-clients’ perspectives, are continuously existing and requiring extensive attentions and effort as far as continuous business improvement and benefit-realization are concerned. Upgrading an ERP solution is not trivial as elements such as program code, user interface, data structures, tables, reports, business processes, and formats or methods for integrating with other systems inside or outside the enterprise could have changed dramatically (Beaumont 2004). AMR Research reported that on average, upgrade costs one man week of project effort and $1,839 per business user (Swanton et al. 2004). In general, the costs of upgrades are still too high, regardless of the type of upgrade project (Caruso 2004).

Upgrade decision has to be justified by its value, usefulness, and contribution to the business of the client organizations. According to a survey in Panorama’s 2010 ERP report (Panorama 2010a), 55% of ERP client-organizations realize 30% or less of expected business benefits. “More often than not, the failure has little or nothing to do with the software itself; instead, it happens because companies don’t leverage the full potential of the software” (Kimberling 2010). To some organizations, in order to wait for the ROI from previous investment, they will put off their ERP upgrade project. To other organizations, for some reasons, “for most IT managers, ERP upgrades fall under the heading of things to be put off as long as possible” (Paul 2008). Delaying upgrade has its associated problems such as resulting in a more complicated and expensive upgrade project, a last minute and hasty upgrade caused more users resentment and more resistant to use the new system later on (Paul 2008).

We know very little about ERP upgrade decision. Yet, to date we observe paucity of empirical and theoretical research with which to conceptualize and explain how (and the important factors affecting) the upgrade decision is made. ‘An upgrade decision’ is defined as a decision made which results in the installed old ERP version (partly or as a whole) being replaced by a newer version either for the same or different vendor’s product.

The importance of this study includes (1) identifying the theories that can best explain the decision-making process involved in ERP upgrade, (2) better understanding how ERP upgrade decision is made, and (3) discovering the most important factors that determine the upgrade decision. The research questions addressed in study are: (1) what is the nature of ERP upgrade decision? (2) How ERP upgrade decision can be best conceptualized? (3) How ERP upgrade decision-making is formulated?
ERP UPGRADE

Experiences from ERP analyst finds that the true reason most ERP (or more specifically SAP’s ERP) client-organizations upgrade their ERP system is “because they’ve reached the end of their extended support agreements for R/3 4.6C” (Bjorlin 2008). Swanton, Samaraweera and Klein (2004) stated that 45% of the upgrades are forced by technology changes, the ending of support, and bug fixes or statutory changes. Most companies can't afford the risk of an unsupported ERP system, and few, if any, have the capability to fully support the vendor's software (McMahon 2004). Some organizations find ERP upgrade project a good opportunity to consolidate various ERP software instances to obtain better business process efficiency (Bjorlin 2008). There are also client-organizations upgrading their ERP system in order to create a foundation for other business initiatives such as business intelligence (BI 7.0) and customer relationship management (CRM 2007); and hardware replacement for cost savings (Bjorlin 2008). New and enhanced functionality in the new release is another compelling factor driving the decision to upgrade (Ostrom 2004; Swanton 2004). According to AMR Research (Jahnke 2002) based on 109 companies, the most often cited benefits were enhanced functionality and improved ability to collaborate with business partners. (However, the learning scope may increase due to new transactions, screens and enhanced functionality.)

Allesch (2004) and Ostrom (2004) find that (for the case of SAP ERP system) total cost of ownership (TCO) savings can also be achieved with new release such as SAP NetWeaver or extension set such as integrated Internet transaction system and business warehousing because of reduction in integration costs and reduced maintenance license on other products, and opportunity to eliminate redundant software components in the architecture. Some clients may take up upgrades in order to take advantage of new technical features (e.g. Java platform within Web Application Server (Web AS)) (Ostrom 2004), better IT platform (e.g. the service-oriented architecture platform to allow better future ERP system’s maintenance delivery and to get better integration with other additional systems such as customer relationship management and product lifecycle management (Bjorlin 2008). Other reasons for the clients to conduct upgrades are strategic business benefits of new solutions (CRM, SCM, portal) (Beaumont 2004) in relation to the suppliers and the customers of the target company and operational benefit such as operational cost reduction (Jahnke 2002; Ng & Chang 2009).

Other reason is to avoid higher maintenance costs for the older versions, such as an additional 2% (could be an increase of $50K per annum) on fees for certain versions (Ostrom 2004). Thirty-nine percent of client-organizations surveyed in Panorama’s ERP report (2010b) expect to make employees’ jobs easier. Other important reasons for the ERP clients to do upgrades are the need to adapt changes and to make compliance to new standard, regulatory or government regulation (Kremers & van Dissel 2000; Swanton 2004; Kumar 2008). SAP client-organizations find that compliance requirements (e.g. financial and environmental compliance such as SOX, WEEE, RoHS), and best practices such as internal control and risk management as the key business driver for upgrading to SAP ERP 6 (Kumar 2008).

According to Wailgum (2009), many midsize companies’ ERP systems are not up to the vendor’s standard of a current software. ERP must be maintained and/or upgraded but its scope has made upgrade expensive and risky to business (Swanton 2004), and painful experience (Wailgum 2010b). Others find frequent upgrade can be costly and disruptive (Kimberling 2010). Figure 1 shows the general decision making steps involved in ERP client-organizations in considering their ERP upgrade decision.
Figure 1. ERP Upgrade Decision-Making

A research conducted by Aberdeen Group (2010) shows that the top reasons for delaying upgrade are budget and time constraints as well as lack of apparent value. Other factors potentially impact (e.g. midsize companies) considerations in decision on ERP upgrades are the deteriorating economic and existing business conditions (Wailgum 2009). AMR Research finds that new applications do not show any immediate return, and waiting for specific functionality are other ERP upgrades deferring reasons.

Study by Ng and Tan (2004) shows that the symbols of extravagance costs of an ERP upgrade project, the sense of uncontrollability in the new changes and the use of a new ERP upgrade software system, and reliance on vendor for supports attached to an ERP system have caused a large government authority in Singapore to postpone its ERP upgrade decision. Other companies may perceive that they are happy with current release (Swanton et al. 2004) and others perceive that as long as the existing business operation is functioning properly then they do not have the urgent need to do upgrade (Aberdeen Group 2010).

The AMR Research, based on an interview survey with 250 end-user large-companies, discovered a bundle of reasons related to organizational factors behind which ERP client-organizations deferring upgrade projects. There are (Swanton et al. 2004): unable to justify the cost to management (27%), plan a larger consolidation project including upgrade (7%), too many customization/modifications (7%), and waiting for staffs and consultants to be trained on new release (3%).

3 THEORETICAL FOUNDATION AND RESEARCH MODEL

In this section, we seek to identify the existing theories that can help to explain and understand how ERP client-organizations make their ERP upgrade decisions (for both yes- and no-upgrade decisions). Based on the literature review on ERP upgrade, we suggest/propose that an ERP upgrade decision, in fact, can be sufficiently explained by looking at the ERP client-organization’s institutional factors (e.g. cultural norms, ways of doing business, conformity); incentives or business benefit factors (which are extrinsic in nature believed to be obtained resulting from an ERP upgrade); and the symbols that an ERP client-organization attaches to an ERP system (which are intrinsic in nature). In order to explain the organizational/institutional factors, we apply the institutional theory; for the incentives or business benefit factors, we use the incentive theory; and for the symbols attached to an ERP system factors, we adopt the symbolic interactionism.

3.1 Institutional theory

Institutional theory suggest that “firm behavior is compliant, habitual, unreflective, and socially defined” (Oliver 1997, p. 699). Organization’s institutionalized activities (including ERP decision-making), according to Oliver (1992), tend to be enduring, socially accepted and resistance to change.
Some institutionalized activities may have no obvious economic purposes (Oliver 1997). Instead of making rational decision all the time, “institutional theorists argue that many activities in firms … are so taken for granted or so strongly endorsed by the firm’s prevailing culture or power structure that decision-makers no longer even question the appropriateness” (Oliver, 1997, p. 700). For example, some ERP client-organizations may delay an ERP upgrade until they can justify the costs of an ERP upgrade and keep an outdated or unsupported version of an ERP system.

The basic premise of institutional theory is that “firms’ tendencies toward conformity with predominant norms, traditions, and social influences in their internal and external environments” (Oliver 1997, p. 700). For instance, due to conformity to government regulation such as financial and environmental compliance (see (Kumar 2008)) and/or pressure from the value chain (Kremers & van Dissel 2000; Jahnke 2002; Kumar 2008). In contrast, some ERP client-organizations prefer to delay an ERP upgrade because of the new version does not conform to their ways of doing business (Swanton et al. 2004).

### 3.2 Incentive theory

According to the Wikipedia (2010), incentive is “any factor (financial or non-financial) that enables or motivates a particular course of action, or counts as a reason for preferring one choice to the alternatives. It is an expectation that encourages people to behave in a certain way”. Incentive theory has been widely applied in behavioral psychology (Killeen 1982), and applied to other fields in economy (Gibbons 2005), sociology (Ellingsen & Johannesson 2008), and corporate management and strategy (Holmstrom & Milgrom 1991; Martimort 1996).

Incentive theory is rooted on the Law of Effect or operant conditioning, proposed by Skinner (2005), which suggests that one’s behavior is driven by “consequences which have followed the similar behavior in the past” (p. 87). In other word, decision or selection made based on this idea can be referred as selection by consequences, as described in (Skinner 1981). For instance, an ERP client-organization that has previous experienced business benefits realization from a prior ERP version will have the motivations or incentives to upgrade its existing ERP system. In contrast, if an ERP client-organization has not obtained any business benefits realization yet from a prior ERP version, then it will have no incentive to do a new ERP upgrade.

Following the results or consequences of prior behavior (e.g. implement an ERP upgrade or install an ERP system), one/organization sets those consequences as the goals or targets for the similar behavior (i.e. do an ERP upgrade) in the future. Thus, the basic concept behind incentive theory is the goal (intended to be achieved) (Killeen 1982). This goal is usually extrinsic in nature, caused by external factors which pull people towards it.

This theory was later further developed and extended to include the factor of magnitude of incentive (Killeen 1985) and delays involved in incentive (Killeen 1982). Killeen (1985) finds that increasing the amount of incentive can increase one’s tolerance with delays involved in getting the incentive. Other researchers (Foster & Hackenberg 2004) observe that the choice of the goal is determined by the delays involved in achieving the incentive. For example, if one’s main goal of performing an ERP upgrade is to avoid vendor support termination and the ERP client-organization has been waited for a long time for any business benefit realization to occur, then these are weak incentives/goals. Skinner (1981) suggests that under this situation there is no incentive actually exists. Conversely, if one’s ERP upgrade goal is to take advantage of new functionalities in order to obtain more efficient business operations and this goal has previously been achieved in a short-period of time, then the incentive to do an ERP upgrade is very strong.

### 3.3 Symbolic interactionism

According to Gopal and Prasad (2000), “symbolic interaction is rooted in the social constructionist position that views all social interaction as following from the meanings assigned by individuals and groups to objects and events in the course of everyday life and practice” (p. 513). Social construction,
as proposed by Berger and Luckmann (1990), is institution’s experiences with objects and events (e.g. an ERP system) that are socially constructed in a particular social setting (e.g. in an ERP client-organization setting). On the other hand, symbolic interaction is primarily focused on how people interpret their own social situations (Prasad 1993).

Symbolic interaction is a methodology framework, traditionally used in sociology and social psychology (Hewitt 1988), and is also applied in studying various information systems such as group decision support systems (Gopal & Prasad 2000) and ERP systems (Ng & Tan 2004). Feldman and March (1981) suggest that “information technologies are used and introduced primarily for their symbolic value”. However, this initial symbolic value(s) attached to an IS/IT may changes after it has been used and interacted with people and business processes, and differently socially re-constructed in different social settings.

In this study, we are interested in studying how the symbols attached to an existing ERP system impacts on an ERP client-organization’s ERP upgrade decision. Supported by the empirical findings by Ng and Tan (2004) symbolism attached to an ERP system is another important component to be considered in examining ERP upgrade decision. This theoretical lens of analyzing ERP upgrade decision is suitable as it complements with the nature of the Incentive Theory focusing on the decision maker’s extrinsic factors. Symbolic interactionism emphasizes and helps in explaining the intrinsic factors, such as extravagance costs of an ERP upgrade project, sense of uncontrollability in the new changes of a new ERP upgrade software system and reliance on vendor for supports (Ng & Tan 2004), possibly considered by an ERP upgrade decision maker. Figure 2 below shows the conceptual model investigated in this study.

![Figure 2. Conceptual Model of ERP Upgrade Decision](image)

## 4 RESEARCH METHODOLOGY

Case study method will be conducted. **Why** – (1) Case study method is chosen as: it can cover several forms of inquiry that help to understand and explain the meaning of social phenomenon with as little disruption of the natural setting as possible (see (Yin 2003)). (2) Also, as there is very little guiding theory available (e.g. in this context of ERP upgrade decision), researchers such as Benbasat, Goldstein and Mead (1987), Yin (1994) and Gable (1994) state that under these circumstances the case study is the most appropriate research method.

The specific typology of case study used here is interpretative (or analytical or explanatory) case study method. **Why** – This type of case study method requires rich descriptions and elaborations of the case organizations, which does not only limited to the ERP upgrade decision-making but also the issues surrounding it in order to better understand the ERP upgrade decision. It is different from straightforward descriptive studies by their complexity, depth, and theoretical orientation (Yin 2003). According to Yin (2003), this type of case study is suitable for developing conceptual categories, and illustrate, support or challenge theoretical assumptions held prior to the data collection. This research method has the potential to provide the level of abstraction which may range from suggesting relationships among variables to constructing theory (Yin 2003). In this case, it will be similar to
grounded theory proposed by Glaser and Strauss (1967), which is a systematic generation of theory and formulation of hypotheses from conceptual ideas, and identification of the concepts based on the key points of the data collected.

At least six case studies with six ERP client-organizations will be implemented to understand how their upgrade decisions are/were made. At the same time the collected data will be used to “illustrate, support or challenge” our theoretical assumptions proposed in Figure 3. This will be followed by making the relevant changes to the proposed unified theory of ERP upgrade decision to better formulate the proposed theories.

**Case selection** – The criteria set in choosing the right case study are limited to the manufacturing industry situated in the same country and using the ERP system from the same vendor. Other additional criteria: for case-type 1 – ERP client-organization that has implemented and has made and/or is making an ERP upgrade decision, i.e., it has experienced at least one ERP upgrade project (either for a single module or the whole ERP version); and for case-type 2 – ERP client-organization that has not done any ERP upgrades for more than five years, or is still running on an officially unsupported version of ERP system.

The targets of respondents in this study are the top executives such as CEO, CIO, and/or CFO who are familiar and involved in making ERP upgrade decision. Information is gathered with the intent of analyzing, interpreting, or theorizing about the phenomenon. Data collection methods may involve (1) Interviews – which can be structured, semi-structured, and/or unstructured; (2) Archival records / Database; (3) Documentations – reports, forms, procedure, manuals, etc.; (4) Direct observation; (5) Participant observation; and (6) Physical artifacts/evidence (Yin 2003).

**Open coding and focused coding** – Emerson, Frez and Shaw (1995) suggest the use of initial open coding in analyzing field notes and interview transcripts to identify and formulate ideas and themes (involved in making an ERP upgrade decision), and then focused coding is applied to determine and explain the core themes. This is followed by writing a narrative-style and thick description of each case organization participating in this study (Gopal & Prasad 2000).

**Case comparison analysis** (Yin 2003) – (1) confirm and identify how the symbols attached to an ERP system differ between ERP client-organizations that do upgrade and defer upgrade projects; (2) confirm and identify how the institutional factors differ between ERP client-organizations that do upgrade and defer upgrade projects; and (3) confirm and identify how the incentives/business benefits factors differ between ERP client-organizations that do upgrade and defer upgrade projects.

**Pattern-matching** – For the predicted pattern of specific variables (e.g., institutional context, motivation/incentive factors, symbols attached to the ERP system and ERP upgrade decision) defined before data collection, the pattern being matched is the key cause-effect pattern between independent and dependent variables (Yin 2003).

For data validation (see (Yin 2003)) such as: (1) construct validity – multiple source of evidence, chain of evidence, and data triangulation will be conducted; (2) external validity – provision of the characteristics of the case firm, and verification of findings consistency with other findings (if applicable) will be provided; (3) reliability – case protocol and case study database will be developed and maintained in this study; and (4) interpretation bias – iterative feedback from the interviewees on interview records and interpretations will be obtained. The potential software used in the data analysis process is the analysis software for word-base records (AnSWR).

The anticipated results from this study are: (1) The conceptual model (i.e., the unified view) of ERP upgrade decision that shows the institutional theory, incentive theory and symbolic interactionism are sufficient to explain the different types of ERP upgrade decisions made by client-organizations, and supports and validates the various cause-effects suggested in the model; and (2) Research method – i.e., this research integrates the symbolism interactionism methodological framework with case study research method. Thus, we expect to identify the lessons-learnt from the integration of the two research methods.
References


