
Active Management Strategies of Enterprise Resources Planning (ERP) Implementation

Sandeep Kumar* & Dr. Vineet Kansal**

**Research Scholar, Department of Computer Science, Dr. K.N. Modi University, Newai, Rajasthan*

*** Director, ITS, Engineering College, Greater Noida*

ABSTRACT:

Implementation of Enterprise Resource Planning (ERP) solutions, which involve both technical and social uncertainties, is in practice a highly uncertain, risky endeavour. Traditional ERP practices address implementation of ERP as a static process; such practices focus on structure, not on ERP as something that will meet the needs of a changing organization. As a result, many relevant uncertainties that cannot be predefined are not easily accommodated. Options theory, which addresses uncertainties over time, resolves uncertainties in changing environments that cannot be predefined. In this paper, we propose an options perspective on the ERP implementation process with a focus on uncertainty. This perspective takes into consideration the often-changing nature of the companies that undertake ERP implementations. By actively managing ERP implementation, management can improve the flexibility of ERP implementation and can take appropriate actions to respond to the changing ERP implementation environment, to achieve more a successful ERP implementation that better meets the needs of the organization.

Keywords: Active management, ERP, Managerial flexibility, Real Options

INTRODUCTION

Several streams of study of ERP implementation have provided foundational theories on implementing ERP. One such stream focuses on the interactions between ERP and organizations (Gattiker et al. 2004; Soh et al. 2000; Somers et al. 2003), and makes the observation that ERP implementation is closely intertwined with complex organizational factors, and thus faces both technical and social uncertainties that cannot be predefined in full, thus that ERP must by necessity be actively managed. Another stream of study concentrates on risk factors in ERP implementation. Such studies point out explicit key risk factors, such as process fit and user fit, that unchecked contribute to the failure of ERP implementation (Hong et al. 2002; Mandal et al. 2003; Scheer et al. 2000; Sumner 2000). Other studies investigate risk factors in different ERP implementation phases and note that by actively managing problems that evolve over time, better ERP implementation will be achieved (Kumar et al. 2003; Loh et al. 2004; Markus et al. 2000; Rajagopal 2002; Ross et al. 2000).

The enterprise resource planning (ERP) system is an integrated set of programs that provides support for core organizational activities such as manufacturing and logistics, finance and accounting, sales and marketing, and human resources. An ERP system helps the different parts of the organization share data and knowledge, reduce costs, and improve management of business processes. ERP requires establishing five core competencies, among which is the

use of change management strategies to promote the infusion of ERP in the workplace. Although some studies tried to address this problem by identifying change management strategies that facilitate the success of ERP implementation, many ERP systems still face resistance, and ultimately, failure.

The six categories that he adopted include; implementation of ERP, optimization of ERP, management through ERP, the ERP software, ERP for supply chain management and case studies, have also undertaken a critical review of empirical literature on ERP system business values, which investigates the impact of ERP system adoption on various measures of organizational performance; they then critically reviewed in the same journal article the literature concerning the related topic of critical success factors (CSFs) in ERP system implementation, which aimed at identifying and investigating factors that result in more successful ERP system implementation, which generates higher levels of value for organizations. Research focuses on the identification and deeper understanding of 'internal' factors (related to the internal functions of the organization), which can increase the business value generated by MIS, such as the business process redesign, new human skills, innovations, 'soft MIS investment', etc. Finally, in the fourth period (from 2005 until today) researches have started dealing with the effect of 'external' factors, which are related to the external environment of the organization, such as generalized competition, strategy, industry concentration, industry dynamism, etc. on MIS business.

Although the value of the role that management may play during ERP implementation has been recognized and many risk factors have been identified for successful ERP implementation, active management is, on the whole, still an implicit concept in the bulk of existing literature that does not address how active management should best implement ERP. Previous ERP implementation has been regulated by net present value (NPV) rules that assume that ERP implementation is static, and thus does not take into account the value that active management may add to ERP implementation.

In this paper, we provide the ERP implementation process with an options perspective based on options theory, which addresses uncertainties over time, allowing adaptation to environments that frequently change. This paper aims to enable active management of ERP implementation. Active management permits the reshaping of strategies and allows for quickness when reacting to risks, and we show in later sections that it can increase the probability of success for ERP implementations. The goal of the present paper is to demonstrate how marketing and ERP implementation ideas and strategies together could help overcome workers' resistance to ERP.

LITERATURE REVIEW

1. ERP (Enterprise Resource Planning)

ERP (Enterprise Resource practices and modern technology Planning) is principally an integration of business management. Information Technology (IT) integrates with a corporate house's core business processes to streamline and accomplish specific business objectives. Consequently, ERP is an amalgamation of three most important components: Business Management Practices, Information Technology, and Specific Business Objectives. In

simpler words, an ERP is a massive software architecture that supports the streaming and distribution of geographically scattered enterprise information across all the functional units of a business house. It provides the business management executives with a comprehensive overview of the complete business execution, which influences their decisions in a productive way.

Today's ERP software architecture can possibly envelop a broad range of enterprise functions and integrate them into a single unified database repository. For instance, functions such as Human Resources, Supply Chain Management, Customer Relationship Management, Finance, Manufacturing Warehouse Management, and Logistics were all previously stand alone software applications, generally housed with their own applications, database, and network. Today, they can all work under a single umbrella – the ERP architecture. In order for a software system to be considered ERP, it must provide a business with much functionality that have features like flexibility, modularity & openness, broadness, the finest business processes, and global focus. ERP Systems Improve Productivity, Speed, and Performance.

2. IMPLEMENTING AN ERP SYSTEM

Implementing an ERP system in an organization is an extremely complex process. Implementing an ERP system eventually necessitates significant changes on staff and work processes. Organizations generally use ERP vendors or consulting companies to implement their customized ERP system. There are three types of professional services that are provided when implementing an ERP system, they are Consulting, Customization, and Support.

- Consulting Services – are responsible for the initial stages of ERP implementation where they help an organization to bring their new system to life with product training, workflow, improvement in ERP's use in the specific organization, etc.
- Customization Services – extend the new ERP system's use or change its use by creating customized interfaces and/or underlying application code. While ERP systems are made for many core routines, there are still some needs to be built or customized for a particular organization.
- Support Services – include both support and maintenance of ERP systems, for instance, troubleshooting and assistance with ERP issues.

The ERP implementation process goes through five major stages: Structured Planning, Process Assessment, Data Compilation & Cleanup, Education & Testing, and Usage & Evaluation.

1. Structured Planning: is the foremost and the most crucial stage where any capable project team is selected, present business processes are studied, information flow within and outside the organization is scrutinized, vital objectives are set, and a comprehensive implementation plan is formulated.
2. Process Assessment: is the next important stage where the prospective software capabilities are examined, manual business processes are recognized, and standard working procedures are constructed.

3. Data Compilation & Cleanup: helps to identify data to be converted and the new information that would be needed. The compiled data is then analyzed for accuracy and completeness, throwing away the worthless/unwanted information.
4. Education & Testing: aids in proofing the system and educating the users with ERP mechanisms. The project team tests and verifies the complete database via multiple testing methods and processes. A broad in-house training is held where all the concerned users are oriented with the functioning of the new ERP system.
5. Usage & Evaluation: is the final and an ongoing stage for the ERP. The lately implemented ERP is deployed live within the organization and the project team checks it regularly for any flaw or error detection.

2.1. ERP Implementation Life Cycle

There are a number of techniques present for the implementation of ERP systems but the search is for the one which is the most effective with minimum risk. Efforts to better understand and manage ERP adoption processes has led to the development of conceptual ERP life cycle frameworks or process models by a number of researchers.

A simple four phase project model has been presented by Morin (1999) consisting of: analytical, design, tests and implementation.

The ERP implementation life cycle by Harwood, (2003). The model has the stages of need, vendor selection, and implementation, go live and review, improvement and finally market awareness that affect the entire cycle. The model is illustrated in figure 1.

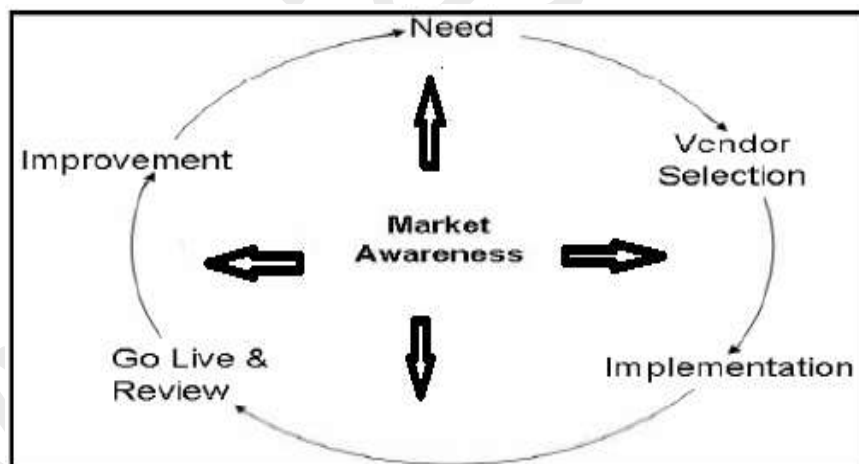


Figure 1 : ERP Implementation Life Cycle (Harwood, 2003)

According to Harwood (2003) the objectives of the organization, which approach to choose and define the participants who would be involved in the implementation life cycle are presented in the figure 2.

| ERP the Implementation Cycle | |
|------------------------------|--|
| Objective | <ul style="list-style-type: none"> ▪ To become more competitive ▪ To lower cost ▪ To improve customer satisfaction (students and staff) |
| Approach | <ul style="list-style-type: none"> ▪ To reduce non-conformance in all activities <ul style="list-style-type: none"> ○ Understanding business process and implication of the change ○ Focus ○ Planning, implementation and control ○ Education/training of the stakeholders |
| Participants | <ul style="list-style-type: none"> ▪ All people within the organization requiring <ul style="list-style-type: none"> ○ Individual understanding and awareness (by effective communication) and responsibility ○ Recognition for success ○ Management commitment and leadership |

Figure 2: Features of a Continuous Improvement Program (Harwood, 2003)

2.2. ERP Implementation Process

Hossein (2004) emphasizes that the implementation of ERP systems should be done by professionally trained consultants and not in-house as most of the businesses are complex having numerous applications and processes throughout their functional units. The implementation of the ERP system will significantly change the staff work practices and as they will require training and orientation which could be better provided by the trained outside consultants. The hiring of consultants has also been encouraged by Khosrow-Puor (2006). The services for consulting, customization and support can be hired. Typically an ERP system project timeline is mostly for 14 months but, this depends on a number of factors such as the size of the business, number of modules, extent of customization, the scope of change and the willingness of staff to take ownership. As the ERP systems are modules they all do not need to be implemented at the same time it can be done in phases. Hiring a consulting firm is cost effective and the duration is also variable depending on the amount of customization requirement.

Furthermore, Gibson et al. (1999) suggest that a different approach is required for ERP software implementation that places less emphasis on the technical aspects of the software implementation. More importance should be on balancing business process design, software configuration and project management of information technology implementation keeping in view the overall strategy and structure of the firm.

3. IMPLEMENTATION STRATEGY

It is very important to know how to deal with an ERP implementation project. There are various aspects that have to be taken into consideration such as taxonomies of ERP implementations, implementation methods and techniques, and comparisons with other software implementation projects. There are two different implementation strategies that can be utilized and an organization must decide as to which strategy is best for ERP implementation in their situation. It could be either be done in phases and termed as 'phased' implementation or the 'Big Bang' approach that is done altogether at the same time. The Big

Bang approach requires multiple modules implementation simultaneous where as in the phased implementation the designing, developing, testing and installing of each module is done separately of the whole ERP package (O'Leary, 2000). These two strategies presented by Welti (1999) are Step-by-Step and Big Bang strategies which are opposite to each other as discussed in detail below:

3.1. Step-by-Step Implementation Strategy

In a phase implementation strategy new interfaces have to be build between the exiting and the new system as the project progresses. The implementation is down in small stages and the chances of failure in such a step-by-step strategy are comparatively lower than in the one step implementation strategy (Welti, 1999; O'Leary, 2005). As with any strategies there are both the advantages and the disadvantages. The opportunities and threats of using the Step-by-Step strategy have been presented by Welti (1999). As the implementation is done in a sequence it reduces the complexity for coordination, control and organization of the project and resources. Each existing interface is connected to the new interface and there is smooth transition. As the cost is spread over a longer period of time it does not become a huge financial burden and the changeover is relatively smooth.

There are also some drawbacks to this approach. The biggest challenge is that the interfaces have to be customized and programmed to maintain the data transfer for implemented modules and later on, to adjust the already running modules to the new ones. This increases the project time and decreases motivation as it takes a longer period of time to implement the new system.

3.2. Big Bang Implementation Strategy

In the second strategy the organization replaces the existing system with a new ERP system at the same time. All the various ERP applications are replaced with in all the different locations of the organization at the same time eliminating the need for interfaces between the old and the new system (Welti, 1999; O'Leary, 2005).

Both the advantages and disadvantages of using the Big Bang strategy have been presented by both Welti (1999) and O'Leary (2005). As the implementations of the new system is done in all the locations at the same time there is no requirement to have an interface between the old and the new systems and this decreases the implementation time and increases motivation. There is a saving of time and the motivation level of the users is high as compared to a Step-by-Step implementation.

As with any approach it has its drawbacks as well and in this implementation strategy the biggest risk is of total failure as the implementation of the new system is done at the same time it is very complex and if it does not work then all is lost at once. Although the implementation time of such a strategy is less but the development time is more i.e. the time between development and implementation may be longer. So in the long run there may be no time advantage either when compared to the Step-by-Step strategy.

3.3. Vanilla Implementation Strategy

Another implementation approach very common in many organizations is the 'Vanilla' implementation approach (Parr and Shanks, 2000; Holland et al., 1999; McCredie and

Updegrave, 1999; McConachie, 2001), which focuses on minimal customization of the ERP package. In this implementation approach usually relies on the business process reengineering (BPR) by the institutions to fit within the setup structure and processes of the university. The vendor delivers the ERP system with no modification or changes to the product to make it fit the existing institutional processes and procedures (Bancroft et al., 1998). The comparison of ERP design alternatives are given in figure 3.

| ERP Implementations types | | | |
|---|-------------------------|--|---|
| Type of Implementation | Details | Benefits | Deficits |
| Vanilla implementation | Complete vendor package | Total integration across all functional areas Re-engineering of all business processes | Expensive Time-consuming |
| Selected ERP modules | Mixed breed | Less costly and time-consuming | Lacks total integration of data Limited applicability and use |
| Build in-house | | Can create system based on its needs Competitors will not have access to similar system | Time- and resource-consuming Expensive Risky May not provide competitive advantage |
| Maintain concurrent legacy systems (status quo) | | Familiarity | May be a competitive disadvantage |

Figure 3: ERP Implementations types (Adapted from summer 2005)

3.4. Selection of Implementation Strategy

The selection of the approach for the implementation of ERP systems is done according to the organizational structure, its complexity, economic issues, and strategic partners; In addition to this Markus et al. (2000b) suggest that the time constraints and geographical location play a vital role in the selection of the implementation approach. Once the selection of an ERP system is done then it is very important to determine the most efficient way for implementation of the new system. The transition from the old to the new system should be smooth.

According to Herzog (2006), the standard approach can be selected as it is more convenient and can easily maintain customized ERP systems. There is also the option to select best modules of the different ERP systems and integrate them. In the implementation of an ERP system the factors to take into consideration are the balance between the number of systems, the degree of customization, the complexity and adaptability of the processes and the cost and maintenance of the system in the long run.

4. IMPLEMENTATION SUCCESS

Implementing ERP systems can potentially allow a company to manage its business better with potential benefits of improved process flow, better data analysis, higher quality data for decision making, reduced inventories, improved coordination throughout the supply chain, and better customer service. ERP system is a major project requiring a significant level of resources, commitment and changes throughout the organization. Often the ERP

implementation project is the single biggest project that an organization has ever launched. As a result, the issues surrounding the implementation process have been one of the major concerns in industry. And it further worsens because of numerous failed cases, including a few fatal disasters, which lead to the demise of some companies. Reflecting such a level of importance, the largest number of articles belongs to this topic. It comprises more than 54% of the entire articles. Many of these articles share implementation experiences from various companies. Some articles attempt to explain why the ERP implementation is difficult and what needs to be done to achieve desirable results. Furthermore, various models of implementation stages and different implementation methodologies are presented. A group of articles are classified under a sub-topic of 'Case Study'; these articles typically investigate the ERP implementation experiences at one or several companies and provides real data and observations. Unlike other articles which also use case studies, here extraction of general knowledge is more emphasized. Also, the articles belonging to this sub-topic tend to focus on individual cases. Some generalizations are occasionally provided in these articles. One of the popular topics in the ERP implementation is to identify or develop 'Critical Success Factors – (CSF)', product life cycle have become very short and technology is changing more rapidly hence new success factors may be arising.

A thorough risk management assessment should be carried out for a smooth and successful implementation. The design of the ERP system is more process oriented in nature and emphasizes the horizontal coordination across the various functional departments. This benefits the entire organization through increased capability to respond to the environmental factors both external and internal and better manage change (Davenport, 2000b). Similarly Kumar and Hillegersberg (2000) further elaborate that the best practices set in the ERP software present potential for the improvement of management competences.

5. DIFFICULTIES OF ERP IMPLEMENTATION

In the view of (Wong, et al. 2005; Monk and Wagner, 2006) various studies have reported failed ERP implementation attempts and consequently the companies have lost not only the millions invested in the package and the consultants hiring but, also lost a major portion of their business. Furthermore, although the various companies spend millions on pounds on the ERP package and its implementation process, there is evidence to the fact that they still encounter various difficulties during the actual implementation this fact has been pointed by (Shehab et al., 2004). A number of such common implementation difficulties are :

- **Managing Technological Advancement**
- **Proper management of ERP**
- **High Cost of Technology**
- **Employee Training and Turnover**
- **Vendor Reliability & Dependence**

6. CHANGE MANAGEMENT STRATEGIES FOR ERP IMPLEMENTATION

Improvement strategies, such as ERP implementation, commonly involve change. Hence, responsiveness to internal customers is critical for an organization to avoid the difficulties

associated with this change (Al-Mashari and Zairi, 2000; Aladwani, 1999; Aladwani, 1998). To assist top management with the complex organizational problem of workers' resistance to ERP implementation, I suggest an integrated, process-oriented conceptual framework consisting of three phase's knowledge formulation, strategy implementation, and status evaluation.

6.1. Knowledge formulation phase

The first step in effectively managing change introduced by IT is to identify and evaluate the attitudes of individual users and influential groups (Aladwani, 1998).

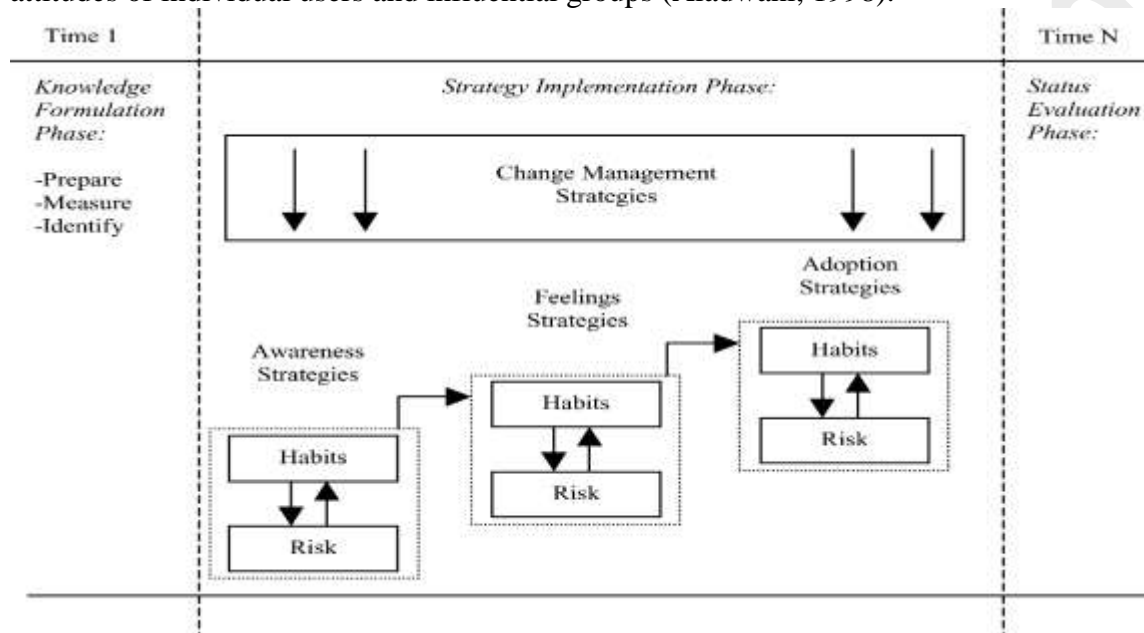


Figure 5: A suggested framework for managing change associated with ERP

According to Hultman (1979), employee-raised facts, beliefs, and values are good indicators of what may cause their resistance to change. This could well be applied to the context of implementing an ERP system. For example, some users may raise issues about their computer illiteracy, or may say that they have spent many years doing an excellent job without help from an ERP system. Other users may develop beliefs that their jobs will be threatened by the new system, or that they will not know how to do the job within the scope of such a system. Yet another group of users may stress values such as the importance of existing power and authority structures.

6.2. Strategy implementation phase

Management can use the knowledge regarding potential users from the previous stage to set up strategies that can best overcome users' resistance to the ERP system, and to convince as many users as possible to adopt it (Aladwani, 1998). If this is the case, it is more appropriate to find an action sheet for implementing the selected strategies. The three-level adoption process (think-feel-do) provides a good framework for describing this phase.

Further, if change agents convince ERP users that their net outcome of the adoption process will be positive, then they will develop strong feelings toward accepting and adopting the new system (Amoako-Gyampah, 1999). The cost minimization strategy should be developed in such a way that it affects both individual workers and influential groups. On the individual

level, the ERP system has to minimize the perceived cost for each employee in order to create a positive adoption attitude.

Last but not least, top management commitment is critical for the success of the whole ERP implementation process (Gable and Stewart, 1999; Stratman and Roth, 1999). Change requires a strategic vision to ensure its long-term success (Aladwani, 1999). In a recent survey by Zairi and Sinclair (1995), leadership was ranked the number one facilitator of large transformation efforts (such as the one introduced by an ERP). ERP implementation can only be accomplished when senior management is totally committed to the initiative. Management commitment and support is the ultimate strategy that will secure the necessary conditions for successfully introducing the change brought by ERP into the organization.

6.3. Status evaluation phase

The process of monitoring and evaluating change management strategies for ERP implementation is the last component of the suggested framework. Besides having a performance measurement system to ensure that the desired business outcomes were achieved (Al-Mashari and Zairi, 2000), important to have a performance system to monitor the progress of ERP change management efforts. It is imperative that top management makes sure workers' anxiety and resistance to ERP is under control. The status evaluation phase provides feedback information to top management in a dynamic manner.

In order to be useful, the feedback should be timely, accurate, and systematic. Based on status evaluation phase outcome, top management takes appropriate action. The feedback coming from the evaluation phase may be positive, which means that recorded performance of counter resistance efforts should be maintained (at least). Alternatively, the performance feedback may be negative. Management may find that there is still strong workforce resistance to the operational changes resulting from ERP implementation. In such a case, top management should make every effort to understand what went wrong. For example, top management may want to re-identify users' needs and re-evaluate the execution of adopted change management strategies to find an acceptable fit between the two.

CONCLUDING THOUGHTS

To overcome users' resistance to change, top management has to:

- study the structure and needs of the users and the causes of potential resistance among them;
- deal with the situation by using the appropriate strategies and techniques in order to introduce ERP successfully; and
- Evaluate the status of change management efforts.

ERP implementation is costly, lengthy, and risky, replete with complex organizational factors such as initially unknown requirements, unexpected user adoption contingencies, and rapidly changing IT environments. Allowing ERP implementation to be regulated by NPV causes a situation where management is unable to respond to uncertainties, thus creating huge opportunity costs. Previous knowledge reveals that phased ERP implementation resolves different uncertainties in different phases. Under this basis, we view ERP implementation with a sequence-of-decisions options perspective, rather than a single decision event. The

results suggest that treating ERP implementation as options provides agility in constant changing environment by to have flexible plans that can adjust to future conditions, and gain better benefits by such active management.

Our study demonstrates how active ERP implementation management is achieved by the options perspective. Future research can be conducted into case studies and empirical comparisons of the effects of the options perspective and the differences between the passive management and the actively management in ERP implementation. For researchers, although ERP implementation has been one of the most significant challenges in the last decade, relatively little research has been conducted into how to support active management in ERP implementation. Active ERP implementation management is still an implicit concept in existing literature. We explicitly discuss active ERP management to bridge the gap and extend the literature by offering an options perspective in ERP implementation. This perspective resolves the uncertainty inherent in ERP implementation. In addition, we explicitly explore how active management can be made. For practitioners, because most companies still make decisions without an explicit understanding of options (Copeland et al. 2001) this paper helps them to take appropriate actions to respond to the changing ERP implementation environment, and achieve more successful ERP implementation.

In this paper, successful ERP implementation requires matching appropriate strategies with the appropriate stage to overcome resistance sources (habits and perceived risks) effectively. The suggested approach demonstrated how this goal may be accomplished.

For the future, a model for formal testing has its roots in the literatures on ERP implementation and marketing. It summarizes the ideas in the present paper, which provides theoretical specification for generating a cumulative body of knowledge in the ERP implementation area.

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