Examine the Critical Success Factors and The Role of Knowledge Management in Successful Implementation of Enterprise Resource Planning Systems (Erps)

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Abstract

Implementation of Enterprise Resource Planning (ERP) systems still present a significant challenge for most organizations, which usually results in serious failures. Frequent commentaries in the literature have stated that certain critical success factors (CSFs) have to be accomplished in an organization for an ERP system project to be successful. In this study we argue and demonstrate empirically that critical success factors with the variable mediator of knowledge management have a significant role in order to achieve the implementation of ERP systems.

The present study is applied and fundamental research of descriptive analytical kind. The data needed for this research are collected through library and field study. The study population includes all managers and experts related to the tea industry who work with ERP systems. A conceptual model was devised and then analyzed using structural equation modeling based on data collected from 80 valid questionnaires.

Keywords: Enterprise Resource Planning; Knowledge Management; Business process re-engineering; Organization Culture
Introduction

In the 1990s, enterprise resource planning (ERP) systems pioneered a process-oriented business management paradigm. ERP entails gaining knowledge of best business practices and applying these to improve or completely replace existing, legacy practices. The implementation projects of ERP in the 1990s and early 2000s faced challenges such as shortages of experienced project managers and consultants and limited vendor support capability. Today, experienced managers and consultants abound and vendor implementation support protocols are well developed.

However, despite this increased experience and capability, the changes required by ERP have often proven to be overwhelming in many organizations, resulting in ERP project failures (Maguire et al., 2010). The overall failures and implementation difficulties of ERP projects have attracted much research interest (Liu and Seddon, 2009), which has resulted in the accumulation of a substantial body of literature that identifies a large number of CSFs for ERP implementation and overall project success.

Enterprise system as a technology is designed to enable firms to better manage their knowledge by integration of business processes and have better control of information and data in the organization. The knowledge required during enterprise system implementation includes a variety of expertise, experiences and skills and therefore cross functional and cross divisional transfer of knowledge is necessary to ensure that the requisite enterprise system knowledge is available for a successful implementation. Implementing ERP systems leads to close communication and tighter integration of business processes which enhance organizational effectiveness and competitiveness. Using ERP systems, manufacturing companies are able to integrate business processes, organization functional units and assimilate information flow. This integration creates new knowledge that enables companies to timely obtain new market insights, quickly adjust to market changes, and rapidly respond to customer requirements. Equipped with the right KM mechanism, ERP systems also enable companies to better extend their business processes beyond the organizational boundary to include customers, suppliers, and trading partners. That is the power of knowledge management in implementing ERP system (Black, 1999).

The use of KM in ERP implementation holds considerable potential both in order to alleviate the implementation process and to provide synergetic effects in the shape of advanced ERP use. More empirical research is therefore needed in order to understand the exact benefits that can be achieved from the alleged complementary processes. The aim of this study is to contribute to this by investigating an ERP implementation project from a KM perspective.

Section 2 presents a review of the literature on ERP implementation. The research hypotheses and associated conceptual model are developed. We describe and detail the methodology that was adopted for the empirical stages of the study in Section 3. The results of the analyses are then presented in Section 4, while Section 5 discusses the findings of the study.

Literature Review

Many researchers have attempted, in various manners, to elucidate the mentioned success factors for organizations. Some researchers have issued a number of articles with the subject of critical
success factors of ERPs in various organizations. In such researches a number of which shall be referred to, the researchers have tried to identify some CSFs through studying the literature and have evaluated these factors using experts’ opinions.

But no studies have examined the variables indirect effects of critical factors through knowledge management on implementation of ERP.

Therefore, in Table 1 the critical factors of success ERP implementation are presented based on authors’ names and papers.

**Table 1: List of Csfs As Mostly Cited In Literature By Various Scholars**

<table>
<thead>
<tr>
<th>CSFs</th>
<th>Citations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Re-engineering</td>
<td></td>
</tr>
<tr>
<td>Organization culture</td>
<td>Motwani et al. (2002); Motwani etal.,(2005); Jones Mary et al.,(2006); Avisona (2007); Ke &amp; wei(2008); Dezdar and Sulaiman (2009)).</td>
</tr>
<tr>
<td>Knowledge management</td>
<td>Wang et al.),(2005)., Sun et al.,(2005); Chen et al.,(2009); Ganesh &amp; Arpita(2010)</td>
</tr>
</tbody>
</table>

1. Conceptual model:

BPR, organization culture, examine their effect on knowledge management and ERP implementation. To facilitate this examination, a conceptual model showing the potential relationships of these three factors to ERP implementation was built and is presented in Fig. 1. The relationships proposed in the model along with their associated research hypotheses are described in the following section.
2. Knowledge management and ERP Implementation:

Today knowledge is considered as a valuable key in competition. Not only it is known as the foundation for stable development, but also it is the source of keeping competitive nature of an organization which is an advantage for the organization.

So far enterprise information systems such as ERP systems are developed and implemented for mainly managing physical assets of an enterprise since 1990s. Due to the fact that both types of assets need to be properly managed, the integration of KM and ERP becomes a strategic initiative for providing competitive advantages to enterprises.

The use of KM in ERP implementation has the potential to facilitate effective product and process innovation and thus fulfill the potential that lies within an ERP system (Huang et al. 2002). The synergy effects between ERP and KM consequently include more efficient implementation methodologies, reduced implementation costs, increased user satisfaction as well as strategic business advantages achieved through innovative ERP use.

In order to benefit from KM related to ERP, the different actors must adopt different strategies based on their role in the implementation process. The implementation partner has to possess the ability to efficiently source knowledge to the client (Timbrell et al. 2001). If there is a mismatch
between the ability to transfer and absorb knowledge, it would become difficult to achieve the desired results. Larger organizations have more resources and can therefore more easily assign the resources that are needed in order to implement a KM strategy that can be used to facilitate effective product and process innovation and thus fulfill the entire potential that lies within an ERP system (Huang et al. 2002).

The range of functionality and use of ERP systems has further expanded in recent years. This has led to the complexity of the system and companies started to acknowledge the importance of managing the knowledge and experience to maximize the usage of the system. Hence, KM became one of the most important requirements to implement ERP systems.

Successful transfer of knowledge between the client, implementation partner and vendor is important in order to successfully implement an ERP system. According to the framework by Chan et al. (2001) knowledge transfer and reuse take place in the ERP implementation and use phases and involve technical, product and company content. The lack of efficient interaction between the involved knowledge owners may lead to ERP implementation failure (Chan et al. 2003). Given these arguments above, the following hypothesis was proposed:

H1) The use of KM is directly and positively associated with ERP implementation

3. Critical factors for successful ERP implementation:

Rockart (1979) introduced a Critical Success Factors (CSFs) approach to information systems. Rockart defined CSFs as the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organization. They are the few key areas where things must go right for the business to flourish. If results in these areas are not adequate, the organization’s efforts for the period will be less than desired’’.

Implementing an ERP system is not an inexpensive or risk-free venture. In fact, 65% of executives believe that ERP systems have at least a moderate chance of hurting their businesses because of the potential for implementation problems (Cliffe, 1999). It is therefore worthwhile to examine the factors that, to a great extent, determine whether the implementation will be successful. Numerous authors have identified a variety of factors that can be considered to be critical to the success of an ERP implementation. This study considers the direct and indirect influence of BPR and organization culture on ERP implementation by the achievement of KM.

3.1. Business process re-engineering (BPR):

ERP applications embed best business practices; however, these generic processes may not be compatible with the business processes and practices of the adopting organizations. Organizations may thus be required to improve or re-engineer their business processes to align them with an ERP’s business model (Lee et al., 2003).

BPR is defined as ‘the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical measures of performance such as cost, quality, service, job satisfaction and speed’ (Altinkemer et al., 1998).
BPR is a strategy to create a conducive platform to facilitate successful ERP implementation. Therefore, it is not surprising that BPR has been found to be a critical factor in the early stages of the ERP implementation process (Ngai et al., 2008). Grover, Jeong, Kettinger, and Teng (1995) identified BPR as a key success factor in implementing IT projects, such as ERP systems. Bingi, Sharma, and Godla (1999), Nah, Zuekweller, and Lau (2003), and Somers and Nelson (2004) also argued that BPR should be involved in the ERP implementation.

In addition to, the review and redesign of organizational processes can be developed with the use of production capacity and the use of organizational knowledge. In other words, enterprise knowledge management leads to improved products and services with the continuity of ideas, creativity, and consequently the proper and effective training of staff in the basic reviewing and redesign of organizational processes (Akbarpur shirazi et al., 2006). Consequently, the following hypotheses were developed:

H2: The use of BPR is directly associated with ERP implementation.

H3: The influence of the use of BPR on ERP system is mediated by the achievement of KM.

3.2. Organization Culture (OC):

The culture of an organization is defined as “a pattern of shared basic assumptions that a group learns as it solves its problems of external adaptation and internal integration, that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems” (Schein, 2000). The implementation of ERP systems always mandate change in business process and organization culture. Organizational culture plays an important role during implementation of ERP systems and consequently its success (Shah et al., 2011). It enforces rules, values and practices at the organizational and individual levels (Rasmy et al., 2005). Many companies were not successful when implementing ERP system. It was not caused by implementation approach but because the organizational culture was not ready to adopt this system

Culture can affect knowledge management in different ways. As knowledge and it's related findings can penetrate into culture, organizational culture is also affected by knowledge management. The logic behind cultural knowledge management is that presupposed specific values of an organization can result in favorable as well as unfavorable behavior and also resulting knowledge management processing.

The two fold role of culture, both as the main obstacle & also as the empowering factor in knowledge management activities, makes the importance of this factor double in efficient managing of knowledge management processes. Organizational culture is considered as the most influential factor in knowledge management. (Jans & Prasamphanich ,2003). In consideration of the above arguments, the following hypotheses were proposed:

H4: The use of Organization culture is directly associated with ERP implementation.
H5: The influence of the use of Organization culture on ERP implementation is mediated by the achievement of KM.

Methodology of The Research

1. Data collection instrument:

In line with this study, managers, executives, in ERP implementation organizations in the tea industry were chosen as Population Since the population of this study should be expert, so there were some limitation in choosing them.

The main method of data collection is the questionnaire survey since, 110 questionnaires sent through by e-mail and in person, 80 was received and completely filled, the response rate of the survey is 72%. The analysis is performed using both SPSS and LISREL software

1.1. Reliability:

The reliability of the scale measurements is tested for internal consistency using Cronbach’s alpha. The common criterion of greater than 0.7 for a better reliability is taken for the interpretation of the results. The internal consistence of the measurement scales is tested using the Cronbach’s alpha for each concept variable as well as for the complete construct. The results are presented in Table 2.

<table>
<thead>
<tr>
<th>Items</th>
<th>Cronbach’s Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Process Re-engineering</td>
<td>0.799</td>
</tr>
<tr>
<td>Organization Culture</td>
<td>0.771</td>
</tr>
<tr>
<td>Knowledge Management</td>
<td>0.727</td>
</tr>
<tr>
<td>Enterprise Resource Planning</td>
<td>0.710</td>
</tr>
<tr>
<td>The research variables</td>
<td>0.741</td>
</tr>
</tbody>
</table>

2.1. Validity:

Given that the questionnaire used in this study designed by the previous researches questionnaires and have been made based on experts, professors and advisors’ ideas, so we can be sure of its validity.
Analyzing The Data of The Research

1. Structural Equation Modeling:

Structural equation modeling based on linear relationships is constructed using LISREL 8.8, which included both measurement model and structural model construction. The resulted model is in Figure 2 and figure 3.

Figure 2: Hypotheses Structural Model In Standard Estimates By Lisrel 8.8 Software
For the measurement model, the concept variables act as the manifest variables for each research variable. The latent variables, which indicate the six research construct variable on the model, are constructed using confirmatory factor analysis based on maximum likelihood extraction method. The relevancy of manifest variables on the Latent variable is well-defined by the research framework.

In relation to absolute index, the ratio of the chi-square statistic to the degrees of freedom should be less than 3, the model equals to 1.68. RMSEA index is the root mean square approximation. This criterion is defined as the difference for each degree of freedom. RMSEA value for models that have good fitness is less than 0.10; the value of the parameters is 0.060 in the model. (CFI=0.90, NFI=0.91, GFI=0.89).

As you can see:

H1: The Relationship between latent variable of Knowledge Management and ERP implementation was found 0.50 that it shows the correlation is very well. T-statistic value of 2.23 was obtained; it indicates that the observed correlation is significant.

H2: The Relationship between latent variable of BPR and Knowledge Management was found 0.20 that it shows the correlation is very minor. T-statistic value of 1.34 was obtained; it
indicates that the observed low correlation is not significant, so the relationship is not acceptable.

H3: The Relationship between latent variable of BPR and ERP implementation was found -0.55 that it shows the correlation is very well. T-statistic value of -4.37 was obtained; it indicates that the observed correlation is significant.

H4: The Relationship between latent variable of Organization Culture and ERP implementation was found 0.58 that it shows the correlation is very well. T-statistic value of 2.81 was obtained; it indicates that the observed correlation is significant.

H5: The Relationship between latent variable of BPR and Knowledge Management was found 0.70 that it shows the correlation is very well. T-statistic value of 3.88 was obtained; it indicates that the observed correlation is significant.

Table 3 summarizes the Supported or rejected hypotheses of research:

<table>
<thead>
<tr>
<th>Structural paths in the model</th>
<th>t-statistic</th>
<th>Impact Factor</th>
<th>Supported or rejected</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1: Knowledge Management → ERP Implementation (IMP)</td>
<td>2.23</td>
<td>0.50</td>
<td>Supported</td>
</tr>
<tr>
<td>H2: Business process re-engineering (BPR) → Knowledge Management</td>
<td>1.34</td>
<td>0.20</td>
<td>Rejected</td>
</tr>
<tr>
<td>H3: Business process re-engineering →(BPR) ERP Implementation (IMP)</td>
<td>-4.37</td>
<td>-0.55</td>
<td>Supported</td>
</tr>
<tr>
<td>H4: Organization culture → Knowledge Management</td>
<td>2.81</td>
<td>0.58</td>
<td>Supported</td>
</tr>
<tr>
<td>H5: Organization culture → ERP Implementation (IMP)</td>
<td>3.88</td>
<td>0.70</td>
<td>Supported</td>
</tr>
</tbody>
</table>

**Conclusion and Suggestions**

In this research we tried to study the critical Success factors (Business Process Reengineering and organization culture) in ERP implementation system in the tea industry organizations. In this regard, first impact of each factor on knowledge management and consequently on ERP implementation system has been studied.
In line with this study, managers and executives in ERP implementation organizations in the tea industry were chosen as sample and questionnaires were distributed among them by email and in person. The collected data were analyzed by using path with LISREL 8.8 software.

The findings suggest that the impact business process reengineering variable has a direct impact on the ERP implementation system. While business process reengineering through KM dose not have an indirect impact on the ERP implementation system.

This research and the previous researches have the same results in the section of impact of organization culture on KM and ERP implementation. Organization culture has a significant impact on both knowledge management and ERP implementation. It seems that organizational culture directly increases the success of ERP implementation, also indirectly through its impact on knowledge management affects ERP implementation.

The results obtained through this survey about organizational culture and business process reengineering as an infrastructure which supports the implementation of knowledge management in companies and there by indirectly also affects the ERP implementation. The important point is that lack of understanding of organizational culture and business process reengineering and their impact on knowledge management can cause obstacles and constraints in ERP implementation. Thus, identifying the factors before implementation can contribute significantly to the success of the implementation or better execution of the project.

Thus, the failure rate is reduced and contributes to prevention of the heavy losses caused by the lack of knowledge in the organization. The results of study can be a good starting point for other researches in more details on KM, along with other critical success factors.

In this paper, the author is discussed to the main causes of process reengineering and organizational culture with knowledge management in ERP implementation but there are other factors as mediating variables are hidden from the view of the authors and have not been represented, it is hoped Other researchers to identify these factors and to examine the case study organizations.

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References


