The influence of organizational factors on successful ERP implementation

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Abstract

Purpose – This study aims to examine organizational factors (i.e. top management support, training and education, enterprise-wide communication) that may influence the enterprise resource planning system implementation success in Iran.

Design/methodology/approach – Empirical data were collected via a survey questionnaire. The questionnaires were distributed to selected managers of companies adopting ERP systems in Iran.

Findings – The results indicate that the companies’ top management must provide full support and commitment to the project if the system is to be successful. In addition, management must also ensure the plans are communicated and understood by the entire company. Finally it is also illustrated that adequate training and education pertaining to the systems must be given to all users to ensure that they are able to use the system effectively and efficiently thus contributing to their satisfaction which will subsequently influence the implementation success.

Research limitations/implications – The ERP implementation success dimensions were measured using subjective and perceptual measures. This was due to the difficulty in securing the related factual data from the participating organizations.

Practical implications – The findings may help companies planning to implement an ERP system to strategise their efforts and process to ensure successful implementation.

Originality/value – This study examines how organizational factors, namely top management support, training and education as well as enterprise wide communication among ERP users, affect ERP implementation success in Iran.

Keywords Enterprise resource planning, Top management support, Training, Education, Enterprise-wide communication, Developing countries, Iran

Paper type Research paper

1. Introduction

Over the past few years, firms around the world have implemented enterprise resource planning (ERP) systems since the use of ERP has been considered as a major determinant to gain competitive advantage. ERP is a suite of application modules that can link back-office operations to front-office operations as well as internal and external supply chains (Yang and Su, 2009). ERP allows a company to manage its business with potential benefits of improved process flow, reduced inventories, better data analysis, better customer service, and improved profit margins (Fan and Fang, 2006). Considering the benefits mentioned previously, it is easy to see why ERP systems are accepted to be one of the most significant developments in the world and also the most accepted standard business software of the last decade (Muscatello and Chen, 2008). ERP implementations in some firms are successful however there are also
many circumstances whereby the implementation was not successful, particularly in terms of timeframe and cost. In the end these firms do not reap the benefits that come with ERP implementation. A research by Zhang et al. (2005) reveals that ERP projects were on average, 178 per cent over budget, took 2.5 times as long as projected and delivered only 30 per cent of promised benefits. This is substantiated by Wang and Chen (2006), in their study, whereby more than 90 per cent of ERP implementations have been delayed, and required additional budget amounts. The question that arises here is “Why do the ERP implementations fail?” which then brings us to the next question: “What are the factors that may influence successful implementation?”. Accordingly many attempts have been made to analyse and determine factors that contribute to the successful implementation of the ERP systems. Review of the literature however indicates that most of the studies were conducted in developed nations such as the US (Nah and Delgado, 2006; Bradley, 2008; Muscatello and Chen, 2008), Canada (Kumar et al., 2003), the UK (Loh and Koh, 2004), and Australia. Nevertheless, there have been some studies conducted in the developing countries such as Malaysia (Nah et al., 2007), China (Chien et al., 2007), South American region (Colmenares, 2004). In addition, there have also studies in the Middle East region (Al-Mashari et al., 2006; Kamhawi, 2007) including Iran (Nashirifard and Nazemi 2004). However the focus of these studies were not on organizational factors. Thus, it is the aim of the study to examine and analyse organizational factors that influence ERP implementation success in Iran. It is important to focus on Iran as it has been recognized as one of powerful nation by the United Nations (Yeganeh and Su, 2008). Moreover, it has been said that the context may vary from country to country (Chien et al., 2007).

The review of the literature in the area illustrated that there are numerous factors that can be used for analysis (which is explained in detail in the next section). This study focuses on one of the factor that is organizational as it is felt that this factor is one of the most detrimental factors (Zhang et al., 2005; Dezdar and Sulaiman, 2009) that affect ERP implementation success. The findings of this study would establish whether the reasons for ERP failure are generic and universal regardless of the country’s culture and economic standing. Specifically, the results would help Iranian companies to strategise their actions particularly those intending to adopt ERP in the future.

In the following sections, the related literature is reviewed. Then, research framework and hypotheses are presented followed by the research methodology chosen to conduct the study. Next, data collection and analysis are described and findings are discussed. Finally, conclusions and implications for future research are highlighted.

2. Literature review

2.1 ERP implementation success

ERP implementation success depends on the viewpoint from which people evaluate it. ERP implementation consultants and ERP project managers often identify ERP project success in terms of finishing the project within budget and on time. ERP system users usually judge ERP success by having smooth operations with the system. Finally, top managers believe that an ERP system is successful when the company achieves business improvements and other predetermined goals (Somers and Nelson, 2004; Zhang et al., 2005). ERP success can be measured using two approaches. First, using
objective financial measures, such as company cost and profits figures. Second, using self-reported subjective ERP success measures (Nah et al., 2007; Bradley, 2008; Muscatello and Chen, 2008; Sawah et al., 2008). Although it may be more popular to measure the success in financial terms, such measures are often not permissible due to the difficulties in quantifying intangible benefits and impacts (Wu and Wang, 2007). In addition, it is also difficult to isolate ERP effect and other intervening environmental variables that may influence organizational performance (Chien and Tsaur, 2007). Therefore, this paper focuses on the subjective or non-financial criteria to measure ERP success.

A review of the literature illustrated that there are five main streams of subjective or non-financial criteria to measure ERP success. First, some of prior ERP success research (for example Kamhawi, 2007) concentrated on measures relating to project management success like “time, budget and predetermined goals”. Second, a number of prior ERP researchers (Chien and Tsaur, 2007; Fan and Fang, 2006) have employed all or some of dimensions of DeLone and McLean’s (1992, 2003) success models for their investigations. Third, several researchers have utilized the Technology Acceptance Model (TAM) developed by Davis (1986) for their ERP implementation studies. Fourth, a number of ERP implementation success studies have been conducted using the single success measure of “User satisfaction” (Wu and Wang, 2007). Finally, a greater number of prior ERP success researchers have employed a combination of the aforementioned measures in their research (Bradley, 2008; Chien et al., 2007; Nah et al., 2007; Ramayah et al., 2007; Sawah et al., 2008; Wang and Chen, 2006; Zhang et al., 2005). As can be seen, these scholars have found that ERP success projects cannot be measured using only one single measure or by following just one of known success model. Following this argument, this study examines ERP success using user satisfaction and organizational impact.

In the ERP system environment, user satisfaction refers to the extent to which users perceive that the ERP software accessible to them meets their needs (Somers et al., 2003). An ERP system with no user satisfaction is less likely to be utilized by the user community and to generate valuable outcomes to the company (Wu and Wang, 2007). Previous researchers operationalized the user satisfaction measurement in diverse ways; however, its definition remained consistent (Bradford and Florin, 2003). Ives et al. (1983) created a 13-item short-form tool, based on the Bailey and Pearson (1983). Their user satisfaction tool included three factor measures: department service and personnel, information product, and user involvement and knowledge. Many researchers (Sawah et al., 2008; Chien and Tsaur, 2007; Nah et al., 2007; Zhang et al., 2005) used the instrument for measuring user satisfaction in the context of ERP system implementation.

Organizational impact consists of the impacts of an ERP system implementation on the company’s operating cost, customer service level, overall productivity gains, and the realization of particular ERP implementation objectives. Implementing ERP software assists companies with standardized data formats, better customer service and retention, and enhanced management decision-making. Moreover, Al-Mashari et al. (2003) noted that the general goal of an ERP system is basically to advance business performance by integrating a variety of business processes across the diverse functional departments and beyond enterprise boundaries. This integration allows for well-organized information flow within the firm as well as between the company and
its customers and suppliers. Chien and Tsaur (2007) classified the organizational impacts of ERP systems into tangible and intangible benefits. Tangible benefits consist of reduction of employees, inventory reduction, improved productivity, faster closing of financial cycles, improvements in order management, enhancement of cash flow management, reduction in procurement costs, reduction in logistics and transportation costs, increase of revenue and profits, improvement in on-time delivery performance, reduction in the need for system maintenance, improved information and processes, internal integration, and improved customer service. At the same time, intangible benefits of the ERP system include improved or new business processes, better visibility of corporate data, improved responsiveness to customers, unexpected reduction in cost, worldwide sharing of information, increased flexibility, enhanced business performance, cost efficiency in staff, inventory, procurement and cash/order management, improvement in productivity, and overall profitability. Several prior researchers utilized organizational impact as a measure of ERP implementation success (Bradley, 2008; Sawah et al., 2008; Chien and Tsaur, 2007; Kamhawi, 2007; Nah et al., 2007; Ramayah et al., 2007; Fan and Fang, 2006). Although user satisfaction and organizational impact are viewed as separate measures by many, Jones et al. (2008), viewed customer satisfaction as a part of organizational impact. One factor that affects organizational performance is user satisfaction.

2.2 Factors influencing successful ERP implementation

Determining factors that are positioned behind a successful ERP system implementation has been a key research question in previous research. Implementation of an ERP system is a complex process including a great many factors and conditions which can potentially influence successful implementation. These factors might have a positive effect on the ERP implementation project outcome, whereas the lack of these conditions could create trouble through ERP implementation. The literature varies regarding what factors are vital for ERP implementation project outcome or responsible for its failure (Zhang et al., 2005). Critical success factors of ERP implementation projects have been investigated from several diverse points of view (Nah et al., 2003). Many researchers have recognized a range of factors that could be critical to the success of an ERP system implementation. For example, Somers and Nelson (2004) recognized 22 critical success factors including Top management support, Education on new business processes, User training on software, On the hand, Al-Mashari et al. (2003) identified 12 critical ERP factors such as ERP selection, project management, training and education, business process management, cultural and structural change management while Umble et al. (2003) divided the factors into 10 categories including Commitment by top management, Clear understanding of strategic goals, Excellent implementation project management, Great implementation team, Successfully coping with technical issues, Organizational commitment to change, Data accuracy, Extensive education and training, Focused performance measures, and Multi-site issues resolved. Based on Dezdar and Sulaiman’s (2009) work the factors can be grouped into 17 categories which subsequently can be re-organized into three main categories; organizational, project and system. Dezdar (2010) found organizational factors to be quite instrumental in determining the ERP implementation success. This research focus on three aspects of the organizational factors i.e. Top management support, ERP training and education, and Enterprise-wide
communication. The importance of these factors, have been discussed earlier in Dezdar and Sulaiman (2009). These factors are described in the following paragraphs.

2.2.1 Top management support. Top management support, has been emphasized, as a crucial factor in successful ERP implementation by many (Al-Mashari et al., 2003; Umble et al., 2003; Zhang et al., 2005). Ngai et al. (2008), claimed that top management support, plays a significant role in the ERP implementation success because ERP are normally large-scale and require extensive resources. Al-Mashari et al. (2003) suggested that top management support should not stop at the initiation and facilitation stage, but it should continue thorough out the entire ERP implementation process. According to Zhang et al. (2005), top management support has two major aspects in ERP implementation projects: providing the necessary resources and providing leadership. The responsibilities of top management in ERP implementation include communicating the company strategy to all members of the organization, developing an understanding of the restrictions and abilities, demonstrating commitment, and establishing rational objectives for the ERP implementation (Umble et al., 2003).

Many studies provided evidences that display how top management support is essential during the entire ERP implementation process and how it remained critical in order to reap the benefits (Bradford and Florin, 2003). Willcocks and Sykes (2000) noted that senior-level sponsorship, championship, support, and participation are one aspect of organisational factor that influences ERP success. Implementing ERP does not only involve changes in software systems usage rather it involves the repositioning of a company and transformation of all business practices. Therefore, top management should publicly, explicitly, and sincerely show their support (financial and non financial) to emphasize the precedence of the ERP implementation (Somers and Nelson, 2004).

2.2.2 Training and education. As mentioned earlier ERP is a complex system thus adequate training and education must be provided to enable the users to use them effectively and efficiently (Correa and Cruz, 2005; Zhang et al., 2005; Bradley, 2008). Training and education would further enhance the users’ level of knowledge and proficiency, thus increasing individual performance and subsequently organizational performance. Nah et al. (2003) stated that sufficient training can increase the probability of ERP system implementation success, while the lack of appropriate training can hinder the implementation. Adequate training and education may also assist the organization to build positive feelings towards the system. More important it may help ERP users to adjust to the organizational change-taking place with the implementation of the system. In addition, training increases ease of use and reduces user resistance, which, in turn, enhances the likelihood of ERP systems use and success (Bradley, 2008). Implementing an ERP system without adequate training may possibly have drastic consequences (Somers and Nelson, 2004).

2.2.3 Communication. For successful implementation of ERP systems, communication across the various functions and levels of a company is needed. Since the communication assists the ERP adopting company to minimize user resistance, it is critical from the initiation to the system acceptance phases (Somers and Nelson, 2004). Esteves-Sousa and Pastor-Collado (2000) stated that both internal communication among ERP project team members and outward communication to the entire company are very essential. Communication among different levels and
functions of ERP implementation projects needs a communication plan to guarantee that open communication happens in the whole organization and with customers and suppliers (Kumar et al., 2003). Muscatello and Chen (2008) argued that suitable communication plans should be set up to keep senior management informed on the subject of ERP project impact, challenges, risks, and progress. The communication should be conducted during ERP steering committee meetings and usual status reporting. Holland and Light (1999) suggested employing communication tools such as newsletters, monthly bulletins or weekly meetings to keep users informed about ERP implementation project progress.

Communication is one of most challenging and difficult tasks in any ERP implementation project. Nah et al. (2007) argued that it is important that employees are informed about the scope, objectives, activities and updates in advance to make ERP implementation more efficient. In enterprise system implementations, communication among stakeholders to report project progress and user input and communicating project expectations to all stakeholders are important (Sedera and Dey, 2006). According to Nah and Delgado (2006), communication should start early, be consistent and continuous, and include an overview of the system, the reasons for implementing it, and a vision on how the business will change and how the system will support these.

Based on the previous discussion, the following hypotheses were defined:

\[ H_1. \] ERP user satisfaction is positively related with ERP organizational impact.

\[ H_2. \] Top management support is positively related with ERP organizational impact.

\[ H_3. \] User training and education is positively related with ERP user satisfaction.

\[ H_4. \] Enterprise-wide communication is positively related with ERP organizational impact.

### 3. Research methodology

#### 3.1 Research design

The aim of this research is to study the organizational related factors that affect the successful implementation of ERP systems in Iran. A questionnaire was utilized to collect empirical data for this study. Items used in the operationalization of the constructs were adapted from relevant prior research (Zhang et al., 2005; Sedera and Dey, 2006; Nah et al., 2007; Bradley, 2008; Muscatello and Chen, 2008). The questionnaire consisted of three sections. In section 1, the respondents were required to fill their demographic profile such as age, gender, level of education, ERP usage period, and ERP usage frequency. Section 2 requires the respondents to indicate their perceptions on the factors that influence ERP implementation success in their organization. There were 26 items. In section 3, respondents were to indicate their perceptions on their satisfaction and organizational impact of ERP implementation in their organization. All the items in section 2 and 3 were measured using a seven-point Likert-type scale with anchors ranging from “strongly disagree” to “strongly agree”. The questionnaire was translated from the English language to the Persian language using the back-to-back technique to ensure the meanings are the same as the original.

The population for the research is Iranian ERP user companies. Since there was no particular source which complied this database, various sources was used such as web
sites of top international ERP vendors companies, web sites of top local IS vendors
companies, web sites of Iranian governmental and non-governmental organizations in
charge of IT, annual reports of public list companies published by Tehran Stock
Exchange web site. An ERP user company was defined as one that has installed at
least three basic modules of the ERP system. Moreover, the ERP system installed
should have gone live no more than three years for the reasons of personnel change and
difficulty of recalling past implementation process. Finally, a list of 31 ERP user
companies was identified.

In data collection phase, all the ERP user companies were contacted and were
required to identify a person to liaise with the researcher. The liaison person then was
required to distribute the questionnaires to all their operational/functional/unit
managers who use ERP systems. Operational/functional/unit managers were chosen
as respondents because they are among the most knowledgeable informants regarding
ERP implementation projects in organizations (Bradford and Florin, 2003). After
constant reminder, 411 completed questionnaires were collected. The questionnaires
were reviewed and 27 questionnaires were omitted, as they were incomplete. Therefore
only 384 questionnaires were used for analysis.

Before the distribution of the questionnaire to the companies, a pilot study was
conducted to ensure its reliability. The questionnaire was distributed to 54 operational
managers and 37 completed questionnaires were collected. The data were tested using
the SPSS software 16.0. It was found that the Cronbach alpha values, for all items, were
above 0.7, hence, the questionnaire was considered to be reliable as suggested by Hair
et al. (2006).

4. Data analysis and findings
The first part of analysis involves the use of descriptive statistics showing the
frequencies and percentages of the demographic variables. The second part of the
analysis examines the factors that influence ERP implementation success, using
structural equation modeling (SEM). SEM was chosen as is commonly accepted as a
powerful technique for capturing and explaining multifaceted relationships in social
science. SEM is considered as a second-generation instrument for data analysis. It is a
mixed methodology, which consists of confirmatory factor analysis, regression, and
path analysis. The majority of the first generation techniques can assess only one level
of relationship between dependent and independent variables at once. However, SEM
is able to handle a series of interrelated research issues in an inclusive and systematic
examination by modeling the relationships among several dependent and independent
variables concurrently. SEM presents multiple advantages over the more frequently
used statistical methods of path analysis and multiple regressions. SEM allows the
researcher to examine several relationships in a single analysis. It also offers the
possibility of testing overall models rather than coefficients separately. SEM has the
capability to test research models with several dependent variables. Lastly, it offers
multiple measures to evaluate model fit. The SEM analysis was carried out in
accordance with a two-step methodology proposed by Hair et al. (2006). According to
this procedure, after the model has been modified to create the best measurement
model, the structural equation model can be analyzed.
4.1 Demographic profile of respondents

Table I illustrates the demographic profile of respondents. It can be seen that there are more males than females. More than two-thirds of respondents were between 31-50 years old and more than three-fourths of the respondents held university degree. In terms of working experience, it was found that more than two thirds have been working for more than 6 years in their companies. More importantly, Table I indicated that the majority of respondents were involved fully or partially in the ERP implementation project. These statistics implies that the respondents were very experienced and well verse with their organisations’ ERP, hence, they were the best informant people to participate in the survey.

4.2 Measurement model

Assessment of the measurement model included evaluation of convergent and discriminant validity of each of the measurement scales. Convergent validity was assessed using three measures: factor loading, composite construct reliability, and average variance extracted (Hair et al., 2006). The outcomes of convergent validity test are offered in Table II. First, the entire factor loadings of the items in the measurement model were greater than 0.70 and each item loaded significantly ($p < 0.01$ in all cases) on its underlying construct. Second, the composite construct reliabilities were within the commonly accepted range greater than 0.70. Finally, the average variances extracted were all above the recommended level of 0.50. Therefore, all constructs had adequate convergent validity as recommended by Hair et al. (2006).

<table>
<thead>
<tr>
<th>Measure/categories</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>328</td>
<td>85.4</td>
<td>85.4</td>
</tr>
<tr>
<td>Female</td>
<td>56</td>
<td>14.6</td>
<td>100</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Below 30 years old</td>
<td>43</td>
<td>11.2</td>
<td>11.2</td>
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<tr>
<td>31-40 years old</td>
<td>111</td>
<td>28.9</td>
<td>40.1</td>
</tr>
<tr>
<td>41-50 years old</td>
<td>150</td>
<td>39.1</td>
<td>79.2</td>
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<tr>
<td>Over 50 years old</td>
<td>80</td>
<td>20.8</td>
<td>100</td>
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<tr>
<td><strong>Education</strong></td>
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<tr>
<td>Undergraduate</td>
<td>88</td>
<td>22.9</td>
<td>22.9</td>
</tr>
<tr>
<td>Graduate</td>
<td>184</td>
<td>47.9</td>
<td>70.8</td>
</tr>
<tr>
<td>Postgraduate (MS)</td>
<td>97</td>
<td>25.3</td>
<td>96.1</td>
</tr>
<tr>
<td>Postgraduate (PhD)</td>
<td>15</td>
<td>3.9</td>
<td>100</td>
</tr>
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<td><strong>Employment with this company</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Less than three years</td>
<td>36</td>
<td>9.4</td>
<td>9.4</td>
</tr>
<tr>
<td>3-5 years</td>
<td>61</td>
<td>15.9</td>
<td>25.3</td>
</tr>
<tr>
<td>6-10 years</td>
<td>112</td>
<td>29.2</td>
<td>54.4</td>
</tr>
<tr>
<td>More than ten years</td>
<td>175</td>
<td>45.6</td>
<td>100</td>
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<tr>
<td><strong>Involvement in ERP implementation project</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fully involved</td>
<td>153</td>
<td>39.8</td>
<td>39.8</td>
</tr>
<tr>
<td>Partially involved</td>
<td>204</td>
<td>53.1</td>
<td>92.9</td>
</tr>
<tr>
<td>Not involved</td>
<td>27</td>
<td>7.1</td>
<td>100</td>
</tr>
</tbody>
</table>

Table I. Characteristics of the respondents
To confirm discriminant validity, the average variance shared between the construct and its indicators should be larger than the variance shared between the construct and other constructs. The outcomes of convergent validity test (see Table III) indicate that constructs share more variances with their indicators than with other constructs.

4.3 Structural model
The second stage of the SEM process involves testing the structural model prior to testing the hypotheses. The proposed structural model was examined using AMOS 16.0 software. The maximum likelihood method was employed to estimate all

<table>
<thead>
<tr>
<th>Construct</th>
<th>Items</th>
<th>Factor loading</th>
<th>Composite reliability</th>
<th>Average variance extracted (AVE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top management support (TMS)</td>
<td>TMS1</td>
<td>0.825</td>
<td>0.806</td>
<td>0.563</td>
</tr>
<tr>
<td></td>
<td>TMS2</td>
<td>0.749</td>
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<tr>
<td></td>
<td>TMS3</td>
<td>0.719</td>
<td></td>
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<tr>
<td></td>
<td>TMS4</td>
<td>0.794</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TMS5</td>
<td>0.748</td>
<td></td>
<td></td>
</tr>
<tr>
<td>User training and education</td>
<td>UTE1</td>
<td>0.860</td>
<td>0.925</td>
<td>0.712</td>
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<tr>
<td></td>
<td>UTE2</td>
<td>0.757</td>
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<tr>
<td></td>
<td>UTE3</td>
<td>0.831</td>
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<tr>
<td></td>
<td>UTE4</td>
<td>0.834</td>
<td></td>
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<tr>
<td></td>
<td>UTE5</td>
<td>0.851</td>
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<tr>
<td></td>
<td>UTE6</td>
<td>0.878</td>
<td></td>
<td></td>
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<tr>
<td>Enterprise-wide communication</td>
<td>EWC1</td>
<td>0.859</td>
<td>0.933</td>
<td>0.699</td>
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<td></td>
<td>EWC2</td>
<td>0.860</td>
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<td></td>
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<tr>
<td></td>
<td>EWC3</td>
<td>0.848</td>
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<td>EWC4</td>
<td>0.811</td>
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<td></td>
<td>EWC5</td>
<td>0.841</td>
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<tr>
<td>User satisfaction</td>
<td>UST1</td>
<td>0.866</td>
<td>0.930</td>
<td>0.725</td>
</tr>
<tr>
<td></td>
<td>UST2</td>
<td>0.842</td>
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<tr>
<td></td>
<td>UST3</td>
<td>0.852</td>
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<td></td>
<td>UST4</td>
<td>0.829</td>
<td></td>
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<tr>
<td></td>
<td>UST5</td>
<td>0.868</td>
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<td>Organizational impact (ORI)</td>
<td>ORI1</td>
<td>0.885</td>
<td>0.942</td>
<td>0.765</td>
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<tr>
<td></td>
<td>ORI2</td>
<td>0.864</td>
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<td>ORI3</td>
<td>0.858</td>
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<td></td>
<td>ORI4</td>
<td>0.879</td>
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<tr>
<td></td>
<td>ORI5</td>
<td>0.886</td>
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Table II. Convergent validity test

<table>
<thead>
<tr>
<th>Construct</th>
<th>TMS</th>
<th>UTE</th>
<th>EWC</th>
<th>UST</th>
<th>ORI</th>
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<tr>
<td>Top management support (TMS)</td>
<td>0.750</td>
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<tr>
<td>User training and education (UTE)</td>
<td>0.471</td>
<td>0.844</td>
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</tr>
<tr>
<td>Enterprise-wide communication (EWC)</td>
<td>0.566</td>
<td>0.487</td>
<td>0.836</td>
<td></td>
<td></td>
</tr>
<tr>
<td>User satisfaction (UST)</td>
<td>0.549</td>
<td>0.884</td>
<td>0.492</td>
<td>0.852</td>
<td></td>
</tr>
<tr>
<td>Organizational impact (ORI)</td>
<td>0.705</td>
<td>0.457</td>
<td>0.766</td>
<td>0.796</td>
<td>0.875</td>
</tr>
</tbody>
</table>

Note: Leading diagonals represent the square root of the average variance extracted between the constructs and their measures, while off diagonal entries are correlations among constructs.

Table III. Discriminant validity test
parameters and fit indices. SEM fit indices measure the extent to which the covariance matrix derived from the hypothesized model is different from the covariance matrix derived from the sample. Based on the results of the SEM fit indices, the proposed model provided a good fit. The normed $\chi^2$ was 2.916, which is within the recommended level of 3.0. The RMSEA was 0.071, which is below the recommended cut off of 0.08. The CFI was 0.926 that is greater than threshold of 0.90. Overall, the hypothesized structural model provided an acceptable fit for the data.

In addition, the SEM path results, standardized path coefficients and $t$-values of all relationships hypothesized in the model are shown in Figures 1. In $H1$, it is posited that ERP user satisfaction will positively influence the ERP organizational impact. The coefficient for this path is also significant ($\beta = 0.461, p < 0.001$) which support $H1$. Moreover, $H2$ proposed that top management support would have a significant effect on ERP organizational impact. The results of SEM analysis support this hypothesis ($\beta = 0.115, p = 0.004$). Furthermore, $H3$ recommended that ERP user training and education will positively influence the ERP user satisfaction. The coefficient for this path is also significant ($\beta = 0.618, p < 0.001$) which support $H3$. Finally, $H4$ recommended that the enterprise-wide communication will positively influence the ERP organizational impact. The coefficient for this path is positive and significant ($\beta = 0.313, p < 0.001$) which supports $H4$.

5. Discussions
From Figure 1, it can be seen that user satisfaction influences the organizational impact significantly. This implies that the higher the level of satisfaction the more likely the ERP implemented will be a success. This finding is consistent with the outcomes of researches conducted by Reinhard and Bergamaschi (2001), Bradford and Florin (2003), Somers et al. (2003), and Wu and Wang (2007). The results of the study also showed that there is positive relationship between top management support and organizational impact. This result supports the findings of previous research (Al-Mashari et al., 2006, Sedera and Dey, 2006; Sawah et al., 2008). Thus it can be concluded that top management support is crucial for ERP implementation success regardless of the country’s culture and economic standing. The success of a major
project like an ERP implementation completely depends on the strong, sustained commitment of top management. Top management must take an active role in leading the ERP implementation project. Management must be involved in every step of the ERP implementation and committed with its own involvement and willingness to allocate valuable resources to the implementation effort. In this way, the progress of the project can be monitored constantly. Top management needs to identify the project as a top priority publicly and explicitly, to set up the suitable and competent project team, to share the role of new systems and structures through the whole organization. Top management should spend significant amounts of time serving on steering or executive committees overseeing the implementation team. Top management must act as a coach, keeping his staff motivated and in harmony.

The results of the study also showed that training and education is positively related to user satisfaction, which subsequently influences the organizational impact. This finding is similar to Bradford and Florin (2003), Colmenares (2004), Yusuf et al. (2004), and Correa and Cruz (2005). ERP training and education refers to the process of providing management and employees with the logic and overall concepts of ERP system (Mandal and Gunasekaran, 2002). ERP training should address all aspects of the system, be continuous, and be based on knowledge transfer principles. Top managers and all system users must be fully educated so they understand how the ERP system should be integrated into the overall company operation. All users must be trained to take full advantage of the system’s capabilities. Training should start with the education of the project team in system, line, and project management, and ends with the system’s users. Moreover, every level in the project class and the various users require different training. The steering committee members need to get a general idea of the system’s functionality. The project team must have an in-depth understanding of the system’s functionality. The users need to learn those system functions that are related to their jobs.

Figure 1 illustrates that enterprise-wide communication is positively related to ERP organizational impact, which is coherent with the findings from Chien et al. (2007), Nah et al. (2007); and Ramayah et al. (2007). Once organizations decide to adopt ERP systems, they have to use communication to explain and justify their actions. What is important is how the business justification for the ERP system is translated to lower level employees so that they feel motivated to go along with the implementation and not resist the changes that will occur. There are several unknowns in an ERP project environment and improved communication can lead to more acceptances of these unknowns and the reduction of unnecessary worry. With effective communication, there is structured manner for employees to find out what is happening in the company. In addition, suppliers and customers should frequently keep informed to know what is going on with the company’s ERP implementation activities. A coordinated communication plan is an efficient way to explain the goals, timelines, benefits, and popular ideas, and that regular reports to executive levels are absolutely essential. The communication plan has to detail several areas including the rationale for the ERP implementation, details of the business process management change, demonstration of applicable software modules, briefings of change management strategies and tactics and establishment of contact points.
6. Conclusions

Based on the review of the literature pertaining to ERP implementation, it was identified that there was a gap in the literature as most of the studies on factors that influence ERP implementation success focused on the developed country. This is also substantiated by Ngai et al. (2008). Nevertheless, there were a few studies, which focused on the developing countries including Iran. This study however examines organizational factors namely top management support, training and education as well as enterprise wide communication among ERP users in Iran. The study showed that there is a positive relationship between top management support, enterprise-wide communication, and ERP training and education with ERP implementation success. It also illustrates a relationship between user satisfaction and organizational impact, which is how ERP success is measured in this study.

This study resulted in important academic and managerial contributions. First of all, this study has contributed to academic research by producing the empirical evidence to support the theories of critical success factors and ERP implementation success. This research confirmed that top management support, enterprise-wide communication, and ERP training and education are positively related with successful ERP implementation. In the Iranian context, organizations could use the findings as a guideline i.e. what to avoid and what to focus on. This in turn would ensure an increase in success rate for future ERP implementations. Second, the research model incorporates the responses from key ERP stakeholders (operational/functional/unit managers) whereas most previous studies focused on ERP end users (Finney and Corbett, 2007).

The managerial contributions of the study are as follows. First, the outcomes of this research present a notice to managers involved in ERP system implementation projects. The current research investigates the critical success factors that are essential in an environment of organizational and technical change associated with the implementation of ERP systems. The results present the managers with the ability to classify strategies, evaluation guides, checkpoints, and measure requirements that offer them a far greater likelihood of ERP implementation success. Second, this study cautions managers that success factors, and best practices in developed countries are not necessarily applicable to developing countries. Before the adoption of ERP, a comprehensive misfit analysis will facilitate an awareness of the anticipated benefits of the ERP systems. As a result, when a company is going to select an ERP system, it should pay particular attention to whether the software can be modified without any difficulty if needed or whether its business requirements can be fulfilled. Third, the outcomes of this study are also useful in making ERP vendors and consultants familiar with the difficulties of implementation in developing countries and preparing some strategies to overcome the barriers.

Fourth, experiences revealed from this research can be useful to other developing countries with similar cultural, economic and political environments, in the Middle East and North African region, and other Muslim and developing countries. Finally, this study compiled a database of all companies in Iran that are using ERP systems. Now, other relevant agencies in governmental and nongovernmental sections can refer to this database. Also, using this database, ERP vendors can see the potential market and find new companies to approach. In addition, the firms, which are going to adopt an ERP system, can use these companies as a reference.
Although the findings of the current study contribute to a better understanding of the successful implementation of ERP, there are some limitations. One, the ERP implementation success dimensions were measured using subjective and perceptual measures. This was due to the difficulty in securing the related factual data from the participating organizations. However, it is stated in the literature (Chien et al., 2007; Nah et al., 2007) that it is a common practice to use highly subjective and this measurement approach. Two, this study focused on the organizational related factors of ERP implementation success. Potential researchers could examine factors relating to other perspective such as ERP project, external environment and ERP system itself. Three, this study collected empirical data using survey questionnaire thus it was possible to examine the actual implementation process. Future research should examine these using methods such as case studies and focus group discussion.

References


Further reading

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Shahin Dezdar is a PhD Candidate in the Faculty of Business and Accountancy, University of Malaya, Malaysia. He received his MS degree in industrial management and his BS in industrial engineering from Amir-Kabir University of Technology (Tehran Polytechnic) in Iran. He has been managing several large projects in enterprise systems implementation and management consultancy in Iran. His research interests include ERP systems implementation, IT/IS planning and management, and strategic management. His research has been published in Industrial Management & Data Systems and several international conferences proceedings.
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