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ERP SYSTEMS IMPLEMENTATION SUCCESS: A STUDY ON IRANIAN ORGANIZATIONS

Shahin Dezdar[1], Sulaiman Ainin[2]

[1]International Institute for Energy Studies, Tehran, Iran
[2]Faculty of Business and Accountancy, University of Malaya, Kuala Lumpur, Malaysia

E-mail of corresponding author: ainins@um.edu.my

ABSTARCT

This study proposes a framework that examines factors that influence the successful implementation of ERP systems. Six critical success factors (enterprise wide communication, business process reengineering, project management, team composition and competence, ERP system quality and ERP vendor support) were identified and used to collect empirical evidence. In addition, organizational culture was examined to determine whether it has any moderating effect on the six variables in relation to ERP implementation success. A survey questionnaire was distributed to organizations with ERP. The targeted respondents were ERP users within the companies. A total of 384 responses were used for analysis. The data obtained was analysed using the Structural Equation Modelling. The results indicated that that ERP implementation success is influenced by enterprise wide communication, project management, team composition and competence, ERP system quality and ERP vendor support. It was also found that organizational culture moderates the relationships between enterprise-wide communication, project management, team composition and competence, ERP system quality, ERP vendor support and success of ERP implementation.

Keywords: Organizational culture, ERP, critical success factor, Iran

1. INTRODUCTION

Enterprise Resource Planning (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. In spite of the many benefits the adoption of ERP systems has not been without problems. A report on ERP implementation projects reveals that on average, 178% are over budget, took 2.5 times as long as projected and delivered only 30% of the promised benefit (Zhang et al. 2005). Moreover, ERP is arguably the single biggest information technology investment an organization can make. Given the high

expenses and low success rate, the causes of these problems or failures need to be understood and solutions leading to success need to be found (Dezdar & Ainin 2011). There are several studies that have addressed the concern above. However, many of the studies focus on specific variables. For example, Holland and Light (1999) focused on strategic factors that span the whole project and tactical factors that can be applied to particular parts of the project while Esteves-Sousa and Pastor-Collado (2000) focussed on strategic, tactical, organizational and technical aspect. This study tries to fill the gap by introducing a framework that combines several variables to give a better understanding of the factors that may affect ERP implementation success.

Moreover most of the studies were conducted in developed countries whereas developing countries may face different challenges in ERP implementation from those faced by developed countries (Chien et al. 2007). In addition, studies undertaken in developed countries may not be applicable in other context (Pairat & Jungthirapanich 2005). Ngai et al. (2008) argued that critical success factors (CSFs) may vary depending on the country in which an ERP implementation is carried out. While many developing countries are now adopting ERP, there has not been much research on the success or failure of its implementation in these regions/countries (Ngai et al. 2008; Sawah et al 2008). Thus, this study focuses on a developing country which is under researched i.e. Iran. Yeganeh and Su (2008) claimed that Iran is a country in the Middle-East region which has also many commonalities with its neighbouring Muslim countries. The Iranian culture is unique as it consist two dissimilar vectors i.e. Islamism and nationalism. The Islamist facet is comparatively young and dates back to the 7th century. On the other hand, the nationalist feature of Iranian culture is connected to its Zoroastrianism heritage and Ancient Persian civilization which date back to 3000-2000BC but which are still common in diverse aspects of Iranian society like Persian literature, New Year Festivals (Nowrooz) and the Calendar.

Following the gaps discussed above, this study aims to identify the critical success factors that influence ERP implementation success in Iranian companies. In addition, it will also analyse the moderating effect of organizational culture on the variables in the model in relation to ERP implementation success.

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. *ERP Implementation Success*

In ERP systems, success takes on special urgency since the cost and risk of these valuable technology investment opponents the possible payoffs. These modern IS characteristics suggest that existing models of IS success may not be entirely appropriate for measuring enterprise system success (Ifinedo 2007). There were two main streams in the literature for measuring ERP success. Some prior studies used objective organizational measures, such as company cost and profits figures as measurement items for ERP success. But many researchers utilized self-reported

subjective ERP success measures. Although it may be more desirable to measure system success in terms of monetary costs and benefits, such measures are often not possible due to the difficulty of quantifying intangible system impacts and also isolating the ERP effect from numerous intervening environmental variables that may influence organizational performance (Chien & Tsaur 2007). There have been prior researches that employed diverse subjective or non-financial criteria to measure ERP success. Some of the researchers have employed one, two or more dimensions of DeLone and McLean (1992; 2003) success models (Chien & Tsaur 2007; Ifinedo 2007). Other researchers have utilized 'Technology Acceptance Model (TAM)' (Bueno & Salmeron 2008; Shih 2006). A number of researchers have applied 'Project Management' measures such as time and budget (Peslak 2006). Several researches have utilized 'User Satisfaction' as an individual measure of ERP implementation success (Chen & Liu 2008; Holsapple et al. 2005). In addition, many researchers have used a combination of measures in their research (Bradley 2008; Chien et al. 2007).

A key question in examining the deployment of ERP systems is centered on determining the critical success factors that lie behind a successful implementation. ERP system implementation is a process of great complexity, with a great many conditions and factors potentially influencing the implementation. These factors could have a positive effect on the outcome of ERP project, while their absence could generate problems during implementation. Many studies have been conducted during the recent years to identify the factors affecting the ERP implementation success and failure. The CSF method is an attractive method for researchers and managers because it facilitates the identification and prioritization of critical factors that will possibly affect successful ERP implementation (Dezdar & Sulaiman 2009). Since 1999, a lot of IS researchers have been increasingly utilizing CSFs to study ERP system implementations. In ERP system implementation, CSFs could be recognized as the few key areas where things must go right for the implementation to succeed (Finney & Corbett 2007).

The ERP literature varies regarding what factors are required for successful implementation (Zhang et al. 2005). Many authors have identified a variety of factors that can be considered to be critical to the success of an ERP implementation. For example, Somers and Nelson (2001) recognized 22 critical success factors assessed them across phases of 110 ERP implementation cases. Al-Mashari et al. (2003) presented a categorization of ERP critical factors where 12 factors were divided into three dimensions related to the stages of ERP project. Nah et al. (2003) performed a survey of the Chief Information Officers (CIOs) of Fortune 1000 companies to gain some understanding of the CIOs' views of the importance of each of the 11 criteria in determining the success in the implementation of an ERP system. Somers and Nelson (2004) divided the 22 CSFs to two parts as 'key players' and 'key activities'. Nah and Delgado (2006) reviewed the literature on CSFs in ERP implementation to identify an extensive list of factors and then structured them into 7 main categories. Sedera and Dey (2006) combined the works of prior researchers and proposed 11 CSFs. Brown and He (2007), based on the importance and/or frequency of a critical factor in the source literature,

identified 13 factors as critical for ERP implementation.

3. Research Framework and Hypotheses Development

The research framework of this study was developed based on the content analysis of literature followed by interviews with six experts in the field of ERP implementation in Iran. The purpose of literature review is to identify and highlight the important variables, and to document the significant findings from earlier research that will serve the foundation on which the conceptual or theoretical framework for the current investigation can be based and the hypotheses developed (Cavana et al. 2001). The content analysis (Dezdar & Sulaiman 2009) identified 17 CSFs (independent variables) and 11 success measures (dependent variables). It must be highlighted however that most of the research were conducted in developed countries and developing countries may face different challenges from those faced by developed countries (Chien et al. 2007). Ngai et al. (2008) argued that CSFs may vary depending on the country in which an implementation is carried out. So, studies undertaken in developed countries may not be applicable in other context (Chien et al. 2007). It is, thus, difficult to conclude whether all these CSFs are relevant to companies in a dissimilar context of this study (Iran). Therefore, a set of interviews was conducted with six key persons involved in ERP implementation projects in Iran. The interviewees comprised of ERP consultants, vendors' representatives and implementation project managers. The interviews were conducted in person on a one to one basis. The interviewees were given a list of 17 CSFs and 11 ERP success measures (identified earlier) and were asked to rank it according to their relevance to the implementation process in the context of Iran. Finally, the expert judgments were analysed. From the list it was concluded that not all the CSF and success measures are applicable in the Iranian context. In addition, the interviewees also pointed out that several of the factors implies/carry the same meaning. Subsequently, the following research framework was developed Figure (1).

3.1. Enterprise-Wide Communication (EWC)

Communication across the different levels and functions of an organization is necessary for success in ERP implementation (Akkermans & Helden 2002). Communication is crucial as it helps to minimize the user resistance (Somers & Nelson 2004). Effective communication of requirements, direction, mission, plan, user input, feedback and changes is critical to all stages to ERP implementation (Nah et al. 2003). Hence, the following hypothesis was developed.

H1: Enterprise-wide communication is positively related with ERP implementation success.

3.2. Business Process Reengineering (BPR)

In the process of configuring the ERP system, a large amount of reengineering should occur iteratively to take advantage of the best practices offered by the system. Business process should change to follow to the requirement of the software. The ERP software should have minimal changes as it is often a sign of success and will lead to lower costs and shorter implementation timeframe (Sedera & Dey 2006). Consequently, the following hypothesis was defined:

H2: Business processes reengineering is

positively related with ERP implementation success.

3.3. Project management (PRM)

The combination of hardware and software and the numerous organizational, human and political issues make many ERP projects massive and naturally complex, requiring strong project management skills (Somers & Nelson 2004). Consequently, a strong project management team is critical for ERP implementation activities to avoid schedule and cost overruns (Sedera & Dey 2006). So, the following hypothesis was developed.

H3: Effective project management is positively related with ERP implementation success.

3.4. Team Composition and Competence

An ERP project requires the effort and cooperation of technical and business experts as well as end-users. Hence, teamwork composition among the implementer, vendor, and consultants are emphasized in ERP implementation (Nah & Delgado 2006). Also, the success of ERP has often been linked to the presence of a champion, who performs the crucial functions of transformational leadership, facilitation, and marketing the project to the users (Wu & Wang 2007). Therefore, the following hypothesis was developed:

H4: ERP team composition and competence is positively related with ERP implementation success.

3.5. ERP System Quality (SYQ)

ERP system quality is measured in terms of flexibility, reliability, and accessibility (Fan & Fang 2006). Nelson et al. (2005) suggested five dimensions to measure system quality including accessibility, reliability, flexibility, response time, and integration. It has been mentioned that system quality affects the implementation success of any ERP system (Zhang et al. 2005). As a result, the following hypothesis was formulated:

H5: Quality of ERP system is positively related with ERP implementation success.

3.6. ERP Vendor Support (VES)

The need for vendor's support in ERP implementation is stronger than in other IS projects because ERP implementation project requires a wide range of skills and technical implementation knowledge. All users must be trained to take full advantage of the system's capabilities to ensure successful implementation (Al-Mashari & Al-Mudimigh 2003). Consequently, vendor support, in the form of technical assistance, emergency maintenance, updates, and special user training, is a vital factor with ERP software implementation (Somers & Nelson 2004). Hence, the following hypothesis was developed:

H6: ERP vendor support is positively related with ERP implementation success.

3.7. Organizational Culture (ORC)

Seddon et al. (2003) stated that when two companies implement the exact same ERP package, the results sometimes are different as they practice different cultures. Organizational culture has been utilized as an independent variable in prior ERP implementation success researches. Three researches examined the moderating effect of organization culture on the relationship between critical factors and ERP implementation success, i.e. Nah et al. (2007) and Ramayah et al. (2007) in Malaysia, and Hong and Kim (2002) in South Korea. Based on the findings of these researches, 'organizational culture' was put as a moderator variable in this study which moderates the relationship between CSFs and ERP implementation success. Hence the following hypotheses were developed:

H7-H12: Organizational culture moderates the relationship between critical factors (EWC, BPR, PRM, TCC, SYQ and VES) and the success of ERP implementation.

4. RESEARCH METHODOLOGY

4.1. Research Design

As mentioned earlier the aim of this research is to examine factors that effect the implementation of ERP success in Iran. The population for the study is Iranian companies that adopt ERP. Since there was no single source which complied this database, the websites of international ERP vendors, local IS vendors, governmental and non-governmental organizations in charge of IT and Tehran Stock Exchange were examined and reviewed. Finally, a list of 31 companies was compiled. The organizations were contacted and 25 agreed to participate in the study.

4.2. Instrument Development

A survey questionnaire was employed to collect data for this research. Items used in the operationalization of the constructs were adapted from relevant prior research (Bradley 2008; Hofstede 2001; Ifinedo 2007; Nah & Delgado 2006; Nah et al. 2007; Sedera & Dey 2006; Zhang et al. 2005). All question items were measured using a seven-point Likert-type scale with anchors ranging from 'strongly disagree' to 'strongly agree'. The mean of scores over all questions provided the composite score for each variable.

The questionnaire consisted of three sections. In section one, a range of demographic data such as age, gender, level of education, ERP usage period, and ERP usage frequency was presented. In section two, 53 items were provided to tap the elements of the constructs. The last section consists of an open-ended question allowing respondents to comment on any aspect they choose. To test the validity of the questionnaire, 'expert judgment validity' was carried out. From a review of the literature, researchers in the area were identified and a set of problem statement, research objectives, research questions, research framework and questionnaire was sent to them via e-mails. However only five responded confirming the research framework and questionnaire set. The questionnaire was translated to Persian language using the back-to-back technique to ensure the meanings are the same as the original. To ensure the reliability of the questionnaire, a pilot study was conducted. The questionnaire was distributed to 54 operational managers and 37 completed questionnaires were collected. The data were tested using the SPSS software 16.0 and it was found that all the variables' cronbach alpha values were above 0.7 hence the questionnaire was considered to be reliable as suggested by Hair et al. (2006).

4.3 Data Collection

As mentioned earlier the 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. After constant reminder, 411 completed questionnaires were collected and 384 were used for analysis as the remaining was incomplete.

5. 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 effect of CSFs on

ERP implementation success, using Structural Equation Modeling (SEM). The 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. The third part examines the moderating effect of organizational culture in the proposed model.

5.1. Sample Characteristics

The characteristics of respondents are presented in Table (1). As can be seen, there were more male respondents, more than two-thirds of respondents were between 31-50 years old. More than three-fourths of the respondents held university degree and had more than 6 years of experiences in their companies. The profile of the respondents illustrate that the majority of respondents were involved fully or partially in the ERP implementation project. The ERP usage profile of the respondents demonstrates that one third of the respondents used Finance module of ERP and module of Logistics was employed by one fourth of respondents. The data shows that the majority of respondents used ERP systems for at least 2 years. With respect to ERP usage frequency, more than two-thirds of respondents utilized ERP systems at least once a day. These records express that the respondents were well experienced and highly educated. Moreover, the respondents were familiar to the business and company's processes and ERP implementation projects as well. In addition, they were familiar with ERP systems' capabilities and outcomes. As a result, the respondents were the best informant people to answer the survey.

5.2. Measurement Model

Confirmatory factor analysis (CFA) was conducted using AMOS 16.0. The overall effectiveness of the measurement model was examined using four common model fit measures: normed $\chi 2$, goodness-of-fit index (GFI), comparative fit index (CFI), and root mean square error of approximation (RMSEA). The measurement model in the CFA was revised by removing items that had large standardized residuals with other items, one at a time. After dropping four items (EWC6, TCC6, SUC5 and SUC10) the measurement model exhibited overall good fit. The normed $\chi 2$ was 2.656, which was below the maximum desired cutoff of 3.0. RMSEA was 0.066, indicating a good fit, below the maximum desired cut-off of 0.08. Also CFI=0.916 was above the recommended threshold of 0.90., suggesting that the measurement model fit the data adequately (Hair et al. 2006).

Further analysis was conducted to assess the psychometric properties of the scales. Convergent validity was assessed using three measures: factor loading, composite construct reliability, and average variance extracted. The outcomes of convergent validity test are offered in Table (2). 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 stated by Hair et al. (2006).

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 are offered in Table (3). As shown in Table (3), all constructs share more variances with their indicators than with other constructs.

5.3. Structural Model

This stage of the SEM process involved testing the structural model prior to testing the hypotheses. The proposed structural model (Figure 2) was examined using SEM package AMOS 16.0. Based on the results of the SEM fit indices, the proposed model presented an acceptable fit. The RMSEA=0.063 was lower than the accepted cut off of 0.08. Also CFI=0.919 was greater than the recommended level of 0.90. Overall, the hypothesized structural model provided a good fit for the data.

5.4. Hypotheses Testing

The purpose of this study is to investigate the impact of six critical success factors on ERP implementation success. The hypothesized relationships are now ready to be tested based on the structural model specified previously. The six hypotheses are represented by the six relationships in the model. Hypothesis (1) is represented by the relationship EWC → SUC; Hypothesis (2) is represented by the relationship BPR → SUC; Hypothesis (3) is represented by the relationship PRM → SUC; Hypothesis (4) is represented by the relationship TCC → SUC; Hypothesis (5) is represented by the relationship SYQ → SUC; Hypothesis (6) is represented by the relationship VES → SUC. In addition, this study was designed to incorporate the interacting effects or moderating roles of organizational culture to provide more insight into ERP implementation projects. So, there are also six hypotheses which examine the moderating effect of organizational culture on the relationships between the six critical success factors and ERP implementation success. Hypothesis (7) is represented by the relationship EWC*ORC → SUC; Hypothesis (8) is represented by the relationship BPR*ORC → SUC; Hypothesis (9) is represented by the relationship PRM*ORC → SUC; Hypothesis (10) is represented by the relationship TCC*ORC → SUC; Hypothesis (11) is represented by the relationship SYQ*ORC → SUC; Hypothesis (12) is represented by the relationship VES*ORC → SUC.

The standardized path coefficients and t-values of all the hypothesized relationships of the research model were presented in Table (4). According to Hair et al. (2006), the standardized coefficient illustrates the consequential change in an endogenous variable from a unit change in an exogenous variable, with all other exogenous variables being held constant. In this method, their comparative contributions can be recognized much more clearly. The sign of the coefficient signifies that the two variables are moving in similar or dissimilar directions. The t-value indicates whether the corresponding path coefficient is significantly different from zero. Coefficients with t-values of between 2.00 and 2.00 show they are not significantly different from zero at the 5% significance level. It means that there is a high probability of obtaining a relationship of this magnitude simply by sampling error.

In addition, the SEM path analysis results are shown in Figure (3). The significant relationships (paths) are illustrated in bold lines, while insignificant relationships are shown by dashed line in this Figure. The first number in parenthesis shows the standardized coefficient and second number indicates the t-value of each hypothesized

relationship. To sum up, out of the 12 hypothesized relationships, 10 were found to be significantly supported. Hypotheses 1, 3, 4, 5, 6, 7, 9, 10, 11 and 12 all had a t-value of greater than 1.96, indicating the relationships were significant at the 0.05 level. The t-value for Hypothesis 2 and Hypothesis 8 were -1.243 and -1.448 respectively, which were not significant at the 0.05 level. Therefore, all research hypotheses except Hypotheses (2) and (8) were supported by the AMOS structural modeling results.

The R-square value of the research model is 0.543 when no moderating effect is considered. However, the R-square value increases to 0.655 when organizational culture is taken into account as the interaction term. The model with organizational culture as a moderator accounts for 65.5% of the variance of ERP implementation success. The increased R-square recommends that organizational culture is a moderator in the proposed research model. For estimating the effect size of organizational culture, the guidelines provided by Cohen (1988) were employed. In sum, the effect size of 0.371 or above is considered large, the effect size between 0.100 and 0.371 is considered medium, and the effect size of 0.1 or below is considered small. So, the result of the effect size ($f2$) in this study indicated that the organizational culture's interacting effect is medium, i.e. $f2$ is 0.254.

6. DISCUSSIONS

The findings of this study support the proposed hypothesis (H1) that there is positive relationship between EWC and SUC. This finding is consistent with outcomes of studies conducted in western countries (Kim et al. 2005) and developing countries (Al-Mashari et al. 2006; Chien et al. 2007; Colmenares 2004; Garcia-Sanchez & Perez-Bernal 2007; Nah et al. 2007; Ramayah et al. 2007). Once organizations make the decision to implement ERP systems, they have to use communication to explain and justify their actions. What is important is how that justification 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. The company's top management should inform all employees of their ERP plans and of the benefits that ERP will bring to the company.

BPR was hypothesized (H2) to be positively correlated with SUC. However, the hypothesized relationship was not supported. This finding highlights the outcomes of majority of studies conducted in developing nations (Kamhawi 2007; Ramirez & Garcia 2005; Zhang et al. 2003). A number of studies have pointed out that the popular ERP packages developed by Western countries may not fit the requirements of other organizations due to different business practices, and legal and government requirements (Ngai et al. 2008). Western ERP packages are implemented in other countries; it is likely that the ERP's underlying business logic conflict with the local business logic, causing misfits which negatively affect the ERP implementation outcomes (Davison 2002). Many ERP adopting organizations in Asia have experienced misfit problems (Xue et al. 2005). Likewise, companies in Iran may have requirements such as Persian user interfaces, report formats, and many rules and regulations required by the Iranian government, which Western packages fail to satisfy. As a result, Iranian ERP adopters had to rely on ERP customization more than

BPR practices to overcome the misfit problems.

The results of this study support the proposed hypothesis (H3) that there is positive relationship between PRM and SUC. This result not only supports the findings of previous researches in western countries (Bradley 2008), but also confirm the results of researches conducted in developing countries (Al-Mashari et al. 2006; Colmenares 2004; Garcia-Sanchez & Perez-Bernal 2007; Kamhawi 2007; Nah et al. 2007; Sawah et al. 2008; Zhang et al. 2003). Organizations should have an effective project management strategy to control the implementation process to avoid overrun of budget and ensuring implementation on schedule (Zhang et al. 2005). Moreover, the scope of the project should be clearly established, managed, and controlled. Proposed changes should be evaluated against business benefits, and scope expansion requests should be assessed in terms of the additional time and cost of proposed changes. Milestones and targets need to be actively monitored to track the progress of an ERP project (Somers & Nelson 2004).

The findings of this study support the proposed hypothesis (H4) that there is positive relationship between TCC and SUC. The results of previous researches in developed nations (Bradley 2008; Loh & Koh 2004; Peslak 2006) and developing countries (Al-Mashari et al. 2006; Chien et al. 2007; Colmenares 2004; Garcia-Sanchez & Perez-Bernal 2007; Ramayah et al. 2007) prove the finding of current study. An ERP project demands the effort and cooperation of technical and business experts as well as end-users. It is necessary to form a skill-balanced project team having internal and external experts, managerial competencies, deep knowledge of the processes, and IT skills. The team also should be provided with clear role definitions (Nah et al. 2003). Moreover, the key member of the project team must be empowered to make decision (Ngai et al. 2008).

The findings of this study support the proposed hypothesis (H5) that there is positive relationship between SYQ and SUC. The study affirms that the ERP implementation success tends to be rated highly when a high-quality system is implemented. The finding of current study is consistent with results of studies conducted in developing countries (Chen & Liu 2008; Fan & Fang 2006; Kamhawi 2007; Zhang et al. 2005). The findings suggest that it is necessary for ERP implementation managers to spend time and effort to make sure that users are satisfied with system reliability, functionality, flexibility and user friendliness, as these are identified as the most important factors that contribute to ERP success when implementing ERP systems. These qualities can be confirmed through ERP software selection and through ERP implementation, including system configuration.

The findings of this study support the proposed hypothesis (H6) that there is positive relationship between VES and SUC. This finding is consistent with outcomes of studies conducted in developing countries (Colmenares 2004; Dowlatshahi 2005; Ramayah et al. 2007; Zhang et al. 2003). Companies intending to acquire ERP systems should take a close look at the ERP providers. Factors that should be taken into account when choosing a provider should include the implementation support they offer and the competence of the installers. It is important for the vendor's staffs to be knowledgeable in both business processes

and ERP system functions. Also, the vendor employees should possess good interpersonal skills and be able to work with user in ERP adopting organization (Al-Mashari & Al-Mudimigh 2003).

The findings of this study support the hypothesis (H7) which states ORC moderate the relationship between EWC and SUC. This is in line with finding of two prior researches conducted in another developing country (Nah et al 2007; Ramayah et al. 2007). An open and supportive organizational culture promotes increased interaction and improved communication, which help to facilitate communication of new and complex concepts of ERP systems to the end-users. Since the complexity of an ERP system will require almost all company personnel to learn new tools and new ways of working, organizational culture can facilitate the learning process involved in successful ERP implementation (Nah et al 2007).

Hypothesis (H8) cannot be supported by this research, which states ORC moderate the relationship between BPR and SUC. No prior researchers have investigated this relationship so far. Since ERP systems require considerable changes in the organization it is common with resistance, confusion and errors within the implementing organization. So, change management activities are important in the all stages of ERP implementation (Somers & Nelson 2004). The proximity of an organization towards a learning state would, in theory, greatly facilitate the process of change. Organizational members must collaborate and share their knowledge as a team to successfully bring about the changes in the business required to realize long-term ERP benefits (Nah et al. 2007).

The results of this research confirm the hypothesis (H9) that declares ORC moderate the relationship between PRM and SUC. This finding is in harmony with finding of the only prior research in another developing country (Nah et al 2007). ERP project leader faced with the challenge of managing an ERP project this massive typically face tight deadlines and a near-impossible means of disseminating all the required training to end-users. Furthermore, the leaders of the project team need to clearly specify responsibilities, establish and control project scope, evaluate any proposed change, assess scope expansion requests, define and set project milestones, enforce timeliness of the project, and coordinate project activities across all affected parties. An open and learning organizational culture also facilitates the execution of a project management program, which increases the chances of success in ERP implementation.

The findings of present study support the hypothesis (H10) that asserts ORC moderates the relationship between TCC and SUC. This finding is in accord with findings of prior research in another developing country (Ramayah et al. 2007). ERP implementation teams are by necessity cross-functional, as the new system brings together and integrates the various functions within an organization. In order to derive the best benefits from the ERP system, the cross-functional teams working on the project should not only be able to work well together, but also understand and appreciate the different strengths and skills that each member brings to the teams. Closed system culture of organization is more prone to come across difficulties in facilitating teamwork and coordination among members of cross-functional teams.

The findings of this study support the hypotheses (H11) and (H12) which state ORC moderate the relationship between SYQ - SUC and VES - SUC. These are in line with findings of two prior researches conducted in developing countries (Hong & Kim 2002; Ramayah et al. 2007). The cultural diversity between ERP customers and ERP vendors indicates not only organizational culture but also national culture (Krumbholz & Maiden 2001). The national culture differences exist more in values and less in practices, and organizational culture differences reside more in practices and less in values (Hofstede 2001). The problem is that the customer's organizational culture clashes with the vendor's culture, implicit in the ERP package (Krumbholz & Maiden 2001). To bridge the cultural diversity, the organizations have to choose among changing the organizational culture and business process to fit into the off-the-shelf ERP systems, or customizing the package to smooth alignment of the software functionality to business requirements. As a result, the companies need to consider the cultural diversity among vendors and themselves before they decide which ERP packages to purchase and implement.

7. CONCLUSIONS

This study developed and empirically tested a model for ERP implementation success in the context of a developing country, namely Iran. An attempt was made to identify the critical factors that are likely to influence the successful implementation of ERP systems. Also, a framework for evaluating the ERP implementation project was developed. The proposed model analyzed the relationship between six independent variables, i.e. EWC, BPR, PRM, TCC, SYQ, and VES with SUC as dependent variable. Also, the moderating effect of ORC on the above mentioned relationships was examined. The results of the data analysis showed that five critical factors (EWC, PRM, TCC, SYQ, and VES) out of six had significant relationship with ERP implementation success. In addition, the results illustrated that ORC had moderating effect on the relationship between EWC, PRM, TCC, SYQ, and VES with ERP implementation success.

The findings maybe further explained based on Hofstede (1984) assessment on Iran i.e. it is a collectivistic, high power distance, and uncertainty avoidance society. Iranian has a collectivistic culture whereby they are interested in operating on the basis of individual relationships among persons, rather than on the basis of impersonal associations (Yeganeh & Su 2007). Having a team which is not only competent but also whose composition is varied allows for successful ERP implementation. The high power distance among Iranians has its roots in several features of Iranian history, mythology, religion, politics, and family structure (Dastmalchian et al. 2001). Those in authority openly demonstrate their rank and the subordinates are required to follow the instructions given without much resistance. Thus, through effective enterprise wide communications the ERP implementations within the organizations could be successfully implemented. As Iranians have moderate level of tolerance for uncertainty they would require more information on the ERP systems before implementing them in their organizations. For example, they would find out what and how existing process would change (business process reengineering) and the

quality of the ERP system before implementation.

This study resulted in important theoretical contributions. First, 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 enterprise-wide communication, project management, team composition and competence, ERP system quality and vendor support positively related with ERP system success. Second, this research is the first study to conceptualize a framework that look at the relationship between ERP implementation success, organizational characteristics, ERP project characteristics, ERP innovation characteristics, and organizational culture. Third, organizational culture has been overlooked in prior studies (Zhang et al. 2005). Empirical evidence from this study suggests that organizational culture is an important unique factor which effectively moderates the relationship between some CSFs and ERP system implementation success. Forth, these findings are also important if the context of this research is taken into consideration. No prior researches aimed to study ERP implementation in Iran. This research will thus add to the growing body of knowledge on ERP implementations in developing countries. Fifth, this study developed a research model which could be applied into other Asian, Muslim and developing countries to test its applicability or for those interested in cross cultural issues of ERP implementation.

This research found significant managerial implications. First, Iranian companies and managers could gain an understanding of the complexities inherent in ERP installations to avoid barriers and increase the likelihood of achieving desired results. Second, this study cautions us against assuming that best practices and success factors in developed nations will necessarily apply for developing nations. Before ERP adoption, thorough misfit analysis and resolution plan based on ERP knowledge will help achieve the expected benefits of the ERP systems (Kamhawi 2007). Third, the findings suggest that it is important for ERP adopters to recognize the cultural differences embedded in foreign ERP applications (Wang et al. 2005). Firms planning to adopt ERP systems must ensure that open oriented systems, learning, collaborative, and supportive attitudes are promoted in the organization. Fourth, the outcomes of this study are also useful to ERP vendors and consultants to be familiar with the difficulties of implementing in developing countries and to prepare some strategies to overcome the barriers. Fifth, experiences revealed can be useful to other developing countries with similar cultural, economic and political environments, in the Middle-East region, Muslim and developing countries.

Several limitations of this study should be highlighted. The first limitation of this study is its generalizability. This study presents the viewpoints of corporations operating in Iran in the region of Middle-East. It is difficult to say whether our findings can be generalized to other regions of the world, because ERP implementation processes have been reported to be influenced by cross-national and cultural factors (Ifinedo 2007). Furthermore, 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, a common practice in the

literature is highly subjective and this measurement approach was deemed appropriate here (Chien et al. 2007; Nah et al. 2007).

Since few empirical studies have examined the ERP implementation success in developing countries, there are numerous paths for future research and extensions of this study. This research employed subjective measures of ERP implementation success. It is suggested to potential researchers to employ some quantifiable measures and compare their outcomes with findings of our research. In addition, future researches might employ several key CSFs that were deemed important but were not integrated in this study including top management support and commitment, change management program, user training and education, and use of consultant.

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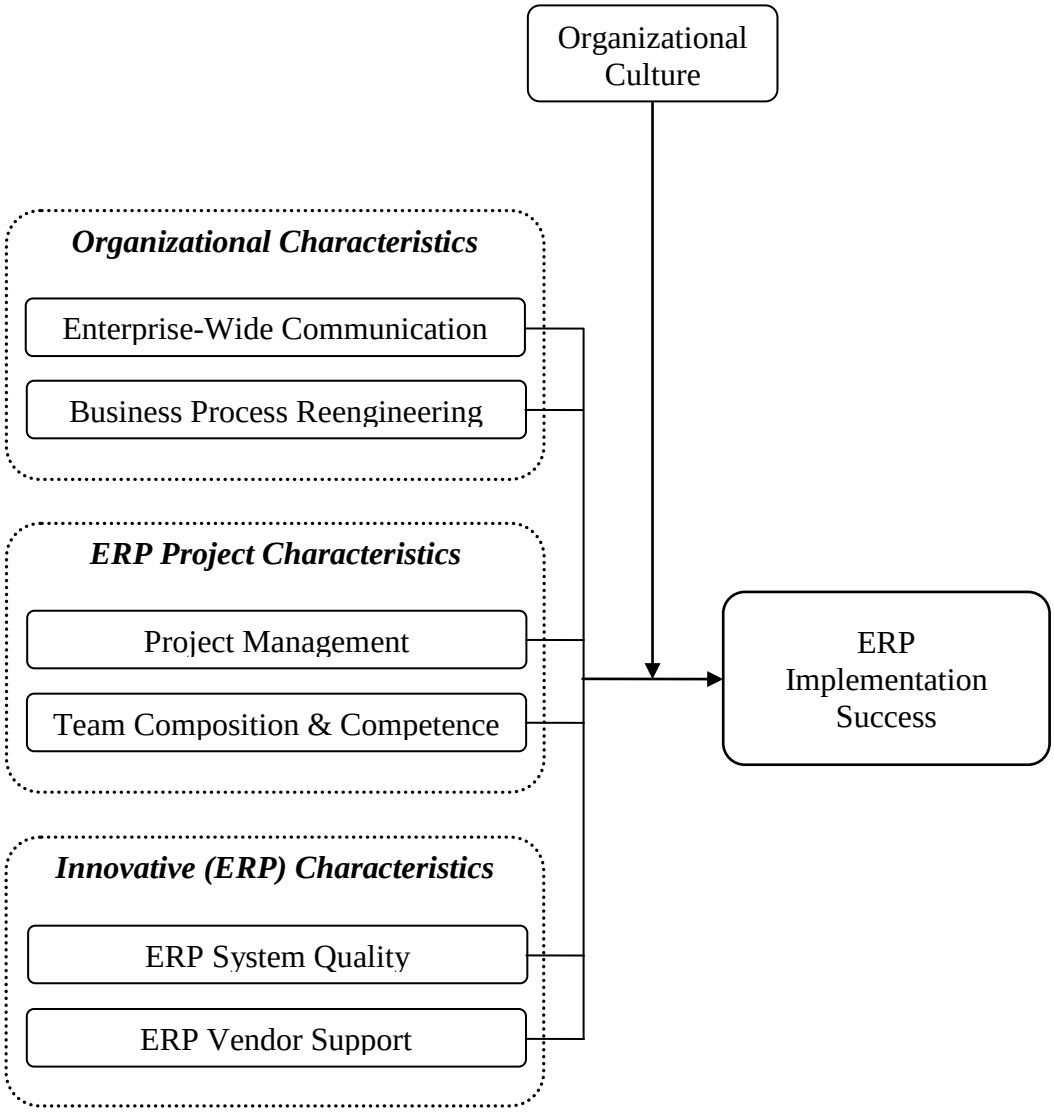

Figure (1): ERP Implementation Success Research Framework

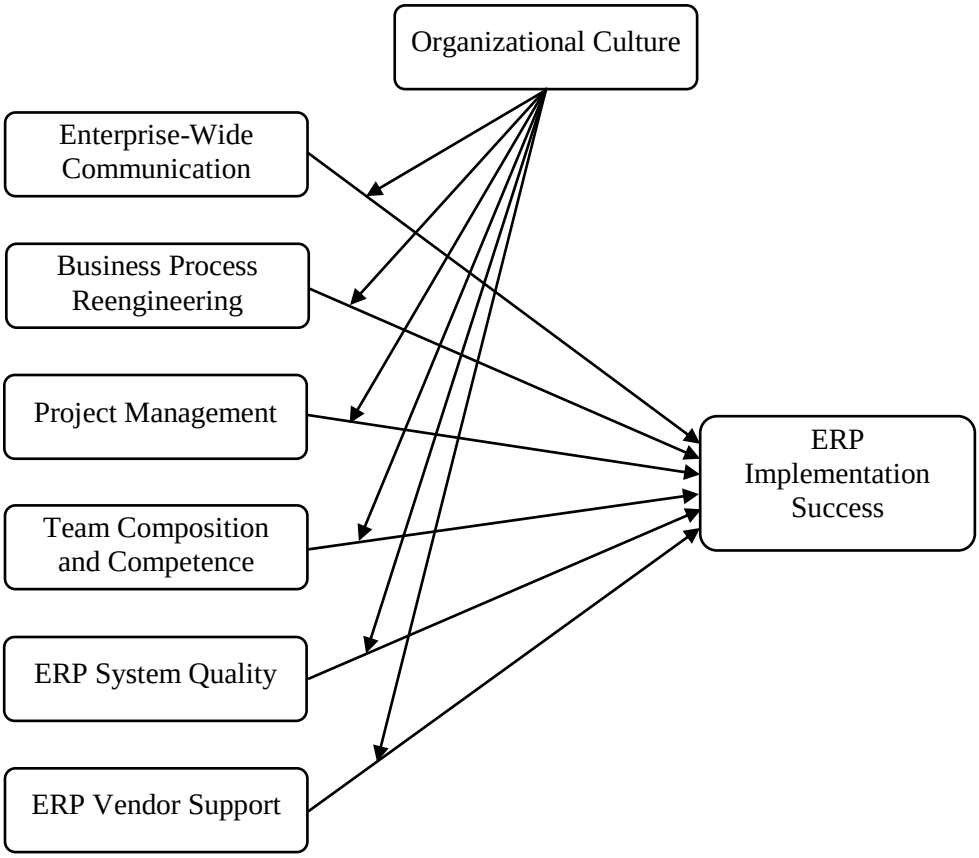

Figure (2) Structural Model – ERP Implementation Success

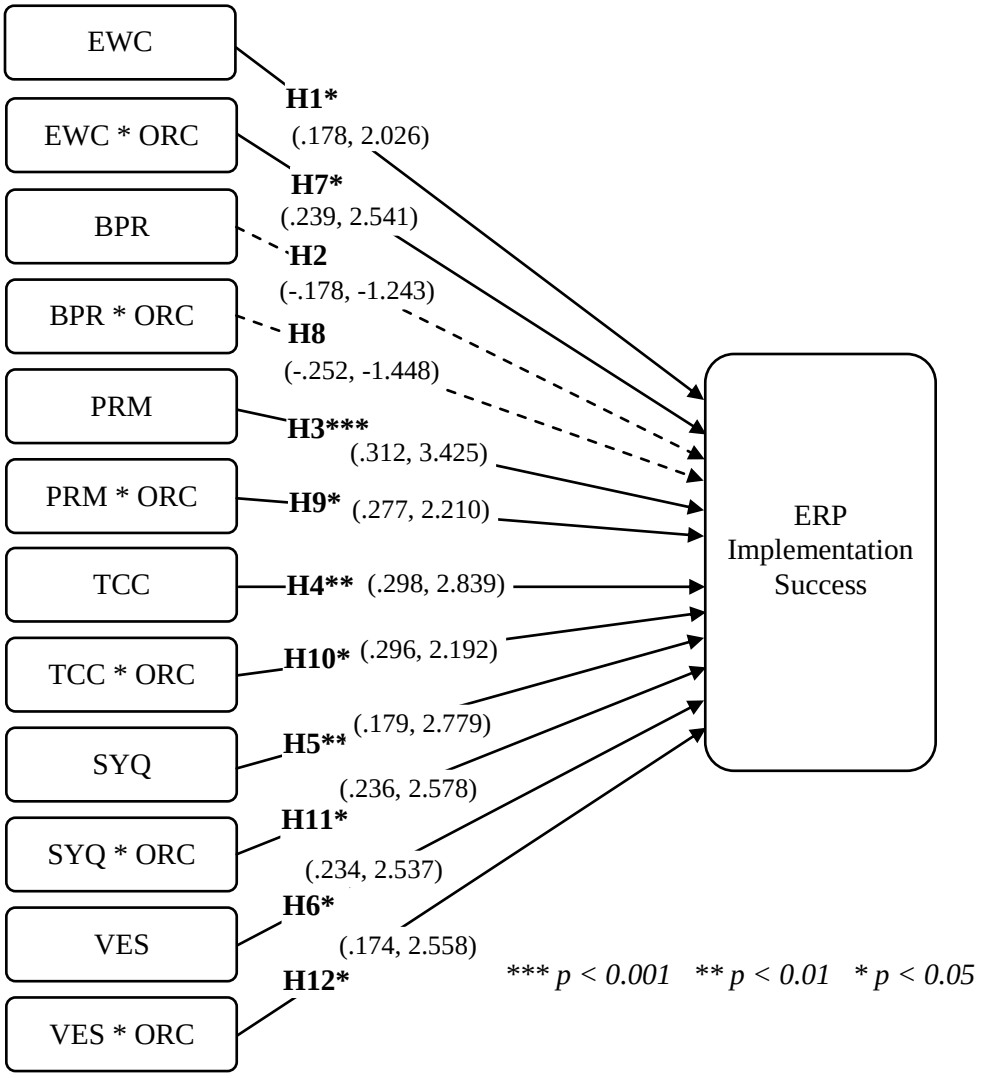

Figure (3) Path Analysis Results for ERP Implementation Success Model

Table (1): Characteristics of the Respondents

Measure	Categories	Frequency	Percent	Cumulative (%)
Gender	Male	328	85.4	79.2
	Female	56	14.6	100
Age	Below 30 years old	43	11.2	11.2
	31-40 years old	111	28.9	40.1
	41-50 years old	150	39.1	79.2
	Over 50 years old	80	20.8	100
Education	Undergraduate	88	22.9	22.9
	Graduate	184	47.9	70.8
	Postgraduate (MS)	97	25.3	96.1
	Postgraduate (PhD)	15	3.9	100
Employment with this company	Less than 3 years	36	9.4	9.4
	3-5 years	61	15.9	25.3
	6-10 years	112	29.2	54.4
	More than 10 years	175	45.6	100
Involvement in ERP implementation project	Fully involved	189	49.2	49.2
	Partially involved	162	42.2	91.4
	Not involved	33	8.6	100
ERP module used	Finance	128	33.3	33.3
	Human resources	64	16.7	50.0
	Logistics	96	25.0	75.0
	Production	64	16.7	91.7
	Sales	32	8.3	100
ERP use period	About 1 year	63	16.4	16.4
	2 years	160	41.7	58.1
	3 years	90	23.4	81.5
	More than 3 years	71	18.5	100
ERP use frequency	About once a day	78	20.3	20.3
	Several times a day	190	49.5	69.8
	About once a week	64	16.7	86.5
	Several times a week	52	13.5	100

Table (2): Convergent Validity Test

Construct	Items	Factor Loading	Composite Reliablity	Average Variance Extracted
Enterprise-wide communication (EWC)	EWC1	.824	.901	.578
	EWC2	.792		
	EWC3	.836		
	EWC4	.750		
	EWC5	.820		
Business process reengineering (BPR)	BPR1	.831	.918	.533
	BPR2	.844		
	BPR3	.831		
	BPR4	.840		
	BPR5	.811		
Project management (PRM)	PRM1	.829	.936	.740
	PRM2	.834		
	PRM3	.808		
	PRM4	.838		
	PRM5	.811		
	PRM6	.815		
	PRM7	.822		
Team composition and competence (TCC)	TCC1	.776	.922	.672
	TCC2	.849		
	TCC4	.863		
	TCC5	.861		
	TCC6	.851		
ERP system quality (SYQ)	SYQ1	.824	.933	.563
	SYQ2	.833		
	SYQ3	.847		
	SYQ4	.846		
	SYQ5	.852		
ERP vendor support (VES)	VES1	.827	.929	.640
	VES2	.813		
	VES3	.821		
	VES4	.837		
	VES5	.834		
	VES6	.835		
Organizational culture (ORC)	ORC1	.766	.920	.593
	ORC2	.856		
	ORC3	.712		
	ORC4	.735		
	ORC5	.867		
	ORC6	.844		
	ORC8	.832		
ERP implementation success (SUC)	SUC1	.839	.945	0.792
	SUC2	.814		
	SUC3	.807		
	SUC4	.782		
	SUC6	.810		
	SUC7	.822		
	SUC8	.734		
	SUC9	.842		

Table (3): Discriminant Validity Test

Construct	Mean	S.D.	EWC	BPR	PRM	TCC	SYQ	VES	ORC	SUC
EWC	4.82	1.03	**0.76**							
BPR	4.63	0.92	0.44	**0.73**						
PRM	5.31	1.14	0.49	0.46	**0.86**					
TCC	5.14	0.86	0.62	0.57	0.61	**0.82**				
SYQ	4.78	0.94	0.46	0.60	0.43	0.53	**0.75**			
VES	5.02	1.09	0.55	0.49	0.58	0.45	0.48	**0.80**		
ORC	4.79	0.83	0.41	0.54	0.47	0.66	0.50	0.44	**0.77**	
SUC	4.90	0.99	0.67	0.45	0.69	0.65	0.44	0.59	0.53	**0.89**

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 (4) AMOS Structural Modeling and Path Analysis Results

Hypotheses	Relationship	Standardized Coefficients	t-value	p-value	Support
H1	EWC → SUC	0.178	2.026	0.043 *	Yes
H2	BPR → SUC	-0.178	-1.243	0.214	No
H3	PRM → SUC	0.312	3.425	***	Yes
H4	TCC → SUC	0.298	2.839	0.005 **	Yes
H5	SYQ → SUC	0.179	2.779	0.005 **	Yes
H6	VES → SUC	0.234	2.537	0.011 *	Yes
H7	EWC * ORC → SUC	0.239	2.541	0.011*	Yes
H8	BPR * ORC → SUC	-0.252	-1.448	0.148	No
H9	PRM * ORC → SUC	0.277	2.210	0.027*	Yes
H10	TCC * ORC → SUC	0.296	2.192	0.028*	Yes
H11	SYQ * ORC → SUC	0.236	2.578	0.010*	Yes
H12	VES * ORC → SUC	0.174	2.558	0.011*	Yes

**** $p < 0.001$ ** $p < 0.01$ * $p < 0.05$*