Critical Success Factors for Erp Implementation: Insights from a Middle-Eastern Country

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Abstract: The purpose of this paper is to explore the critical success factors (CSFs) of enterprise resource planning (ERP) system implementation in context of the developing countries. A survey questionnaire including the list and brief description of 17 CSFs of ERP implementation was designed and distributed among ERP adopter companies in Iran. Operational/functional/unit managers' perception about the criticality of these 17 CSFs was examined using frequency analysis and t-student test. All the 17 CSF were identified as significant factors for the successful ERP implementation in Iranian companies. Besides, comparative analysis of our findings indicated that results are consistent with findings of six prior researches in developing countries. The paper appears to be the first study to focus on the CSFs of ERP implementation in Iran. This research thus adds to the growing body of knowledge on CSFs of ERP implementations in developing countries. This may act as a starting point for more researches in this area in Middle-East, North Africa and other Muslim developing countries. This research improves the understanding of the managers in adopting companies on critical factors that must be carefully considered to ensure a successful ERP implementation.

Key words: Enterprise resource planning ⋅ ERP implementation ⋅ Critical success factors ⋅ Iran ⋅ Developing country

INTRODUCTION

Enterprise resource planning (ERP) system is an integrated software solution which covers a variety of business processes that enables companies to achieve a holistic outlook of the organization [1]. Dezdar and Ainin [2] described ERP software as an integrated system solution which is employed to manage all of the resources of the organization. In addition, they believed that ERP systems can provide all the diverse units' needs by integrating all the functions and divisions of an enterprise into a single computer system. The ERP systems offer several considerable intangible benefits to the implementing companies such as improved information and processes, internal integration and improved customer service and they also present a number of most important tangible benefits like cost effectiveness in inventory, personnel, procurement, cash/order management, improvements in productivity and overall

profitability [3]. Due to the huge benefits of ERP systems, many organizations around the world still plan to acquire this software. Regardless of the various benefits of the ERP system, its adoption and implementation have not been without problems. Many companies have assigned considerable organizational resources to their ERP projects, but have encountered unexpected challenges due to the compound nature of ERP systems. A report illustrates that, on average, ERP implementation projects took 2.5 times longer than projected, were 178% over budget and brought about only 30% of the agreed benefits [4]. Wang *et al*. [5] stated that over 90% of ERP implementations have been delayed and budget needed for the additional amounts due to many changes in the original plan. Given the high costs of ERP implementation and low success rate, the critical factors leading to success of ERP projects need to be found. Understanding the critical factors of the success of ERP implementation would be of benefit to both implementing companies and

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ERP software vendors. ERP implementing companies could achieve an understanding of the complexities inherent in ERP implementation projects to avoid possible barriers. In addition, decision makers will be able to prepare better strategies to increase the likelihood of achieving the desired results. Besides, ERP system vendors would build ERP products that keep their customers happier and consequently they may possibly increase their market share and their profits [6]. So, this study aims to examine critical success actors (CSFs) that affect ERP implementation success in Iran.

This study is significant because of several issues. First of all, identifying factors leading to success of ERP systems is of increasing importance. Amoako-Gyampah [7] believed that although adoption and implementation of ERP systems has been studied, additional research and insights are needed. Second, most of prior researchers have developed their list of critical success factors from a small number of case studies [8]. This research is carried out employing a large scale survey in ERP user companies. Third, ERP vendors are now trying to extend their market to companies in developing countries but little research has been conducted on ERP adopting companies in developing countries [6]. Ngai *et al*. [9] emphasized that additional effort should be directed to ERP projects in these regions/ countries as they represent a vast potential ERP market and a very large pool of companies. Despite the introduction of ERP systems since the 1990s, there have been only a few studies on ERP implementation in Iran in this domain. Consequently, this study contributes to a broader understanding of ERP implementation and the critical factors that influence its success in the context of Iran. The findings of this study can be also valuable for ERP adopting companies and ERP vendors in other Muslim countries and also Middle-Eastern, Asian and developing countries.

In the following sections, the related literature is reviewed and a comprehensive list of CSFs is developed in the second section. The research design, including data collection is then explained in the third section. The fourth section presents the data analysis and findings. In the discussion and conclusions section, the implications and limitations of the study are highlighted along with guidelines for future research.

Critical Success Factors for Erp System Implementation:
A key research 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. 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. In ERP system implementation, CSFs could be recognized as the few key areas where things must go right for the implementation to succeed [10]. Since 1999, a lot of IS researchers have been increasingly utilizing CSFs to study ERP system implementations. Somers and Nelson [11] recognized 22 critical success factors assessed them across phases of 110 ERP implementation cases. Al-Mashari *et al*. [12] 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*. [13] 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. Sedera and Dey [14] combined the works of prior researchers and proposed 11 CSFs. Brown and He [15], based on the importance and/or frequency of a critical factor in the source literature, identified 13 factors as critical for ERP implementation. Finally, in a recent research, Dezdar and Sulaiman [10] developed a compilation of CSFs for ERP implementation projects. They employed content analysis method to scrutinize the studies conducted in last 10 years (1999-2008) and provided 17 CSFs in five main categories, as follows:

- *ERP Adopting Organization*: Top management support, Enterprise-wide communication, Business plan and vision, Organizational culture, Appropriate business and IT legacy systems.
- *ERP Project*: Project management, Business process reengineering, ERP team composition and competence, Change management program, Project champion.
- *ERP User*: User training and education, User involvement.
- *ERP System*: Careful selection of ERP software, System quality, Software analysis, testing and troubleshooting.
- *External Expertise*: Vendor support, Use of consultant.

The critical success factors of ERP implementation projects identified from the study of Dezdar and Sulaiman [10] are explained in subsequent paragraphs:

Top Management Support: The ERP system is required to receive support and approval from top management prior to its implementation. Top management must be involved in all the processes of the ERP implementation project. Al-Mashari *et al*. [12] suggested that top management support should not stop with initiation and facilitation, but it is required to cover the whole ERP implementation process. According to Zhang *et al*. [4], 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 consist of communicating the company strategy to all staff, developing an understanding of the restrictions and abilities, demonstrating commitment and establishing rational objectives for implementing the ERP system. Moreover, top management should supervise the ERP project progress and present direction to the ERP project teams. Without clear commitment and leadership from top management, employees will find out ways to sustain the status quo and the investment in the new ERP system will be wasted accordingly [16].

Enterprise-Wide Communication: Enterprise-wide communication is a critical success factor that uses tools such as monthly or weekly meetings, bulletins, frequent e-mail updates and newsletters. Nah *et al*. [13] advised that the communication has to be two-way to prevent gaps that can take place if the accurate business requirements and approval are overlooked. Previous scholars believed that there should be an effective communication between ERP project team members and users and also between functional units and departments as well to have a smooth ERP implementation [11, 17]. Besides, the goals and objectives of ERP implementation projects should be explained for users via adequate communication channels such as presentations, demonstrations, newsletters. Furthermore, the users' expectation, comments and their approval should be obtained at every level of the project [8, 14]. Lastly, the progress report of the ERP project should be informed to all stakeholders as the implementation takes place [13].

Business Plan and Vision: The most important phase of any ERP project should start with a conceptualization of the goals and feasible methods of realizing these goals.

Moreover, the ERP project goals should be clarified so they are operational and specific, to specify the general guidelines of the project [11]. The ERP business plan should summarize the anticipated tangible and strategic benefits, resources required and costs and risks involved in the implementation of the ERP system. A clear vision helps the ERP adopting company to set the priorities correctly and to develop and complete a well-organized business plan. The firm's vision and the strategy that result from this vision should be translated into tangible priorities and after that it should be determined how the ERP system implementation will facilitate the organization to deliver these priorities. Zhang *et al*. [4] proposed that the vision/ goals/ justification should be clearly stated in the business plan, including a clear statement of the ERP project mission and goals and reasons for the investment that should be linked to business requirements.

Organizational Culture: Enterprises around the world have various backgrounds and often vary in organizational culture and business requirements [9]. When two organizations implement the exact identical ERP software, the implementation outcomes sometimes are dissimilar. Organizational culture provides employees a common frame of reference for changes in an organization. When organizations have different cultures, people have different perceptions and interpretations of organizational changes, which affect employees' embracing changes [18]. Organizational culture can be measured using six dimensions: process vs. results orientation, employee vs. job orientation, parochial vs. professional identity, open vs. closed system, loose vs. tight control and normative vs. pragmatic mentality [19]. The 'process vs. result orientation' refers to whether an organization is more concerned about the processes and means to be followed to perform the work or the targets that are tracked with this work. The 'employee vs. job orientation' indicates whether the organization is more concerned with the execution of work or the well-being of the person. An 'open vs. closed system' refers to the climate of communication within the institute.

Appropriate Business and IT Legacy Systems: Legacy systems summarize the current information technology, business processes and corporate culture and structure. The present legacy systems have to be carefully determined and assessed to identify the scale and nature of potential problems that a company could face through the ERP implementation process. Nah *et al*. [13] pointed out that it is essential to assess the existing legacy system

since more complex and greater legacy systems need more organizational and technological changes through the transitional phase of the ERP implementation project. In fact, the problem of legacy systems is that the majority of companies keep the data across a number of separate computer systems in different departments, regions, offices or factories. Every one of these legacy systems will possibly supply important support for a specific business task. Nevertheless, when they are going to be integrated, they demonstrate one of the most serious obstacles to the company's performance and productivity [10]. For that reason, it is very important that a company should move towards the change of legacy system cautiously and, most importantly, with an inclusive plan.

Project Management: Management of ERP implementation projects usually comprises five main parts including preparing an official implementation plan, providing a reasonable time frame, setting up periodic meetings for monitoring project status, having an effective project leader who is also a champion and participating project team members who are stakeholders [4]. Several researchers pointed out that the scope of the ERP implementation project, in terms of the BPR required, the amount of implementation and participation of business units, should be obviously created and controlled [8, 14]. In addition, the ERP project milestones should be formally defined with obvious delivery dates. Moreover, the tasks of all people involved in the ERP implementation project should be defined and assigned [13]. Furthermore, the progress of an ERP implementation project is supposed to be evaluated and reviewed on a periodic basis. Finally, all activities of the vendor/consultant should be followed and checked via an official procedure [13].

Business Process Reengineering: Business Process Reengineering (BPR) evaluates the business processes of an enterprise in order to identify the best method of performing business [6]. Business process activities focus the firm on identifying and improving the efficiency of critical operations, on restructuring important non-value-adding operations and on eliminating inefficient processes. Muscatello and Chen [8] believed that using reengineering methods to develop a uniform vision of the firm's processes enables the company to reduce uncertainty and achieve ERP implementation success. BPR commonly starts by identifying and clearly

documenting the present business processes [20]. Then the existing redundant and inconsistent activities are analyzed against performance goals and ERP requirements. Based on the outcomes of this analysis, a number of new business processes that properly align with ERP functions are developed [8]. Then the company's procedures need to be decomposed to diverse levels of detail.

ERP Team Composition and Competence: An ERP implementation project engages all of the departments in an organization. It demands the collaboration of technical and business professionals as well as ERP users. Companies implementing an ERP system must be willing to dedicate some of their best employees to the project for successful implementation. These individuals should have a proven reputation and there should be a commitment to release these individuals to the project on a full-time basis. In addition, team members should focus solely on the ERP project and it should be their main concern [13]. Furthermore, the members of the ERP project team have to be authorized to make quick decisions regarding the project [14]. This research adopted the definition of ERP team composition and competence as ERP team members who are technologically competent, understand the company and its business, fully involved, highly rewarded and committed and come from departments affected by the new ERP system.

Change Management Program: ERP system implementation requires adopting companies to change the way they do their business and also necessitates the users to change the ways they do their jobs. An ERP implementation team is needed to properly provide a change management plan [13]. Top management should look at organizational issues that may threaten ERP project success like a culture that is resistant to change or a group of managers who do not support the objectives of the ERP implementation project. However, to guarantee ERP implementation success, it is recommended that top management must address these problems by integrating them into a change management program [2]. Dezdar and Sulaiman [10] found that an effective change management plan should involve the combination of technology, process and people. The change management project programme guarantees that the end-user community accepts the new ERP system. An important task in change management is to make a positive user attitude and user acceptance of the ERP project [9, 11].

Project Champion: The success of technological innovations such as ERP systems has often been associated with the attendance of a champion, who carries out the critical functions of change leadership and marketing the ERP system to all of the stakeholders [11]. The project champion is supposed to be a high-level manager sponsor who has the authority to support the ERP implementation project all over the enterprise. One evident place to look for such a champion role is with the chief information officer, chief executive officer, or vice president in charge of information technology. Project champions should understand the business and organizational environment as well as the ERP system. The project champion should possess strong leadership skills and technical, business and managerial abilities [21]. Project champions must try to manage user resistance. Since, ERP team members usually work for long hours and do overtime, the project champion is supposed to motivate them during the implementation project [13].

User Training and Education: Training and educating ERP users are both absolutely essential since ERP software is not easy to use even for highly educated people with excellent IT abilities. The education and training increases ease of use and reduces user resistance which, in turn, enhances the likelihood of ERP systems use and success. ERP training and education should be permanent, based on knowledge transfer principles and handle all features of the ERP system [22]. The main purpose of ERP training must be the effective understanding of the different business processes embedded in the ERP system. The training and education programme should commence with the ERP project team, senior management and finish with the end users. Furthermore, the different users and each level in the project group need diverse training. For instance, the ERP end users need to learn those functions that are associated with their occupations. The ERP project team should have a comprehensive understanding of the system's functionality. The steering committee members are required to obtain a general idea of the system's functionality.

User Involvement: User involvement enhances user satisfaction by developing reasonable beliefs about the capabilities of the ERP system. Zhang *et al.* [4] believed that when a company makes a decision to implement an ERP system, the users can be involved in the definition phase of the firm's ERP system requirements and also in the implementation of ERP systems. When a user

participates in the ERP implementation process, the user can comprehend the new system faster and present his opinions. Using this technique enables the user to deal with the ERP software and can also narrow the gap between the new and old systems. Furthermore, the user realizes some of the ERP ideas earlier and accordingly the subsequent training will be accepted with no trouble. Moreover, involving a number of users in the early stages of ERP adoption will facilitate internal training. In the long run, the ERP user company may not be able to rely on vendors or consultants due to the expensive training and consulting rate. In this case, early involved users can be employed to train other new ERP users. Finally, users can be involved in the process of ERP system selection [23].

Careful Selection of ERP Software: A number of the biggest ERP implementation failures have taken place because the system's capabilities are incompatible with the firm's business procedures and processes. As a result, an organization must select an appropriate vendor that is able to supply a flexible ERP system. Previous scholars attempted to identify significant principles that must be taken into account when choosing ERP software. For instance, Dezdar and Ainin [24] emphasized that the ERP software selected should be matched with the majority of the current business processes of the adopting organization. ERP software that is not developed to meet the particular business requirements of the organization can cause great trouble. In addition, the ERP package must be easy to implement, user-friendly and flexible and it is recommended that applicability, adaptability, upgradeability and integration are critical issues in ERP system selection. The ERP system should match the overall business strategy of the ERP adopting company. ERP adopting companies must consider the vendor's market focus, track record with customers, vision of the future and with whom the vendor is aligned.

System Quality: ERP system quality was defined as user perception of measuring the ERP system in terms of its accessibility, reliability and flexibility. DeLone and McLean [25] believed that the quality of the system is at the technical level, where efficiency and accuracy of the system generating information were vital. These were object-based feelings and revealed perceptions of the end users. DeLone and McLean [25] combined the earlier research and presented the diverse potential of system quality metrics, with such extensive items as ease of learning and use, data accuracy, system integration and flexibility and system efficiency and reliability. Prior

researchers emphasized the important characteristics of the ERP system for measuring its quality such as providing accurate and reliable outputs, presenting useful functionality for doing a job, offering user friendly features and finally, the ability to exchange data with other systems servicing diverse functional departments [14].

Software Analysis, Testing and Troubleshooting: The integration of the ERP system into the adopting company is very difficult and should be managed appropriately. Additional software may need to be analyzed and developed to combine the ERP systems and the company legacy systems. In addition, testing and troubleshooting of software is needed to make sure that the ERP system operates according to plan. Validation and Testing of ERP software are very essential to guarantee that the business process configurations are realistic and the ERP system works technically. A significant test of an ERP implementation project is whether the processes represented in the ERP software really match the business processes occurring in the company. Troubleshooting for handling ERP system errors is primordially important [12, 13]. ERP adopting companies have to work closely with ERP vendors and consultants to settle implementation problems. Quick response, perseverance, endurance and problem solving capabilities are essential to handle any ERP implementation troubleshooting.

Vendor Support: ERP systems are extremely complex and require extensive training. Users need training in-house to see how the system will change organizational business processes. ERP training should deal with all aspects of the system, be continuous and based on the principles of knowledge transfer where consultants or vendors are involved. In addition to developing a training plan at the beginning of the project, the training is provided at several points during an ERP project in order not to use all the training just before implementation was finished. ERP vendors should establish a good relationship and communicate well with adopting companies, provide quality services in an adequate time, assign employees with the domain knowledge of the industry and enough experience for implementation, offer adequate training and practice to increase the user's proficiency in ERP usage and finally provide suitable user guides, operation guides, manuals and any formal documents required for using the ERP system [4, 8, 26].

Use of Consultant: The consultant's support in an ERP project is much more needed than in other information system projects because ERP implementation involves a broad sort of expertise that comprises technical implementation knowledge, risk management, change management, as well as business process reengineering. ERP consultants perform various tasks in the ERP adopted organization, which may include: solving problems, offering related and required knowledge, mobilizing various skills, assisting in configuration and deriving value from an ERP package [11]. Moreover, ERP consultants continue to play important roles in terms of filling gaps by performing requirements analyses, recommending suitable solutions and managing overall implementations. ERP consultants carry out a variety of responsibilities which may consist of mobilizing diverse proficiencies, providing required and related knowledge, supporting the ERP configuration, deriving value from the ERP system and resolving potential problems [5].

ERP Implementation Success: A review of the literature pertaining to ERP implementation success illustrated that basically success can be categorized into four perspectives: ERP system, ERP user, ERP project, or ERP adopting organization i.e. organisational impact [27]. Based on their frequency analysis, it was found that organizational impact and user satisfaction were the two most frequently used measures of implementation success. Hence in this research, ERP implementation success was defined based on two dimensions, i.e. organizational impact and user satisfaction. It evaluates optimal success from the business and user perspectives. These criteria are also in line with the prior studies conducted in ERP implementation success [4, 13, 28].

Research Design: In this research, critical success factors for ERP implementation are investigated in those companies in Iran which employed ERP systems. Therefore, the hypothesis of this research is presented as follows:

H0: The critical success factors of ERP system implementation appeared in the questionnaire are significant for the ERP system implementation in Iranian companies.

Iranian ERP adopting companies are target population of this study. Since there was no single source which complied this database, various sources were used

such as websites of top 10 international ERP vendors companies, websites of top 30 local IS vendors companies, websites of Iranian governmental and non-governmental organizations in charge of IT, annual reports of public list companies published by Tehran Stock Exchange website, published reports and articles and interview with several IT/ERP experts. Finally, 31 ERP implemented companies were determined as target population of this research. A survey questionnaire was developed to assess the respondents' perceptions of the CSFs for ERP implementation success and the degree to which each factor is considered critical. 17 critical success factors used in the questionnaire were adapted from a recent published research [10]. For each CSF, a brief description of the factor was provided. A five-point Likert scale ranging from "Extremely critical and important for the success of the ERP implementation" to "Neither critical nor important for the success of the ERP implementation" was employed to determine the importance level of each CSF. The target 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. After constant reminder, 315 completed questionnaires were collected. The questionnaires were reviewed and 27 questionnaires were omitted as they were incomplete. Therefore only 288 questionnaires were used for analysis.

Data Analysis and Findings: The characteristics of respondents have been illustrated in Table (1). As can be seen, the respondents were much more male than female. Besides, more than two-thirds of respondents were between 31-50 years old and had more than 6 years of experiences in their companies. In addition, more than three-fourths of the respondents held university degree. Furthermore, the profile of the respondents illustrate that the majority of respondents were involved fully or partially in the ERP implementation project. 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. Subsequently, the respondents were the best informant people to answer the survey.

Table (2) demonstrates descriptive statistics obtained for the CSFs as well as their ranking from 1 to 17 based on their Mean value. A value of 5 represents "Extremely critical and important for ERP implementation success" and a value of 1 represents "Neither critical nor important for ERP implementation success". A score of 3 points is labeled as "Moderately critical and moderately important for ERP implementation success". As can be seen, over the 17 CSFs analyzed, the minimum score for mean was 3.04 points on the five-point Likert scale. A score of 3.04 stands for a little bit more critical than moderately critical. So, it can be considered that all the 17 CSF analyzed in this research are significant factors for the successful ERP implementation in Iranian companies. In addition, Table (2) shows the relative importance of the CSFs for the operational/functional /unit managers. As can be seen, five critical factors of 'Top management support, Project management, Project champion, Business process reengineering and ERP team composition and competence' were recognized by the respondents as extremely critical and important for successful ERP implementation (their Mean value are greater than 4). Besides, 11 critical factors of 'Careful selection of ERP software, Change management program, User involvement, Vendor support, Business plan and vision, Enterprise-wide communication, Organizational culture, User training and education and System quality' were discovered as critical and important. Moreover, three critical factors of 'Appropriate business and IT legacy systems, Use of consultant and Software analysis, testing and troubleshooting' were identified moderately critical for successful ERP implementation in Iranian context.

For testing the research hypothesis, a "t-student" statistical test was applied. If it is found significant that the mean value of a factor is equal to or greater than 3 at a significant level of 0.01, the factor is considered to qualify as a critical success factor. Table (3) shows the results of t-student test. Since all the calculated values of "t" are greater than the corresponding "t-table" values of 1.68, it is concluded for all the CSFs that their mean is significantly equal to or greater than 3. Consequently, the hypothesis of this study is supported.

For further investigation, a comparative analysis was conducted between findings of this research and findings of six prior studies in developing countries (Table 4). As can be seen, 12 out of 17 CSFs from our findings are in the range of prior researchers' ranking in developing countries. It shows more than 70 percent agreement between our findings and prior findings. However, the last five CSFs show a slight variation from prior findings.

Table 1: Characteristics of the Respondents

Measure	Categories	Frequency	Percent	Cumulative (%)
Gender	Male	246	85.4	85.4
	Female	42	14.6	100.0
Age	Below 30 years old	32	11.1	11.1
	31-40 years old	96	33.3	44.4
	41-50 years old	104	36.1	80.6
	Over 50 years old	56	19.4	100.0
Education	Undergraduate	62	21.5	21.5
	Graduate	141	49.0	70.5
	Postgraduate (MS)	73	25.3	95.8
	Postgraduate (PhD)	12	1.2	100.0
Employment with this company	Less than 3 years	25	8.7	8.7
	3-5 years	54	18.8	27.4
	6-10 years	89	30.9	58.3
	More than 10 years	120	41.7	100.0
Involvement in ERP implementation project	Fully involved	123	42.7	42.7
	Partially involved	165	57.3	100.0

Table 2: Ranking of ERP Implementation CSFs by Operational/Functional/Unit Managers

Rank	Critical Success Factors	Mean	Extremely critical and important (5)	Critical and important (4)	Moderately critical and important (3)	Important but not critical (2)	Neither critical nor important (1)
1	Top Management Support	4.62	70.8 %	20.8 %	8.3 %	-	-
2	Project Management	4.42	53.5 %	34.7 %	11.8 %	-	-
3	Project Champion	4.33	43.1 %	47.2 %	9.7 %	-	-
4	Business Process Reengineering	4.17	39.2 %	38.2 %	22.6 %	-	-
5	ERP Team Composition and Competence	4.00	16.7 %	62.5 %	20.8 %	-	-
6	Careful Selection of ERP Software	3.96	29.2 %	37.5 %	33.3 %	-	-
7	Change Management Program	3.96	12.5 %	37.5 %	50.0 %	-	-
8	User Involvement	3.92	29.2 %	41.7 %	20.8 %	8.3 %	-
9	Vendor Support	3.88	25.0 %	41.7 %	29.2 %	4.2 %	-
10	Business Plan and Vision	3.83	29.2 %	31.6 %	32.6 %	6.6 %	-
11	Enterprise-wide Communication	3.71	25.0 %	20.8 %	54.2 %	-	-
12	Organizational Culture	3.67	25.0 %	22.2 %	47.2 %	5.6 %	-
13	User Training and Education	3.62	31.9 %	36.1 %	31.9 %	-	-
14	System Quality	3.62	14.2 %	42.4 %	35.1 %	8.3 %	-
15	Appropriate Business and IT Legacy Systems	3.46	-	50.0 %	45.8 %	4.2 %	-
16	Use of Consultant	3.38	12.5 %	29.2 %	41.7 %	16.7 %	-
17	Software Analysis, Testing and Troubleshooting	3.04	5.9 %	16.7 %	57.3 %	16.0 %	4.2 %

Table 3: Results from t-Student Test for CSFs of ERP Implementation

Critical Success Factors	Mean	Standard Deviation	t-value	Sig. (2-tailed)	Hypothesis
Top Management Support	4.62	.634	23.725	.000	Supported
Project Management	4.42	.693	18.092	.000	Supported
Project Champion	4.33	.647	13.728	.000	Supported
Business Process Reengineering	4.17	.770	11.876	.000	Supported
ERP Team Composition and Competence	4.00	.801	14.779	.000	Supported
Careful Selection of ERP Software	3.96	.791	14.941	.000	Supported
Change Management Program	3.96	.612	10.760	.000	Supported
User Involvement	3.92	.911	7.990	.000	Supported
Vendor Support	3.88	.834	8.875	.000	Supported
Business Plan and Vision	3.83	.926	7.266	.000	Supported
Enterprise-wide Communication	3.71	.842	7.737	.000	Supported
Organizational Culture	3.67	.914	8.046	.000	Supported
User Training and Education	3.62	.697	8.238	.000	Supported
System Quality	3.62	.830	7.159	.000	Supported
Appropriate Business and IT Legacy Systems	3.46	.577	6.742	.000	Supported
Use of Consultant	3.38	.906	6.229	.000	Supported
Software Analysis, Testing and Troubleshooting	3.04	.854	6.417	.000	Supported

Table 4: Comparative Analysis of CSFs Ranking in Developing Countries

Critical Success Factors	Iran (This Study)	India [29]	Venezuela [30]	Mexico [31]	China [15]	Malaysia [32]	South-Asia [14]	Range
Top Management Support	1	1	1	1	1	5	1	1-5
Project Management	2	5	3	2	-	9	4	2-9
Project Champion	3	9	2	3	-	-	2	2-9
Business Process Reengineering	4	3	19	5	8	-	10	3-19
ERP Team Composition and Competence	5	4	4	3	10	1	7	1-10
Careful Selection of ERP Software	6	-	11	6	3	-	-	3-11
Change Management Program	7	8	7	11	12	10	8	7-12
User Involvement	8	11	9	10	-	8	-	8-11
Vendor Support	9	10	17	-	4	12	3	3-17
Business Plan and Vision	10	7	14	14	7	7	9	7-14
Enterprise-wide Communication	11	6	5	4	-	3	11	3-11
Organizational Culture	12	-	-	13	-	4	8	4-13
User Training and Education	13	2	12	8	5	2	-	2-12
System Quality	14	13	-	-	11	-	-	11-13
Appropriate Business and IT Legacy Systems	15	-	-	13	6	13	-	6-13
Use of Consultant	16	12	15	7	9	-	6	6-15
Software Analysis, Testing and Troubleshooting	17	-	13	12	13	11	-	11-13

DISCUSSION AND CONCLUSIONS

Top management support was perceived by the respondents as extremely critical and important for the successful ERP implementation in Iran. Implementing an ERP system is not a matter of changing the software systems; rather it is a matter of reengineering the company and transforming the business practices to the best business practices. So, top management support can play a useful role in settling disputes and in providing clear direction. Top management of organization must be willing to become involved and to allocate valuable resources to the ERP implementation effort. Project management was identified as the second extremely critical factor for successful ERP implementation. The successful ERP implementers dedicate significant time before an implementation to develop a playbook or project plan. A project plan is used to guide project execution, document planning assumptions, facilitate communication between project team members and define key management reviews regarding content, degree of completion and timing. The need to have a project champion was considered as the third critical factor by operational/ functional/ unit managers of ERP adopters' companies. Someone should be placed in charge to champion the ERP project throughout the organization. The project champion should possess strong leadership skills as well as business, technical and personal managerial competencies. The project champion must own the ERP system and push forward the implementation. Another extremely critical factor for ERP implementation success is business process reengineering. BPR is a prerequisite to take full advantage of the ERP software. Enterprises should be willing to accept the embedded best practice, whenever possible and model their business processes according to those depicted by the ERP system. The fifth critical success factor for ERP implementation project was ERP team composition and competence. A balanced and cross-functional team should be chosen and provided with clear role definitions. ERP implementation teams should be multidisciplinary, dedicated teams, comprised of IT specialists, key users and operations personnel, as well as consultants with process redesign and change management skills. So, companies have to dedicate some of their top employees to the ERP implementation team.

This research presents several interesting findings. First of all, the entire 17 CSFs are significant CSFs for ERP implementation in the context of Iran. Second, the results of operational/functional/unit managers' ranking of ERP critical success factors in Iran are largely consistent with prior studies conducted in other developing countries. Third, the relative ranking of some CSFs in Iran varies with other developing countries. This finding supports the claim of Ngai *et al.* [9] that some of critical factors may not be equally important to different countries. Fourth, the findings of this study shows that 'Top management support, Project management, Project champion, Business process reengineering and ERP team composition and competence' are the top five critical factors for successful ERP systems implementation in Iranian firms. The results of this paper have several important implications for ERP researchers and practitioners. On the theoretical side, the study attempts to bridge the gap in the literature

about the CSFs for successful ERP implementation in developing countries. So, the list of 17 CSFs of ERP implementation can be examined in other developing countries. Moreover, this research may be helpful for those interested in cross cultural issues of complex IS implementation such as ERP. On the practical side, this research improves the understanding of the Iranian organizations on critical factors that must be carefully considered to ensure a successful ending ERP implementation. The CSFs identified in this study can serve as a checklist that covers all possible success factors associated with ERP implementation in Iran. This research considers all 17 CSFs without grouping them according to phases or stages of ERP implementation project. Complementary researches could be conducted by considering CSFs in different phases or stages of ERP implementation. Furthermore, more studies can be conducted in developing countries in Middle-East, North Africa and Moslem countries. Lastly, this study has focused on the factors of implementation phase. We would argue that other post-implementation activities are as important in the lifecycle of an ERP system, including the upgrading and maintenance of the ERP software.

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