Key factors in the successful implementation of enterprise resource planning system

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C H R O N I C L E	A B S T R A C T
	Enterprise Resource Planning Systems (ERP) are considered as the newest and most effective tools of enterprise resource planning and include an interconnected information, management and engineering system that meets all the needs of an organization. ERP implementation is costly and time-consuming and makes fundamental change in the process, if not implemented correctly it will cause challenges in most parts of the organization and will certainly fail. Therefore, the identification of key success factors in implementing ERP helps organizations avoid the loss of the project. This research aims to identify key success factors for ERP by examining 185 managers, professionals, experts of the Information and Communication Technology Institute associated with the Ministry of Communications and Information Technology of Iran. A questionnaire was used to collect data. Findings from exploratory factor analysis indicate that five factors: 1) user friendliness, flexible and consistency 2) establishment of project management; 3) alignment with user needs; 4) Management of organizational changes, and 5) observing the principles of successful implementation of ERP affect the institute and the corresponding suggestions are proposed consistent with these findings.

1. Introduction

During the past few years, there has been growing competition among organizations and firms to offer products and services in a global market. Enterprise Resource Planning Systems (ERP) is one of the most important tools for the integration of information and communication technology (ICT) in organizations to join in global market. These systems are not only capable of planning resources, but also integrate all units and corporate functions in an integrated computer system to meet all necessary requirements. ERP systems integrate all various subsystems in organizations using the latest technologies obtained in the field of information technology. ERP implementation normally costs significantly and it is time consuming since it needs fundamental changes in processes, which creates

tensions in most parts of the organizations and the outcome could be undesirable. In order to integrate the resource management and research excellence, ERP can contribute as one of the most advanced technology. However, implementing an ERP system is one of the main challenges in recent decades, so that organizations consider the investment in ERP systems as a significant strategy, which creates competitive advantage for many organizations.

Despite the strategic importance of these systems, most of the projects implemented in the early stages of implementation and commissioning of these systems failed, so that researchers stated the failure rate between 40 and 60 percent (Chang et al., 2008). Hence, the main concern of authorities for Communications and Information Technology Research is to identify key success factors in ERP implementation in order to prevent possible failure of the project. The major problem of this study, conducted in 2013 at the Institute of Communications and Information Technology in Iran, was to identify the key factors affecting the successful implementation of ERP and determine their relative importance in the research.

2. The concept of enterprise resource planning

The emergence of ERP systems goes back to the development of standard systems for production planning and control in Iran. Early systems were handy and they were used for ordering materials, hiring and tribute to the men, etc. Today, ERP systems are referred to the comprehensive software system that can integrate all the information activities of the organization and resources (money-Human Resources-Merchandise-Equipment) with the aim of increasing productivity, management and planning (Holland & Light, 1999).
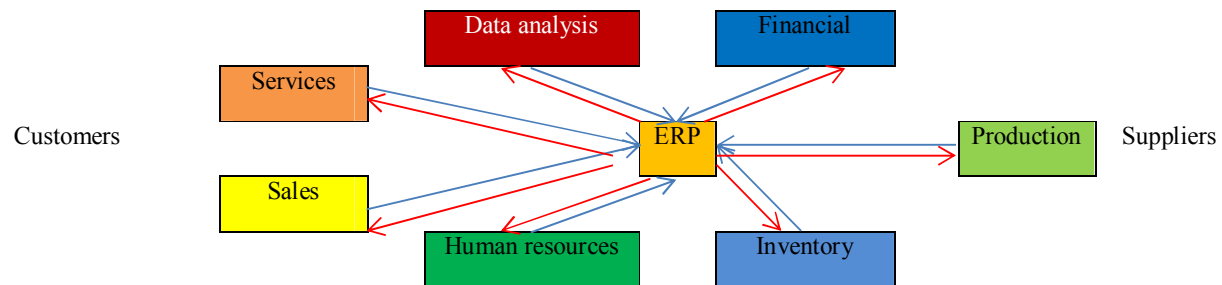
Fig. 1. The concept and role of enterprise resource planning systems

3. Factors affecting the successful deployment of ERP

Due to the complexity of ERP, many factors are involved in successful deployment of the system that have been identified in different models and researches (Nah et al., 2001; Somers & Nelson, 2001) and the results are reflected in Table 1. Some of the identified factors are the indicators of technological variables and some others are governing factors influencing the organization. Factors can be classified into two groups of strategic and tactical factors.

In view of the provisions of Table 1, the factors affecting the successful deployment were classified in internal and external factors and are selected in this study as an initial conceptual model.

In view of the conceptual model of the research, the research questions are discussed as follows:

1. What are the key factors influencing the successful deployment of ERP systems?

2. How is the rating importance of each the influencing factor?

Table 1
Factors influencing the successful deployment of ERP

Row	Source	Effective Factors
1	AL-mashari et al., 2003	1. Full coverage of current actions by the application of ERP; 2. Choosing the Right ERP and 3. The high flexibility of ERP Software
2	Pabedinskaitė, 2010	1. Choosing the Right ERP; 2. Selecting ERP alignment with the vision, objectives and strategy upstream (strategic) of the organization; 3. Software training team implementing ERP; 4. Implementing ERP software training team
3	Verville & Halingten, 2003	1. ERP software compatible with the organization's culture; 2. Needs of stakeholders outside the organization by ERP; 3. Motivation and participation of employees in ERP implementation
4	Plant &Willcocks, 2007	1. Strong project management during implementation; 2. Implementation of Value Engineering; 3. Improving organizational processes in the implementations of ERP; 4. Using software manufacturers to implement
5	Jadhav & Sonar (2004)	1. High Security of Software ERP; 2. Product validation and implementation of ERP; 3. personalization capabilities of ERP 4. easily work with ERP; 5. Reasonable cost (purchasing the license, implementation, implementation and support)
6	Bernroider & Koch, 2001	1. Creating flexibility in the organization during implementation; 2. The amount of creativity in the organization during implementation, implementation, and support; 3. Appropriate counseling and support during implementation support team ERP; 4. Short implementation time of ERP
7	Ful-Hoon & Delgado, 2006	1. Using local Implementing 2. Multilingual ERP Software
8	Yusuf et al., 2006	1. training team implementing of ERP; 2. Strong project management during implementation; 3. Motivation and participation of employees in ERP implementation
9	Wei et al., 2005	1. training team implementing of ERP; 2. Product validation and implementation of ERP; 3. High Security of Software ERP; 4. Choosing the Right ERP
10	Zairi, 2003	1. Top management support; 2. Project Management
11	Holland & Light, 1999	1. Strategy of ERP; 2. Support of senior management; 3. Project planning and scheduling; 4. User acceptance; 5. Monitoring and feedback; 6. Communication; 7. problem solving

4. Research methodology and the results

In terms of the research philosophy, this research is a positivist philosophy. The present study is applied in terms of the purpose and is expressible in terms of correlation, descriptive and survey studies. The population in this study consists of administrators, faculty members, researchers, and experts from the Institute of Information and Communication Technology (Iran Telecommunication Research Center) who are qualified to comment on the deployment of enterprise resource planning systems and 185 people. Given that in exploratory factor analysis it is required to evaluate at least 5 variables, thus the entire population is sampled for providing sufficient condition. In other words, instead of sampling in this study all censuses was used. The researcher made questionnaire was used In order to collect the required data and measure the variables. Indicators measured in the study were exposed to the judgment of relevant experts and finally the agreed questionnaire was used as data collection tool. In the questionnaire, based on the conceptual model 32 questions were proposed that show the variables influencing the successful deployment of enterprise resource planning systems and subjects responded in 5-point Likert scale. To assess validity, the questionnaire was distributed among a number of experts and after the obtained reliability; the questionnaire was distributed in the population. In addition, to assess the validity or reliability of the questionnaire Cronbach's coefficient alpha was used. Calculated Alpha value (0.94) indicates the validity of the questionnaire is relatively high. To identify the factors influencing successful deployment of ERP (first research question) in

Institute of Information and Communication Technology Exploratory factor analysis was used. As can be seen in Table 2, the condition for using Factor analysis in terms of the adequacy of the sample and test is the Sameness of the variables correlation matrix. As shown in Table 2, The KMO statistic value is equal to 0.854 that shows the adequacy of sampling was good enough. (More than 0.70). Bartlett's test shows that the significance level is equal to 0.001. Therefore, the condition of using factor analysis to analyze the data is established.

Table 2
Results of KMO and Bartlett's test

Sampling adequacy (KMO)		.854
Chi-square value	Bartlett test	4096.519
Degrees of freedom		496
Significance level		.000

Table 3
Factors influencing the successful deployment of enterprise resource planning

Indicators of factors	Factors				
	1	2	3	4	5
First factor: organizational change management based on the deployment of ERP					
People need to deploy ERP for new ideas	0.85				
Necessary training related to ERP	0.81				
Improved methods of organization through ERP implementation	0.79				
ERP system compatibility with the organizational culture	0.78				
Process re-engineering and organizational	0.78				
Emphasis on the security of ERP Software	0.69				
Convert and transfer data from the old system to the ERP system	0.66				
Planning to implement ERP projects	0.62				
Research strategies for the integration of necessary resources	0.62				
Incentives for managers to implement ERP systems	0.61				
Flexible alternative methods rather than rigid procedures	0.55				
Previous systems integration through ERP	0.53				
Emphasis on counseling and support for ERP implementation team	0.45				
Second: Effective Project Management System					
Financial power necessary to cover the costs of ERP implementation		0.79			
ERP systems alignment with the strategic direction of the Institute		0.66			
Emphasis on project management in ERP system implementation		0.63			
Needs of stakeholders in the implementation of ERP systems		0.61			
Involvement in the planning and implementation of ERP systems		0.5			
Senior management support for implementation of the various stages		0.46			
Incentives for managers to implement ERP systems		0.44			
The third factor: observing the design principles and alignment with the structure					
Emphasis on reputation and credibility of ERP			0.84		
Emphasizing the short duration of the design and installation of ERP			0.72		
Emphasis on multilingual ERP Software System			0.69		
Convenience of articles of the ERP system software			0.66		
Emphasis on compatibility with the structure of ERP			0.52		
The fourth factor: align with user needs and product quality					
Full coverage of the design process of ERP software				0.67	
Ability to customize the ERP software				0.61	
Strategy to purchase ERP software				0.59	
Positive history and validity of ERP Deployment consultants				0.49	
The fifth factor: user friendliness, flexible and adaptable					
Emphasizing the need for flexibility to cover technical ERP users					0.78
emphasis on Adaptation of ERP systems with internal network					0.75
Convenience principle GIS application stage					0.58
Equity	7.55	3.78	3.53	3.78	2.57
Variance	23.61	11.83	11.05	9.03	8.04
Cumulative Variance	23.61	35.44	48.5	55.54	63.59
Cronbach's alpha	0.89	0.78	0.79	0.77	0.77

Exploratory factor analysis of test results show that the five key factors in the successful implementation of Enterprise Resource Planning systems (ERP) are involved in the Institute of Information and Communication Technology. First to fifth Factors explain 23.6%, 11.8%, 11.05%, 9.03% and 8.04% of the variance in dependent variables, so that 63.29% of the total variance in ERP implementation success can be explained by five factors. In other words, there are still other factors, which have been identified in this study. As shown in Table 3, 32 variables were mounted on five factors. As seen in Table 4 and Table 5, factors have been recognized as follows:

First factor: organizational change management based on the deployment of ERP: 13 variables were loaded on this factor and the highest percentage of variance (23.61) corresponds to this factor. In the first factor, "index of integration necessary resources in Research Strategies" has the highest average index of 3.43 and the index of "Managers' incentives for implementation of ERP" has the lowest mean value equal to 2.05.

Second factor: Effective Management of Project Establishment System: 7 variables were loaded on this factor. This factor explains 11.83% of the total variance. in the second factor the index of "the Institute of funding to cover the cost of ERP" has the highest average index of 4.56 and the index of "top management support various stages of implementation of ERP" has the lowest mean value equal to 2.80.

Third factor: observing the design principles and alignment with the structure: 11.05 percent of the total variance is explained by this factor. 5 variables were loaded on this factor. In the third factor, the index of "focus on the design and installation for the successful deployment of ERP" has the highest mean of 3.01. The "index of articles of convenience system software ERP" is equivalent to an average minimum of 1.64.

Fourth factor: the alignment with the needs of users and the quality of the product: 4 variables were loaded on this factor. This factor explains 9.03% of the total variance. in the fourth factor the index of "focusing on coverage of current operations and processes in software engineering, ERP" has the highest mean of 3.42 and the index of "Strategy of purchasing ERP System Software" has the lowest mean value equal to 3.13.

Fifth factor: user friendliness, flexibility and adaptability: 8.03% of the variance is associated with this factor. 3 variables were loaded on this factor. In the fifth factor the index of "focus on the internal consistency of system" has the highest mean of 4.29 and the index of "emphasizes the design and installation of ERP success in the short term" has the lowest mean value equal to 3.76.

5. Rating importance of factors

As can be seen in Table 4, the rating importance of effective factors is as follows: 1) User friendliness, flexibility and adaptability of ERP with the situational context of the organization, 2) the effective project management of ERP establishment, 3) ERP alignment with user needs; 4) proper management of organizational change in the process of ERP establishment, 5) observing ERP design principles and alignment with the structure.

Table 4
Rating importance of factors

Row	Effective Factors	Average rating
1	User friendliness, flexibility and adaptability	4.36
2	management of project establishment	3.48
3	alignment with user needs and product quality	3.23
4	management of organizational change	2.30
5	observing ERP design principles and alignment with the structure	1.62
Chi-square342.788 , Number : 185		Degrees of freedom4

6. Discussion and conclusions

The study has shown that management of project establishment, alignment with user needs and product quality, management of organizational change, and observing ERP design principles and alignment with the structure are five key factors in implementing successful ERP in the Institute of Information and Communication Technology (Iran Telecommunication Research Center).

Given that the questionnaire measures the perception from the reality, this perception may not be entirely consistent with the facts. This is true in the above study. Since the findings of this study are

in conjunction with the Institute of Information and Communication Technology (Iran Telecommunication Research Center) cautious should be observed about generalizing it to other research organization. Since the five factors identified show only 59.63 % of the variation in the dependent variable. Therefore, other factors are not identified in this study. We believe, the organization should involve the staff in implementation for the further reduction in the staff strength of ERP. In addition, a reliable planning and should be carried out in the organization to deploy ERP. Certainly, the use of consultants and specialists in the educational process will be more effective system deployment. A planned program should be carried out in order to achieve the desired status and this process should be based on scientific methods, project management institute will be supervised by senior managers. In addition, in the design of ERP system, its multilingual adherence to international protocols and national security principles - emphasizing the preservation of information in the process of change are particularly emphasized. The organization should cover the entire research process, helping in the design and management software n the shortest possible time. Finally, It is recommended to make the produced ERP more consistent with the research and there should be the possibility to customize the modules.

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