

Critical Success Factors for Enterprise Resource Planning Systems from the Stakeholders' Perspective: The Case of Jordan

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Abstract

This study is motivated by the high failure rate of enterprise resource planning (ERP). An analysis is conducted of the numerous studies that have attempted to explore factors that may lead to success in ERP. A descriptive, quantitative, and qualitative approach was used to examine the critical success factors (CSFs) and their effect on emerging ERP success in public and large private organizations in Jordan.

The overall findings of this study indicate that the CSFs for ERP in the private sector are totally different from those in the public sector and that various stakeholders have different opinions regarding these factors.

Keywords: Enterprise resource planning, critical success factors, private, public

1. Introduction

Enterprise resource planning (ERP) was first introduced by the Gartner Group in the early 1990s (Sarpola & Scott Judy, 2003) and was intended to show how large industrial organizations planned to use their wide range of resources (money, manpower, processes, machinery, and other resources). ERP systems are currently used by almost every type of organization, regardless of its size, to enable organizations to use their resources effectively and optimally (Klaus & Gable, 2000).

Akkermans et al. (2003) stated that there are various ways to define ERP. From the business perspective, it involves a combination of information technology and business processes. From the strategic perspective, the British consulting firm JBA considered ERP to be a business approach that starts in the boardroom and spreads across the entire organization. From a technical perspective, ERP is an extension of material requirements planning (MRP), which was introduced in the 1970s, and manufacturing resource planning (MRP II), which was introduced in the 1980s.

The main purpose of ERP is to integrate a wide range of information about organizational resources to create a cooperative environment with business partners, meet customer requirements, and enhance performance (Ince et al., 2013), as any technology that helps an organization to integrate its data and information will be key to the organization's survival (Nemati & Mangaladurai, 2014).

Examples of successful ERP implementation include IBM, who was able to reduce the time needed to ship replacement parts from 22 days to three days as a result of the successful implementation of an ERP system (Davenport, 1998), the Earthgrains Company, who claimed that they were able to increase customer satisfaction to 99% and raise their operating margin from 2.4 to 3.3 as a result of improvements in on-time delivery following ERP implementation. Par Industries improved its on-time delivery performance from 60% to 95%, and the lead time to the customer was reduced from six days to two days following ERP implementation (Ehie & Madsen, 2005).

Nevertheless, organizations still hesitate to implement ERP. It has emerged that ERP is harder to implement than it seems, and thus many well-known organizations have failed to implement ERP, including Nike in 2001, Hewlett Packard in 2004, and the Hudson's Bay Company in 2005 (Aldammas & Al-Mudimigh, 2011). The experience of

FoxMeyer Drugs was perhaps the worst, with the company filing for bankruptcy in 1996 claiming that this was the result of bad ERP implementation (Scott & Vessey, 2002).

ERP has many disadvantages. As Davenport (1998) claimed that ERP tends to implement generic processes, a company with unique, customized processes will lose its competitive advantage. This is supported by a study conducted in Turkey by Ince et al. (2013) who found that if an organization seeks a competitive advantage, they will need to concern themselves to a greater extent with supply chain management (SCM). Further, Shang and Seddon (2000) found that the implementation of ERP requires reengineering of some processes and employee training, in addition to managerial and technical support, and is also time-consuming and expensive. In addition to the conformity required by the model, vendor dependency, complexity, scalability outreach, and extended ERP capability must be considered (Rashid et al., 2002).

The high failure rate in relation to ERP implementation highlights the importance of understanding the factors that lead to success. First, we have to define the meaning of “success,” which depends on for whom and from where it is being measured. Thus, there is no universal agreement on how to define success (Markus et al., 2000). Generally, success or failure is measured in terms of cost, schedule, and scope, which is called the iron triangle (Lamers, 2002). According to Zhang (2005) it was found that ERP implementation took 2.5 times longer than expected, ran 178% over budget, and delivered only 30% of the promised benefits.

Accordingly, many studies have examined the factors that result in successful ERP implementation, known as critical success factors (CSFs) (Nour & Mouakket, 2013). The best definition for CSFs is “The limited number of areas in which satisfactory results will ensure successful competitive performance for the individual, department, or organization. CSFs are the few key areas where ‘things must go right’ for the business to flourish and for the manager’s goals to be attained” (Ngai et al., 2008). This approach provides clear guidance for the organization in determining where to focus their attention and resources by providing managers with a framework to use as a planning tool, which enables them to determine the tasks that must be successfully completed to obtain their goals and objectives (Nour & Mouakket, 2013).

According to many studies, the CSFs for ERP are a clear vision, business plans and goals (Al-Mashari et al., 2003), a positive relationship with vendors, a good fit with the organization’s legacy system (Somers & Nelson, 2004), culture, lack of knowledge, high cost of integration (Rajakpaxse & Seddon, 2005), top management morals, ethics, and support in terms of financial and other resources (Finney & Corbett, 2007) [20], good coordination, communication, and training (Dezdar & Ainin, 2011), strong leadership and project champions (Li et al., 2017), Ali et al. (2017) added a lack of understanding of organizational and local culture, lack of change management, poor system selection, and lack of project team competency as CSFs for ERP.

ERP systems are being used in both public and private organizations, even though Miranda (1999) have claimed that most ERP systems are designed for the private sector and cannot meet public sector requirements, as it is impossible for ERP systems to move public sector organizations to best practice. However, other studies have found nothing to prevent the successful implementation of ERP in the public sector, as these organizations must also control, manage, and centralize the organizational information flow (Gulledge & Sommer, 2003). In Pakistan, Shah et al. (2011) conducted a study into public administration, and a low level of user involvement, lack of change management, lack of vendor experience, lack of top management support, and a high level of turnover among ERP team members were found to be critical factors in relation to ERP adoption. The study pointed out that CSFs in the public sector are similar in both developing and developed countries. This was consistent with a study on ERP implementation in the Canadian government done by Kumar et al. (2001). The results confirmed that the ERP system faced more behavioral and management challenges than technical challenges, and factors such as resistance to change, lack of training, lack of coordination, and lack of project planning were the most critical factors affecting ERP implementation. A study of public administration in Poland concluded that CSFs in the public sector were similar to those in the private sector. However, there were two additional groups of factors that need to be included: factors related to public procurement procedures and factors related to government process management (Ziembra et al., 2013).

Similar to many other developing countries, ERP has been implemented in Jordan, and researchers have now started to study ERP in Jordan with a view to identifying the CSFs. A study was undertaken by Rabaa'i (2009) aimed to identify the effect of organizational culture on ERP implementation in both the private and public sectors in Jordan from ERP experts' perspectives. It was found that organizational culture has an effect on ERP success in addition to project communication, team composition, change management, and top management support, and that it is applicable in both the private and public sectors. Another study focused on Jordan concluded that top management, interdepartmental communication and cooperation, user training, and project team competency were

the main factors affecting the success of ERP from the perspectives of executives and managers in the Jordanian market (Abu- Shanab et al., 2015).

Among the many studies identified concerning ERP, few researchers attempted to identify the CSFs from different stakeholders’ points of view. In this study, these factors are assessed from the various ERP stakeholders’ perspectives. The importance of this study based on, first, the importance of the various interests, roles, and opinions of each ERP stakeholder, all of which must be taken into consideration, and second, the shortage of studies conducted in Jordan regarding ERP and the factors leading to successful implementation.

The aim of this study is to provide managers with valuable assistance in planning a successful ERP implementation to increase the possibility of ERP success, thereby enabling the country to obtain the related benefits, by developing a framework of the major CSFs for ERP systems in Jordanian organizations. This can be achieved by:

1. Identifying the stakeholders in ERP systems and analyzing their roles.
2. Identifying the CSFs for ERP according to various stakeholders’ perspectives.

ERP implementation is time-consuming and costly; however, if implemented correctly, the result is worth it. Successful ERP implementation is not a miracle; it is simply a matter of the right people implementing the right system at the right time in the right environment.

2. Methodology

To achieve the goal of this study, a descriptive, quantitative, and qualitative approach was adopted. Following the literature review, interviews were conducted with ERP consultants who are experts in ERP implementation in major private and public organizations in Jordan to identify the key ERP stakeholders and their roles, and to validate the CSFs found in the literature. The ERP consultants agreed, based on their experience, to adopt the model proposed by Ngai et al. (2008), as they considered it to be the most suitable model covering all critical factors in ERP. Then, a questionnaire was prepared based on the model proposed by Ngai et al. (2008), which consists of 18 main factors and numerous sub-factors, to gather information to identify and prioritize the CSFs for ERP system implementation in Jordan based on the various stakeholders’ perspectives.

Table 1 summarizes the model proposed by Ngai et al. (2008).

Table 1. CSF and Sub-CSF based on Nagi classifications

CSF	Sub CSF
Appropriate business and IT legacy systems	Business plan /vision /goals /Justify the project based upon factors of cost and economic scale justification Business process/rules are well understood
Business Process Reengineering	Minimal customization Change management culture and program User involvement Organizational culture and political structures Commitment to change
Change management	Understanding corporate culture Re-train IT workforce in new skills Training and education Developed clear education and training strategy Education on new business process
Communication	Inter-departmental communication Communicated regularly with all who would be affected Open and honest communication
Data accuracy	Data management Data analysis and conversion Data quality control
ERP strategy and Implementation	Regard as a technological, business, and organizational project Alignment between business strategy and IT strategy Begin process changes first Strategic alignment of exercise

	<ul style="list-style-type: none"> ERP is treated as a program not a project Phased vs. Big Bang Use accelerated implementation strategy Deep understanding of the key issues relating to ERP implementations Select a good methodology Careful selection of appropriate package Suitability of software and hardware Decision-making process/style
ERP project team	<ul style="list-style-type: none"> ERP teamwork and composition (Personnel) Steering committee Project team competence Empowered decision makers Selecting the right employees Employee morale (incentives) Business and technical knowledge of team members and consultants Balanced or cross-functional implementation team Managing consultants Staff retention Full-time team members Employee/personnel relations Sparing use of consultants

Table 1. Contd.: CSF and Sub-CSF based on Nagi classifications

ERP Vendor	<ul style="list-style-type: none"> Vendor-customer partnerships Use of vendors' customization tools Vendor support
Monitoring and evaluation of Performance	<ul style="list-style-type: none"> Kept suppliers/customers informed Benchmarked implementation progress against clear milestones or performance metrics Focused performance measures Client acceptance Monitoring and feedback
Organizational Characteristics	<ul style="list-style-type: none"> Had technology/infrastructure in place Organizational experience of IT or organizational change projects of a similar scale Company-wide commitment Implementation of ERP was not due to competitive pressure
Project champion	<ul style="list-style-type: none"> Clear and defined project plan (goals, objectives, strategy, scope, schedule) Smaller scope Avoid scope creep Implementation costs Realistic deadlines for implementation are set Realistic expectations with regard to ROI and reduced IT/IS costs exist
Project management	<ul style="list-style-type: none"> Management of expectations Total-quality management Interdepartmental cooperation Dedicated resources, "To-be concept" as project guideline Knowledge management Managing conflicts in ERP projects Clear and simple project organization Defining the choices of architecture
Software Development, testing, and troubleshooting	<ul style="list-style-type: none"> Integration Software configuration Troubleshooting Functional requirements are clearly defined before selecting an ERP product

Perceived complexity
Top management support
Fit between ERP and business/process
National culture
Country-related functional requirements
Source: Asmi and Jazi (2010)

The questionnaire is composed of two sections. Section one covers demographic and general information. In Section two, the respondents are required to describe the status of the ERP in their respective organizations by rating their level of agreement using a five-point Likert-type scale, where 1 = strongly disagree and 5 = strongly agree. The questions in section two were adopted from Ehie and Madsen (2005), Dezdar and Ainin (2011), Nah et al. (2003), Nah et al. (2006), Françoise et al. (2009), Saleh Shatat and Mohmed Udin(2012), Kim et al.(2005), and Bradley (2008).

To validate the questionnaire, a draft was reviewed by four ERP experts from both the private and public sectors to validate the content, comment on the clarity and length of each question, and suggest any additions, deletions, or modifications to any question. After taking their suggestions into consideration, the final version of the questionnaire was approved by all four experts, at which point it was deemed ready for distribution to the study population.

The population involved in this study was identified by the ERP experts, and included top managers, project managers, IT managers, business owners, business consultants, and key users in public and large private organizations in Jordan that either have implemented or are planning to implement an ERP system. Large organizations were defined as those that, according to the Ministry of Industry, Trade and Supply (MITS), have more than 250 employees and capital of more than 30,000 Jordanian dinars.

After the population was determined, the required sample size had to be calculated.

This was done based on a study that considered the minimum number of participants in a questionnaire-based study to be five times the number of variables being analyzed (i.e. the number of items in the questionnaire) (O'Rourke & Hatcher, 2013). The sample size was validated using a study by Naing et al. (2006) in which it was stated that the formula suggested by Metcalfe (1999) can be used to calculate the required sample size. Accordingly, by adopting the above approaches, the sample size needed for this study was 235 respondents.

With both the population and the sample size identified, the questionnaires were ready to be distributed.

Fig. 1 shows a model of the methodology used in this study.

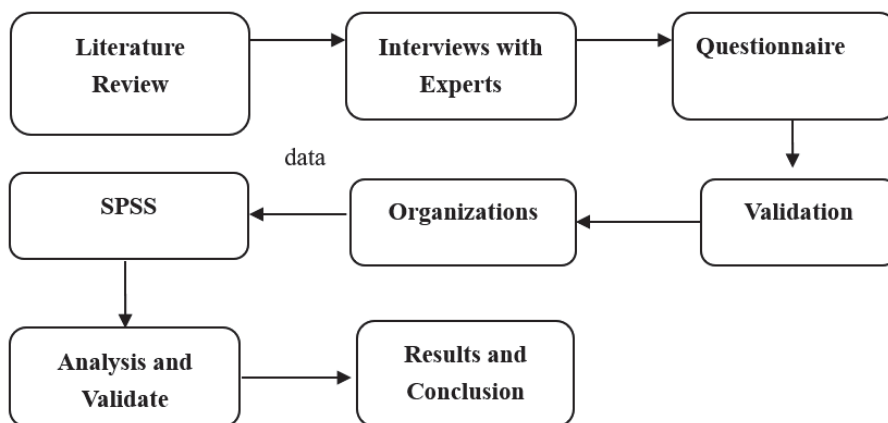


Figure 1. Flowchart of the study methodology

3. Data Analysis and Discussion

Three hundred and thirty-five respondents (key stakeholders) from public and large private organizations participated in this study, with a 100% response rate as a result of intensive follow-up and personal interviews with

participants.

Table 2 summarizes the key stakeholders for ERP systems and their main roles, as per the ERP experts' points of view.

Table 2. Key stakeholders in ERP systems and their main roles as per ERP experts' points of view

Stakeholder	Activities
Top Manager	- Steering and controlling the project - Allocating needed resources - Ethical and financial support
Project Manager	- Managing the project progress. - Solving the problems. - Managing the allocated resources
Business Consultant	- Guiding the software company to choose the best business practice
Business Owner	- Guiding the software company inside the organization, to understand all its practices and processes cycles.
IT manager	- Key for the servers.
Key User	- Execute the works

The total number of questionnaires available for analysis was 325, rather than 335, as data screening revealed some missing and unengaged data in 10 questionnaires, hence those questionnaires were omitted. Table 3 shows the distribution of the participants.

Table 3. Participants' distribution according to organizational sectors and participants' roles in ERP systems

Stakeholder	Public	Private
	59.4%	40.6%
Top Manager	10%	16%
Project Manager	9%	14%
Business Consultant	4%	11%
Business Owner	20%	14%
IT manager	9%	9%
Key User	48%	36%

The questionnaire was considered reliable, showing a Cronbach's alpha of 0.916, as a test with a Cronbach's alpha of ≥ 0.7 is considered to be reliable (Cronbach & Shavelson, 2004). The results of the questionnaire were analyzed and discussed with the ERP experts.

The questions in Section two of the questionnaire were prepared to measure the effect of each factor under consideration on the success of ERP in the organization, the success measurement being based on the iron triangle of cost, schedule, and scope (Lamers, 2002).

By analyzing Section two of the questionnaire, it was found that:

- 1- Top management support, change management, and organizational characteristics were the major CSFs for ERP in the public sector. This was consistent with the findings of a study on public administration in Pakistan done by Shah et al. 2011) and a study on the Canadian government (Kumar et al., 2001).

The ERP experts in Jordan fully agreed with the above findings, as they considered the main obstacles to successful ERP implementation in the public sector to be the organizational structure, infrastructure, and culture, and these factors became even more critical with lack of top management support and poor training and change management.

- 2- Teamwork and team composition, communication, change management, and project management were the CSFs for ERP in private sector.

Again, the ERP experts in Jordan fully agreed with the above findings, as they considered communication and teamwork to be the CSFs for ERP success in the private sector. This is indicative of the maturity of this sector, as ERP projects are team projects, and thus mainly depend on a good communication culture. Good project management is required to create a team environment to achieve success.

The experts were very satisfied with this result, and hoped that the public sector would be able to embrace this idea instead of perpetuating the “one-man-show” environment in which they are currently operating.

- 3- In the private sector, it was found that project management was one of CSFs for ERP, but not top management support.

One of the ERP vendors commented that project management in the private sector is empowered to take the necessary decisions regarding projects, and that this is one of the main factors behind the successful implementation of ERP in the private sector. However, this is not the case in the public sector, where all critical decisions are supposed to be taken by top management. The experts' points of view matched the findings of Rabaa'i (2009), who noted that in Jordan, critical decisions must be approved by top management, the project manager does not have any control of or access to resources, and everything is under the control of top management, especially in the public sector, while the private sector was more flexible.

- 4- There were obvious differences between the results in the two sectors, contrary to the findings reported by Rabaa'i (2009).

The experts found that our results were more realistic, as the culture in the public sector is completely different to that in the private sector. As the previous study was undertaken in 2009, and this research was done in 2016, they believe that seven years is more than enough time to implement all the required changes. Therefore, it appears that the private sector has evolved and improved their ability to implement ERP, unlike the public sector.

- 5- It was also found that the role played in the ERP process is significant in terms of predicting ERP success in both sectors.

- Top managers in both sectors did not consider top management support to be critical for ERP success. In the public sector, top managers were concerned about reengineering and organizational characteristics, while in the private sector they considered that good project management, change management, teamwork and team composition were the main CSFs for ERP.

- The project managers' point of view was similar to that of the top managers in the private sector regarding the importance of project management, but in the public sector the project managers cited everything except project management, stating that top management support, change management, reengineering, and organizational characteristics were the CSFs for ERP.

- IT managers are technical people, and thus are more concerned with technical factors. IT managers felt that in the public sector, organizational characteristics and top management support were critical for ERP, but in the private sector, project management and communication were the CSFs for ERP.

- Business owners in the public sector know that organizational characteristics and employee resistance will be obstacles to ERP implementation, so good change management is needed, and because of the public sector culture, top management support is a must. In the private sector, business owners know that in addition to change management, project management is a must, as all stakeholders are in the private sector.

- Business consultants in the private sector considered that project management was the main CSF for ERP success, while in relation to the public sector, they were concerned about the legacy system, as the public sector has very old and complex systems, with some business procedures required to follow government regulations, which cannot be changed or modified. From the business consultants' point of view, this makes reengineering one of the CSFs for ERP in the public sector. Of course, such significant changes need good change management to overcome employee resistance. Further, business consultants consider the national culture to be one of the CSFs for ERP.

- The key users in the public sector considered organizational characteristics and change management to be the CSFs for ERP. In the private sector, the key users agreed that organizational characteristics and change management were critical for ERP, as well as teamwork and team composition, communication, and the national culture.

4. Conclusions

The Critical Success Factors for ERP implementation in both the private and public sectors in Jordan were identified from six key stakeholders' perspectives.

1-Top management support, change management, and organizational characteristics are the main factors influencing the success of ERP in the public sector in Jordan.

2-Teamwork and team composition, communication, change management, and project management are the main factors influencing the success of ERP in the private sector in Jordan.

3-In the public sector, no one is concerned about project management, and they still depend on top management support. On the contrary, all stakeholders in the private sector agreed on the critical importance of project management rather than top management support.

4-Business consultants in the public sector were the only stakeholders to consider the legacy system because of the government regulations that control business processes in the public sector.

5- The main issues in relation to implementing ERP are managerial issues, not technical issues.

The following recommendations are provided in an attempt to enhance the status of ERP in Jordan.

1-The public sector should focus their attention on adopting an "organizational project management maturity model". A culture of a project environment should prevail, rather than one of a functional environment.

2-Change management is a critical factor, and both sectors should be aware of this. The private sector is clearly already aware, and the success they are experiencing is due to good change management, so both sectors should adopt a "change management culture" and implement ERP via a very clear change management process.

3-The public sector should be concerned about "organizational environment factors" (both inside and outside factors).

4-The public sector should develop a greater understanding of the importance of team building in facilitating the change process to successfully deliver the required outputs of ERP.

5-It is important to recognize the critical role of "stakeholder engagement plans" in managing the various needs and expectations of all stakeholders. This can be achieved by good project management and good communication to create a good feedback plan in relation to all milestones achieved in the project.

As part of the recommendations of this study, and to achieve a more global picture of this subject, further studies should be conducted on the market. It is recommended that studies be undertaken focusing on different stakeholders in both sectors to obtain their points of view. Furthermore, research into CSFs for ERP in SMEs is needed, as the financial and social obstacles facing SMEs differ from those facing large organizations. This sector cannot be ignored, as, according to the MITS, 97% of all companies in Jordan are classified as small to medium enterprises (SMEs). Further, intensive research into the private sector is needed to examine different industry sectors because this diversity should not be ignored. As there are many providers being used in Jordan, it would be worthwhile to distinguish the different effects of these providers on ERP success. In addition, because the number of ERP packages that are installed and the time of commencing the implementation are expected to have an effect on ERP, an investigation of these factors is recommended.

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