

# Factors Influencing the Success of ERP System Implementation in the Public Sector in the Kingdom of Bahrain

Omar Mohamed Bukamal<sup>1</sup> & Rami Mohammad Abu Wadi<sup>2</sup>

<sup>1</sup> MBA Student, MBA Program Directorate, Collage of Business and Finance, Ahlia University, Manama, Kingdom of Bahrain

<sup>2</sup> Accounting and Economics Department, College of Business and Finance, Ahlia University, Manama, Kingdom of Bahrain

Correspondence: Rami Mohammad Abu Wadi, Accounting and Economics Department, Ahlia University, Kingdom of Bahrain. Tel: 973-3343-3680. E-mail: rwadi@ahlia.edu.bh

Received: September 26, 2016

Accepted: October 19, 2016

Online Published: November 20, 2016

doi:10.5539/ijef.v8n12p21

URL: <http://dx.doi.org/10.5539/ijef.v8n12p21>

## Abstract

This study aims empirically to analyze the critical factors that impact the success of ERP system implementation in the public sector in the Kingdom of Bahrain and to clarify the benefits gained from the implementation. The study used a detailed questionnaire as a measuring instrument across the sample group to measure two main variables, the first being critical success factors (CSFs), and the second whether ERP implementation was successful or not. The CSFs are top management commitment and support, ERP system matching organization, business process re-engineering, vendor support, and training users.

Those factors found to have a significant impact on ERP system implementation and the results illuminate the high level of success in implementing ERP systems. While simultaneously demonstrating that an organization with a functioning ERP system does not achieve the desired benefits by default, but rather the organization requires certain Critical Success Factors (CSFs) to be present and in effect for those benefits to be achieved.

**Keywords:** ERP benefits, top management support, process reengineering, vendor support, training users

## 1. Introduction

Today, business operations most commonly depend on efficient technology to manage systems and enhance the process of work quality within a standardized way of business operations. Organizations are looking for a development and continuous process of information technology that can easily handle business workloads. ERP refers to an information system that can help organizations to coordinate and integrate information within departments (Ziemba & Oblak, 2013). The main purpose of ERP implementation is the ability to improve the competitiveness of an organization. The ERP systems provide real and significant benefits. Also, they provide those systems with the reason for replacing inefficient standalone legacy systems, improving consumer relations, increasing data processing efficiencies, improving communications among business functions, and improving overall decision making (Abdelrazek, 2015).

The emergence of ERP came about as a result of a revolution that took place in the domain of Information and Communication Technologies (ICTs). The ICT revolution has been observed by organizations of all sizes to be an excellent opportunity to minimize production costs and maximize revenues at the same time. It began as an applicable system that is mostly beneficial for controlling and monitoring every single function regardless of its significance to the business processes (Shatat, 2015). The ERP system was introduced with the main purpose of strengthening business operations and productivity in organizations and plays an important role in managing the flow of massive workloads (Almuharfi, 2014).

### 1.1 Research Problem

The main research problem of this study is how to analyze the factors that can be helpful for the organization. There is a research gap and limited information about how management can take the opportunity of a strategic planning and controlling system in business operations. In fact, many organizations have adopted the ERP system and hope to obtain its expected benefits by reducing costs, an increase in efficiency and effectiveness, and achieve a competitive advantage, regardless of their conformity with its internal operations performance and

practices.

The current study attempts to answer the general research question “what are the factors that impact the success of ERP implementation in the public sector in the Kingdom of Bahrain?” To answer this question the researcher will address the following sub-questions:

- 1) Does top management commitment and support have an impact on ERP system implementation?
- 2) Does the ERP System matching the organization have an impact on ERP system implementation?
- 3) Does business process re-engineering have an impact on ERP system implementation?
- 4) Does vendor support have an impact on ERP system implementation?
- 5) Does training users have an impact on ERP system implementation?
- 6) Was the ERP system implemented successfully?

### 1.2 Research Hypotheses

The present study investigates the relationship between two sets of variables: the independent variables and dependent variable. The independent variables would be “top management commitment and support, ERP system matching organization, business process re-engineering, vendor support, training users.” The dependent variable is “success of ERP in the public sector in the Kingdom of Bahrain.” Thus, the researcher can formulate the following six research hypotheses to examine throughout the study.

H01: There is no significant impact of top management commitment and support on the success of ERP implementation in the public sector in the Kingdom of Bahrain.

H02: There is no significant impact of ERP system matching organization on the success of ERP implementation in the public sector in the Kingdom of Bahrain.

H03: There is no significant impact of business processes re-engineering on the success of ERP implementation in the public sector in the Kingdom of Bahrain?

H04: There is no significant impact of the support of suppliers/vendors of enterprise resource planning systems on the success of ERP implementation in the public sector in the Kingdom of Bahrain.

H05: There is no significant impact of training users on the success of ERP implementation in the public sector in the Kingdom of Bahrain.

H06: There is no significant impact of all factors together (top management commitment and support, ERP system matching organization, business process re-engineering, vendor support, training users) on the success of ERP implementation in the public sector in the Kingdom of Bahrain.

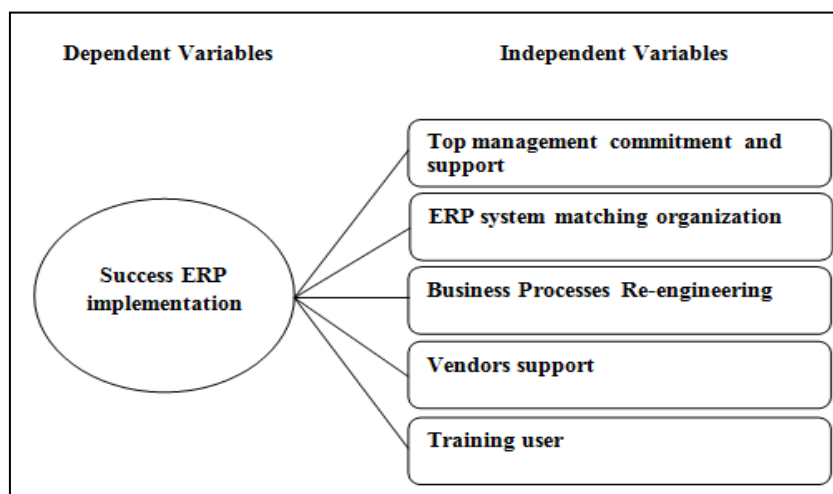


Figure 1. Conceptual framework

Source: Designed by the researcher.

## 2. Literature Review

This section of the research employs second-hand information. It provides information about the topic of ERP

systems and their impact on organizations from past studies. The following section is divided into Bahrain public sector, Enterprise Resource Planning (ERP) system, historical evolution of the ERP system, importance and benefits of ERP system implementation, ERP system issues, implementation of an ERP system, ERP critical success factors, and summary.

### *2.1 Bahrain Public Sector*

Government units or more precisely the public sector was defined by the SNA (2008) in a very extensive and specific statement, the public sector is the publicly financed or controlled institutions which practice market or non-market activities as they are financed and under the control of a public authority. Specifically, the public sector consists of an expanding range of organizations such as all units of government, non-market public or private institutions, social security funds, and non-profit organizations that are financed and controlled by a public authority (System of national accounts, 2008).

The public sector is part of the country's economy that provides many governmental services and basic goods that are not or cannot be provided by the private sector. The participation of this sector varies in every country. Accordingly, the E-Government portal asserted that the government consists of 59 organizations, which are divided into 28 ministries and 31 governmental entities. However, most of them include services like the police, infrastructure (water supply, bridges, roads, electricity, telecommunications, and so forth) in addition to the military, education, and health care. This sector also provides other non-payer services that benefit all society not only an individual that uses it (Investorwords, 2016; eGovernment, 2016).

The public sector of the Kingdom of Bahrain has a complicated nature where its production and services provided are changing over time to fit the needs of society. Almost everywhere in the world governments face challenges of providing more services with scarce resources. The need for higher performance, with developed services and the public interest are essential concerns to highlight when considering governmental organizations. Over time, governments are re-engineering and re-designing the procedures, policies, and budget plans to keep up with technological transformation, and to promote human development. The Kingdom demonstrates a powerful dedication to human development, and through having consultations and dialogs comprehensively with government organizations, development needs are identified and addressed to meet requirements either through developing human capacities in these organizations, or technology used to resolve a challenge, also, to provide users and organizations with the capability to develop where needed (BDO, 2016).

### *2.2 Enterprise Resource Planning (ERP) System*

Information Technology has advanced markedly recently, and takes on an imperative role in corporate globalization, and effectively an indirect increase in the level of competition within industries. ERP systems are considered one of the best information management systems. Today's business environment is powerful and unpredictable thereby causing firms to face the incredible challenge of expanding markets and high customer expectations. Thus, it is necessary that ERP systems can handle today's dynamic company environment. In over a decade, there has been much clamor over ERP, and it has attracted attention from practitioners throughout industry (Chou & Hong, 2013).

Recent as it is, the concept of ERP is broadly defined in management literature. These various definitions of ERP represent the multiple perspectives of the reviewers who provided them, shown in Figure 2. One of the simplest and most widely adopted definitions for ERP systems is the definition referring to ERP as "Software packages that enable the integration of business processes throughout an organization" (Sammon & Adam, 2010). A second definition points out that ERP can be understood as a software system with a single database that integrates and completes the information from all functional areas allowing users to access through a channel of communication and a unified interface (Salmeron & Lopez, 2010).



Figure 2. ERP enables an organization to share data

Source: (Magal & Word, 2012).

These definitions point to an overview of the ERP system in which other authors have defined it in depth. Rajnoha et al. (2014) have defined ERP as a software solution that integrates the different functional realms, and streamlines business processes in an organization.

Moreover, the Gartner Institute presented ERP systems as those strategies applied in the business domain so that the software employed in the processes of production, finances, and distribution can make the best use of business resources in a dynamic manner. ERP is intended to enable business organizations to maximize the outcomes of operation processes. Also, ERP can be employed to analyze capacity so that the speed and effectiveness of the business are improved (Moohebat et al., 2010).

The perspectives on ERP above lead the researcher to understand that ERP constitutes information technology that enables businesses to connect their numerous functions. These functions are linked and integrated together to include auditing, control of inventories, business finances, business operations, management of supply chains, and HR management. Though ERP is distinguished by its complexity within any business integration, it has been recognized as one of the most significant improvements and outcomes of the ITC revolution in the late 20th and early 21st centuries. Deduced from the previous definitions of the ERP system, ERP is employed to simplify the processes of sharing information, planning business processes, and the decision-making process on an enterprise-wide basis. Prior research indicates that ERP systems were first introduced as late as the 1980s. Numerous successes have been associated with the implementation of ERP ever since (Ziemba & Oblak, 2013). Studies show that during that period 60% of the USA 1000 Fortune Companies applied ERP and spent 300 billion dollars on the implementation of ERP. Nevertheless, these studies assert that there is some level of complexity associated with the implementation of ERP, and some problematic issues always appear together with the implementation of ERP (Orozco et al., 2015).

Nowadays, the most recent generation of ERP systems is more advanced and efficient in dealing with various business units including purchasing, sales and operations planning, manufacturing, inventory/materials management, order processing, accounting and finance, customer relationship management, human resources, and more (Usman & Ahmad, 2012).

### 2.3 ERP Critical Success Factors

In the past few years, reviewers have published articles that have given attention to the factors that contribute to the success of ERP implementation (Ahn & Choi, 2008). Others focused on indicating how ERP implementation succeeds. They concluded that ERP can be identified when the business organization can achieve its objectives at the most desired duration and according to the most specific budget. It is alleged that ERP succeeds when it enables the organization to minimize costs of production and maximize revenues, through assigning a project group and project manager that are committed, select the appropriate system that matches the organization, and vendor support with qualified skills and wide knowledge (Dezdar & Sulaiman, 2009).

Numerous prior studies attempted to approach the factors that can be named behind the success of ERP implementation in different types of business organizations. These factors refer to a set of critical success factors (CSFs) for ERP implementation. These critical success factors (CSFs) are alleged to involve: (1) support from the senior management in the organization, support of the vendor, competence of consultants, support from the users, capacities of the organization's IT, and leadership of the project management. However, business process

re-engineering was not considered as an effective factor in the success of the implementation process of the ERP system by (O'Connor, 2012). In addition to other reviewers, who indicate that the most significant factors that contributed were only the management of the project, activities of consultant planning, and internal auditing (Basu & Lederer, 2011).

Similar to the previous research study, Hasibuan and Dantes (2012) considered 20 key success factors of ERP system implementation and also related them to the ERP system implementation stages. The stage of implementation is one of the most important key success factors identified as follows: communication factors, appropriate selection of ERP package in project preparation, change management, and users. Business process re-engineering was dropped as a less effective factor. While Shatat (2015) reviewed the previous literature and ordered the 20 factors into three categories high, medium, and low depending on their degree of importance. He reached the top ten and ranked them respectively, these factors are top management support, user involvement, clear goals & objectives, strategic IT planning, user training & education, vendor support, teamwork & composition, project champion, monitoring & evaluation of performance, and education on new business processes. He pointed out that organizations should take these factors into account to help them implement the ERP system successfully.

Ziembra and Oblak (2013) identify essential critical success factors for the implementation of ERP systems in public administration by dividing the factors into four categories related to public procurement procedure, government processes management, project team competencies, and project management. The study found that the following factors are critical for the implementation of systems. These factors are clear goals and objectives, identified processes, process re-engineering, project team competence, consultants, cooperation with research centers, expertise in IT, top management support, clear roles and responsibilities, change management, risk management, end users involvement, communication, and project management.

In the sum of articles that shed light on the factors that stand behind the successful implementation of the ERP system, a set of factors were explicitly discussed. This set of success factors has been reached based on a review of academic and industry literature, the following factors are identified as factors of ERP implementation success:

Proper and successful implementation of ERP occurs when there is clear identification of the vision, goal, and business plan that lead the organization's strategy and business goals showing the merits, resources, costs, and risks. Research has focused on the essential need for organizations to set their scope and objectives as clearly as possible just before starting to implement their ERP system (Kronbichler et al., 2009).

#### 2.3.1 Top Management Commitment and Support

The second factor in the set that enables organizations to successfully implement their ERP system is the support received from the organization's management. This support seems to be essential for implementing ERP (Garg, 2010). Once top management delegates the process of ERP implementation to lower levels of management, there is less commitment to the successful implementation of the ERP system. When top management positively supports and motivates the implementation of ERP, success is anticipated (Basu & Lederer, 2011).

#### 2.3.2 Project Management

Thirdly, when the organization effectively manages the ERP project, success is almost granted for implementing the ERP system. Thus, reviewers claim that it is important to plan properly for ERP systems implementation. The organization needs to have an integrated approach to satisfy the needs of different functional areas in the organization. When there is effective management, the organization is likely to adequately plan, organize, and monitor these different activities related to ERP implementation (O'Connor, 2012).

#### 2.3.3 ERP System Matching the Organization

The organization has to study and review many ERP systems implemented in business processes, to choose the most convenient and applicable system for its own operations. Therefore, fitting the ideal ERP package to the organization should consider timeline, budget, and process. The organization should concentrate on a certain business process and requirement by using gap analysis to identify the dissimilarities of what the system can offer them and what they need, to provide a guideline on which package best matches their business process (Almuharfi, 2014).

#### 2.3.4 User Training and Education

Users of the ERP system must have the appropriate skills and capabilities while running the system, namely they should be aware of its concepts, features, and logic. Hence, the relevant aspects of training content were

divided into features of the ERP system software, logic and concepts of ERP, and hands-on training (Alsabaawi, 2015).

#### 2.3.5 Business Process Re-Engineering (BPR)

In addition, one of the essential factors that are crucial for ERP implementation success is business process re-engineering. It is understood as the core brainstorming and comprehensive redesign of business processes to reach considerable improvements in concurrent measurements of performance, like quality, cost, speed, and service. To reduce customization activities, organizations should have the ability to fit the ERP system by differentiating their business from others. This reality necessitates an examination of business processes, which is one of the critical and beneficial results of ERP system implementation. There is no one ERP solution, which can be demonstrated to be a cure and satisfy every business requirement. Thus, organizations always face the challenge of integrating different system packages from many vendors and demand business process re-engineering of a high standard (Abdelrazek, 2015).

#### 2.3.6 Communication

There is no doubt that when an organization possesses effective communication among its stakeholders internally and externally, the success of the ERP system implementation is granted, communication, data sharing, and knowledge concerning the project gives particular power to the participants so that better results occur (Chen et al., 2008).

#### 2.3.7 Change Management

Managing change within the organization includes creating some balance of the forces that stand behind change against those forces that reject change. Reviewers allege that when the organization essentially understands the need for change, they are likely to remain competitive. Moreover, implementation of the ERP system is anticipated to succeed (Hasibuan & Dantes, 2012).

#### 2.3.8 Cultural Factors

There are clues that when the organization understands the cultural factors and their importance to the implementation of the ERP system, the employees of this organization are likely to cooperate to make the ERP system implementation succeed. Writers in this domain allege that the culture of the organization and the ability to manage change are among the factors that are most cited when describing the success of ERP implementation (Wittstruck & Teuteberg, 2012).

#### 2.3.9 Vendor Support

Having qualified vendor support is a material advantage in implementing the ERP system stage, where the initialization of the system needs to be very accurate and professional in a way that launches it appropriately. The essential tasks and operations should be examined to detect bugs and errors to reduce problematic issues in the next phase. However, the testing and examination of the system will not prevent technical and operational issues from arising here, when the organization would need consultation and guidelines to solve these issues. In addition, difficulties in processing some transactions while operating may need the customization of a specific type of processing where the vendor can put in a customized option that will fill this need. On a regular basis, organizations and users of the ERP system will need consultancy help on how to implement the transactions and management to monitor the practice of users (Vilpola, 2008).

#### 2.3.10 Implementation Team

The presence of staff members who are experts in ERP project implementation and their involvement in the implementation process promotes success. The literature confirms that when the implementation team possesses more experience and knowledge, there are more chances for success (Chao et al., 2012).

#### 2.3.11 ERP User Involvement

User involvement is one of the most critical factors for implementation success. Active user involvement in the design and implementation of the system often leads to user acceptance and facilitates the desired transformation (Moon, 2007).

### 3. Research Methodology

#### 3.1 Validity and Reliability Study Instrumentation

In this study, it is essential that the researcher should check the questionnaire's validity and reliability. To eliminate the occurrence of unrelated wrong answers, validity must be taken into consideration (Hair et al., 2013). Therefore, two academic instructors, who are specialized business majors in the university, checked the

questions' validity by reviewing the questionnaire. It was modified according to their feedback, which was included in the questionnaire. Moreover, to ensure the validity of the study, a relevant body of literature was used.

Reliability was tested by determining the degree of consistency of the results and that the questionnaire was free from errors. If the questionnaire gives the same outcomes when repeated consistently, it is found to be reliable (Saunders et al., 2009). Cronbach's Alpha has scaled responses (Agree Strongly, Agree, Neutral, Disagree, and Disagree strongly) and it was used to determine the internal reliability of the questionnaire's variables.

Table 1. Reliability of the questionnaire

Factors	Questions	Cronbach's Alpha
Top management commitment and support	1-6	0.850
ERP system matching organization	7-9	0.799
Business processes re-engineering	10-14	0.824
Vendors support	15-19	0.889
Training users	20-26	0.918
Success of ERP implementation	27-40	0.944
<b>Total questions</b>	<b>1-40</b>	<b>0.967</b>

A pilot test was carried out to prove the questions' reliability. For the purpose of this guidance, the questionnaire was tested on a small number of respondents to identify if there was any ambiguity or weakness in the questionnaire, and to make all necessary adjustments and if respondents had made any comments, before allocating it to the selected sample. In this test, the focus was on filtering the questionnaire to reduce the number of problems that might occur while analyzing the collected data, and to enhance the reliability and validity of the questionnaire. After entering the data into SPSS for calculating the reliability of the study instrument, the results in Table 1 above, showed that the questionnaire scored over (0.7) which is acceptable for a measurement according to Cronbach's Alpha (Hair et al., 2013).

### 3.2 Findings and Analysis

The main goal of the research is to answer the researcher questions. This section will provide an adequate amount of information to realize the research objectives, try to answer the research questions, and find the results to the test hypotheses – this is done specifically after analyzing the data collected from the research sample. To find out what are the critical factors that most impact the success of ERP system implementation, this question was divided into sub-questions. The following results represent an overview of the analysis of descriptive variables, depending on the extraction of means and standard deviations.

Question one: Does top management commitment and support have an impact on ERP system implementation? To answer this question, the researcher uses descriptive analysis by calculating the mean and standard deviation. Subsequently, it will be analyzed in depth by testing the hypotheses in this regard.

Table 2. Descriptive statistics for top management commitment & support

No.	Measures	Mean	Std. Deviation	Importance level	Rank
1	Top management effectively provides all the essential equipment for implementing ERP.	4.12	0.94	High	1
6	Top management was updated with the implementation ERP process progress.	3.69	1.04	High	2
4	Top management has set official policies for ERP implementation.	3.68	1.06	High	3
2	The organization is effectively committed to employ members of the ERP implementation team.	3.68	0.96	High	4
3	Top management motivates employees to make use of the ERP system.	3.66	1.09	Median	5
5	Top management seeks to maintain a permanent financial plan for the ERP improvement for any related activities.	3.60	1.03	Median	6
		3.74	0.77	High	

Table 2, shows that the mean ranged between 4.12 – 3.60, where the overall factor mean was calculated to be

3.74, which represents a high degree. The first variable represented was found to have the highest mean which reached 4.12 with a standard deviation of 0.94, which is considered to be a high level of importance. However, the fifth variable came in the last place with the lowest mean of 3.60 and a standard deviation of 1.03, which is a median importance level. This result shows that top management commitment and support in the public sector were high in the respondents' point of view. Despite all the questions being ranked as a high level of importance except the third and fifth variable ranked as a median degree, this shows that top management has good control over the implementation process and that they have a good performance and does not represent a weak position.

Question Two: Does the ERP system matching the organization have an impact on ERP system implementation? To answer this question, the researcher uses descriptive analysis by calculating the mean and standard deviation. Subsequently, it will be analyzed in depth by testing the hypotheses in this regard.

Table 3. Descriptive statistics for ERP system matching organization

No.	Measures	Mean	Std. Deviation	Importance level	Rank
8	The flow of operations presented through ERP is compatible with the flow of business processes.	3.59	0.91	Median	1
9	Operations presented through ERP are compatible with business practices in the organization.	3.55	0.90	Median	2
7	Operations presented through ERP satisfy all the required business processes.	3.47	0.94	Median	3
		3.54	0.77	Median	

The results found in Table 3 clarify that the ERP system matching the organization operational transactions is median from the respondents' perspective, in which all of the factors had a median level of importance and the factor mean is 3.54. Whereas the mean ranged from 3.59–3.47, the highest mean was for the eighth variable, and the lowest mean was for the seventh variable with a standard deviation of 0.91 and 0.94 respectively. This explains that the median degree results from the changes in the work environment in those organizations that might affect the matching between the ERP system and the new operations to flow with the new work environment.

Question Three: Does business process re-engineering have an impact on ERP system implementation? To answer this question, the researcher uses descriptive analysis by calculating the mean and standard deviation. Subsequently, it will be analyzed in depth by testing the hypotheses in this regard.

Table 4. Descriptive statistics for business process re-engineering

No.	Measures	Mean	Std. Deviation	Importance level	Rank
10	The implementation of ERP system requires the organization to re-direct its resources strategically.	3.60	0.95	Median	1
14	Through process re-engineering, the organization can make radical shifts.	3.54	1.01	Median	2
11	The organization pinpointed problematic issues with performance in addition to setting objectives for improvement during the ERP implementation.	3.52	0.98	Median	3
13	Resistance to change is minimized according to the practices of processes re-engineering.	3.50	0.90	Median	4
12	Business operations are re-engineered continuously in the organization.	3.44	1.02	Median	5
		3.52	0.74	Median	

As shown in Table 4, the business process re-engineering overall mean is 3.52 with a range of 3.60 – 3.44 for variables 10 and 13 respectively. All the variables in this factor had a median level of importance at the respective point of view of the respondents, the highest standard deviation was held by variable 12 to be 1.02 and the lowest by variable 13 being 0.90. Therefore, the re-engineering or the ERP system is the least effective factor in the success of ERP system implementation according to the previous studies. Despite, the fact of being the least effective factor, the re-engineering process require improvements and more consideration in the



organization where it affects the development of other aspects like the work environment flow of process and operation.

Question Four: Does vendor support have an impact on ERP system implementation? To answer this question, the researcher uses descriptive analysis by calculating the mean and standard deviation. Subsequently, it will be analyzed in depth by testing the hypotheses in this regard.

Table 5. Descriptive statistics for vendor support

No.	Measures	Mean	Std. Deviation	Importance level	Rank
16	The vendor provides adequate technical support for ERP implementation.	3.59	0.99	Median	1
17	The vendor provides high-quality technical support for ERP implementation.	3.58	0.99	Median	2
15	The vendor provides the organization with all the required technical support while implementing ERP.	3.54	1.04	Median	3
19	The vendor provides suitable training for ERP users.	3.53	1.04	Median	4
18	The vendor has an effective relationship with other parties concerned with ERP implementation in the organization.	3.52	1.02	Median	5
		3.55	0.85	Median	

In Table 5, the mean of vendor support was calculated to be 3.55 in a range of 3.59 to 3.52 and the importance level was categorized as a median degree. The highest mean 3.59 of variable number 16 had a standard deviation of 0.99, whereas the 18th variable had the lowest mean 3.52, with a standard deviation of 1.02. This explains that vendor support has been effective and provides suitable training and medium quality technical support. In addition, this indicates that the ERP system users might have developed technological skills, which remove the need for training from the vendor.

Question Five: Does training users have an impact on ERP system implementation? To answer this question, the researcher uses descriptive analysis by calculating the mean and standard deviation. Subsequently, it will be analyzed in depth by testing the hypotheses in this regard.

Table 6. Descriptive statistics for training users

No.	Measures	Mean	Std. Deviation	Importance level	Rank
26	The training programs are properly and well designed for users.	3.61	0.99	Median	1
20	Training programs for ERP users within the organization.	3.61	1.10	Median	2
25	The training programs are handled by highly qualified consultants and trainers.	3.60	1.07	Median	3
21	A clear strategy for training users exists within the organization.	3.55	1.06	Median	4
24	The organization-wide training program for ERP users is in place and all users are involved.	3.53	1.02	Median	5
23	ERP users are intensively trained on using the system.	3.51	1.07	Median	6
22	The organization provides all the required resources for training users.	3.50	1.11	Median	7
		3.56	0.87	Median	

The above Table 6 describes the results generated for training users factors in which the mean is 3.56 with the highest mean being 3.61 of variable 26, and lowest 3.50 of variable 22, and their standard deviation were 0.99 and 1.11 accordingly. The overall factor level of importance is median from the respondents' perspective. This represents a sufficient user training consideration in public sector organizations. However, an improvement in training programs for users should be taken into consideration.

Question Six: Was the ERP system implemented successfully? To answer this question, the researcher uses descriptive analysis by calculating the mean and standard deviation. Subsequently, it will be analyzed in depth by testing the hypotheses in this regard.

Table 7. Descriptive statistics for successful ERP system implementation

No.	Measures	Mean	Std. Deviation	Importance level	Rank
40	Information provided through ERP is accurate.	3.79	1.04	High	1
38	Information provided through ERP is significant.	3.78	1.08	High	2
28	The ERP system functions are reliable.	3.73	1.00	High	3
31	The ERP system combines information from different areas of the organization.	3.72	1.02	High	4
37	Information provided through ERP is understandable.	3.72	0.97	High	5
36	ERP provides the organization with timely information.	3.69	0.95	High	6
35	ERP provides the organization with adequate information.	3.68	1.00	High	7
33	ERP provides the most adequate solutions according to what is available.	3.66	0.94	Median	8
39	Information provided through ERP is usable and can be analyzed.	3.66	1.02	Median	9
27	The ERP system is easy to use.	3.65	1.03	Median	10
32	ERP provides users with simultaneous information.	3.65	1.08	Median	11
30	The ERP system allows for customization.	3.58	0.99	Median	12
29	The ERP system is flexible.	3.57	1.02	Median	13
34	The front window of the ERP system in the organization has attractive visual features.	3.52	1.07	Median	14
		3.67	0.77	High	

The success of ERP system implementation represents the dependent variable that will be affected by all the items mentioned above, the dependent variables results are stated in Table 7 above. The overall factor got a high degree of importance with a mean range of 3.79 – 3.52 for the 40th variable and the 34th variable accordingly, with a standard deviation of 1.04 for the first and 1.07 for the second one. Exactly half of the variables had a high degree, and seven had a median degree of importance, this leads us to a result that the organization has a chance to improve the quality of the system and services that are provided to achieve a successful ERP system implementation and the organization performance overall.

### 3.3 Test Hypotheses

In this section, the researcher has tested the hypotheses by applying regression analysis. However, there are some limitations and requirements that should be taken into consideration to ensure the accuracy and correctness of the regression analysis, as follows:

- 1) Normal distribution should be considered in distributing data.
- 2) Multicollinearity of the study's independent and dependent variables.

In cases where these terms are not applicable, the researcher should use non-parametric tests.

#### 3.3.1 Normal Distribution Test

Table 8. Skewness – Kurtosis test

Constructs	Skewness	Kurtosis
Top management commitment and support	-0.348	-0.378
ERP system matching organization	-0.166	-0.030
Business process re-engineering	-0.200	-0.276
Vendor support	-0.194	-0.508
Training users	-0.278	-0.236
Success of ERP implementation	-0.336	-0.282

Note. \*Significant at  $p \leq 0.01$ .

To test the normal distribution of the data, the researcher has applied both the Skewness-Kurtosis test and Kolmogorov-Smirnov test. Table 8 above shows that the skewness and kurtosis figures a range of  $\pm 2.58$  with a level of significance of  $\leq 0.01$ . This result indicates that the data of the study variables have normal distribution generally (Hair et al., 2013).

Table 9. Kolmogorov-Smirnov test

Constructs	Sig.
Top management commitment and support	0.000*
ERP system matching organization	0.000*
Business process re-engineering	0.000*
Vendor support	0.000*
Training users	0.037*
Success of ERP implementation	0.007*

Note. \*Significant at  $p \leq 0.05$ .

Also, Table 9 according to the Kolmogorov-Smirnov test shows that there are differences with statistical significance for all dependent and independent variables that are included in the study with a level of significance  $\leq 0.05$ . Therefore, the data of this study is considered to have a normal distribution.

### 3.3.2 Multicollinearity Test

Table 10. Multicollinearity test

Constructs	Tolerance	VIF
Top management commitment and support	0.406	2.461
ERP system matching organization	0.422	2.370
Business process re-engineering	0.467	2.143
Vendor support	0.392	2.551
Training users	0.449	2.228

To test the variables' independence and non-interference with one another, the researcher used Variance Inflation Rate and Tolerance. To verify the variables' independence the calculated values of tolerance should be greater than 0.20 and VIF values less than 10 (Hair et al., 2013). Referring to Table 10, and to be more specific while reviewing the values of VIF and tolerance, confirms the independence of the study variables.

According to the previous results of data readiness and validity, the researcher can then apply the regression analysis test to answer the main question of the study and test its hypotheses.

To test the research hypotheses, the researcher conducted regression tests for preparation to accept or reject the null hypotheses.

### 3.4 Simple Regression

H01: There is no significant impact of top management commitment and support on the success of ERP implementation in the public sector in the Kingdom of Bahrain.

To test H01 the researcher used simple regression to acknowledge the impact of top management commitment and support on the success of ERP implementation in the public sector in the Kingdom of Bahrain.

Table 11. Simple regression analysis for **H0<sub>1</sub>**

R	Beta	R Square	Adjusted R Square	F Value	P Value
0.642a	0.626	0.412	0.396	25.919	0.000*

Note. \*Significant at  $p \leq 0.05$ .

The above Table 11 depicts that the statistical value F is 25.919 with a level of significance lower than 0.05 which highlights that there is a significant statistical impact of top management commitment and support on the success of ERP implementation. Thus, reject the null hypothesis and accept the alternative hypothesis.

In addition, the Beta value configures that top management commitment and support effect is positive where the strength of this relationship reaches 62.6%. Depending on the adjusted R-square the explanatory and predictive value, that is the variance of top management commitment and support on the success of ERP system implementation is 41.2%. This means that a one-time change in top management commitment and support

affects the success of ERP implementation to change by 41.2% accordingly.

H02: There is no significant impact of ERP system matching the organization on the success of ERP implementation in the public sector in the Kingdom of Bahrain.

To test H02 the researcher used simple regression to acknowledge the impact of ERP system matching organization on the success of ERP implementation in the public sector in the Kingdom of Bahrain.

Table 12. Simple regression analysis for **H0<sub>2</sub>**

R	Beta	R Square	Adjusted R Square	F Value	P Value
0.728a	0.725	0.531	0.524	84.760	0.000*

Note. \*Significant at  $p \leq 0.05$ .

As shown in the above Table 12, the statistical value F is 84.760 with a level of significance less than 0.05, which states the significant impact of ERP system matching organization on the success of ERP implementation. Thus, reject the null hypothesis and accept the alternative hypothesis. Alternatively, the Beta value shows that the ERP system matching organization impact on the ERP implementation is positive regarding the strength of its relationship that reaches 72.5%. However, depending on the adjusted R-square the variance to ERP system matching organization and the success of ERP implementation is 52.4% this explains that a one-time change in ERP system matching organization will cause a 52.4% change in the success of ERP implementation.

H03: There is no significant impact of business process re-engineering on the success of ERP implementation in the public sector in the Kingdom of Bahrain.

To test H03 the researcher used simple regression to acknowledge the impact of business processes re-engineering on the success of ERP implementation in the public sector in the Kingdom of Bahrain.

Table 13. Simple regression analysis for **H0<sub>3</sub>**

R	Beta	R Square	Adjusted R Square	F Value	P Value
0.643a	0.605	0.413	0.400	31.420	0.000*

Note. \*Significant at  $p \leq 0.05$ .

As shown in the above Table 13, the statistical value F is 31.420 with a level of significance lower than 0.05, which states that there is an impact between business process re-engineering and the success of ERP implementation in the public sector in the Kingdom of Bahrain. Thus, reject the null hypothesis and accept the alternative hypothesis. The Beta value highlights that business process re-engineering is positive, and this relationship strength is 64.3%. Depending on adjusted R square the variance of re-engineering on the success of ERP implementation is 40%.

H04: There is no significant impact of vendor support of enterprise resource planning systems on the success of ERP implementation in the public sector in the Kingdom of Bahrain.

To test H04 the researcher used simple regression to acknowledge the impact of vendor support of enterprise resource planning systems on the success of ERP implementation in the public sector in the Kingdom of Bahrain.

Table 14. Simple regression analysis for **H0<sub>4</sub>**

R	Beta	R Square	Adjusted R Square	F Value	P Value
0.681a	0.673	0.464	0.452	38.580	0.000*

Note. \*Significant at  $p \leq 0.05$ .

As shown in the above Table 14, the statistical value F is 38.580 with a level of significance less than 0.05, which states that there is an impact of vendor support of enterprise resource planning systems on the success of ERP implementation in the public sector in the Kingdom of Bahrain. Thus, reject the null hypothesis and accept the alternative hypothesis. Where Beta value shows that the impact of vendor support upon the success of ERP implementation is positive, and the strength of the relationship reaches 67.3%. Depending on adjusted R square

the variance of vendor support in the implementation process is 45.2%.

H05: There is no significant impact of training users on the success of ERP implementation in the public sector in the Kingdom of Bahrain.

To test H05 the researcher used simple regression to acknowledge the impact of training users on the success of ERP implementation in the public sector in the Kingdom of Bahrain.

Table 15. Simple regression analysis for **H0<sub>5</sub>**

R	Beta	R Square	Adjusted R Square	F Value	P Value
0.655a	0.610	0.429	0.411	23.701	0.000*

Note. \*Significant at  $p \leq 0.05$ .

As presented in the above Table 15, the statistical value F is 23.701 with a level of significance lower than 0.05, which indicates the significant impact of training users on the success of ERP implementation in the public sector in the Kingdom of Bahrain. Thus, reject the null hypothesis and accept the alternative hypothesis. Also, the value of Beta shows that training users' impact on the success of the implementation process is positive, and the relationship strength reaches 61%. Depending on adjusted R square the variance of training users' impact on the implementation process success is 41.1%.

### 3.5 Multiple Regressions

H06: There is no significant impact of all factors together (top management commitment and support, ERP system matching organization, business process re-engineering, vendor support, training users) on the success of ERP implementation.

To test H06 the researcher used multiple regressions to acknowledge the impact of each previous independent variable (top management commitment and support, ERP system matching organization, business process re-engineering, vendor support, training users) on the dependent variable which are shown in the below Table 16.

Table 16. Multiple regression analysis is **H0<sub>6</sub>**

Constructs	B	Std. Error	Beta	T	P Value
Top management commitment and support	0.058	0.065	0.058	0.903	0.368
ERP system matching organization	0.403	0.063	0.403	6.380	0.000*
Business process re-engineering	0.094	0.062	0.091	1.512	0.132
Vendor support	0.214	0.060	0.234	3.573	0.000*
Training users	0.124	0.055	0.139	2.275	0.024*
R Square			0.691		
Adjusted R Square			0.651		
F Value			17.385		
P Value			0.000*		

Note. \*Significant at  $p \leq 0.05$ .

The table above shows that the variance of all independent variables (top management commitment and support, ERP system matching organization, business process re-engineering, vendor support, training users) depending on adjusted R square is 65.1%. Moreover, the statistical value F is 17.385 with a level of significance lower than 5%, which indicates that there is a significant impact among all factors on the success of ERP implementation process in the public sector in the Kingdom of Bahrain. Thus, reject the null hypothesis and accept the alternative hypothesis.

## 4. Conclusion of the Study

Based on the results found in this study, the researcher draws the following conclusions:

- Top management in the public sector in the Kingdom of Bahrain have effectively provided and updated all implementation processes of ERP system requirements, and have been committed to employ members of the implementation team to make use of the ERP system. Therefore, top management is greatly supporting its organization implementation processes by maintaining a financial plan for related activities and

improvements.

- Public sector organizations follow a precise and accurate procedure in the process of collecting data, storage, processing, and retrieval.
- Organization operations is an essential aspect to be taken into consideration when choosing the appropriate system, whereby ERP system matching the organization would smooth out the process and ease the flow of work in the organization.
- In addition, business process re-engineering would be more flexible regarding time-saving and cutting costs than customization of the ERP system according to the current operations flow, which would increase unnecessary costs and delays.
- Vendor support effects the implementation process sensitively, whereby the higher the qualifications of the vendor the higher the likelihood of the successful implementation of the ERP system process. Hence, the vendor's participation in plan setting and the high-quality application and maintenance will always smooth the flow of the implementation process.
- Lastly, training users was found to be crucial where it increases their acceptance of the system and their preparedness to use it effectively, increasing the chance of a successful implementation.

## 5. Recommendations

As discussed in the research results previously, to enhance the utilization of ERP in the public sector in the Kingdom of Bahrain, the researcher offers a set of recommendations, with the hope that those recommendations will be given serious attention to improve the perceived benefits of the ERP system. Also, they aim to enhance the current body of knowledge in general and relate it specifically to the core of this study. The researcher recommends that the items below be taken into consideration:

- Top management in the organization should be prepared accordingly to execute the implementation of the ERP system during the stage of implementation itself and show their involvement and ownership through financial support and motivation.
- Organizations must select the appropriate system that would be effective in accordance with its operation. It is recommended that organizations concentrate on their employees' capabilities, financial abilities, to what extent changes can be applied, and what is required before selecting the appropriate system for the reason that such systems are highly sensitive and complex and need careful and wise planning before selection.
- In selecting the appropriate system matter, the organization should choose a project team manager who is qualified in managerial and technical matters and is most preferably familiar with the implementation of ERP systems, in order to improve the team's performance and reduce training costs in terms of money and time.
- In accordance with the study results on business process re-engineering, it is recommended that organizations that have the flexibility to change their operations should establish re-engineering of the business process to fit the organization to the system requirements rather than customizing the ERP system, thereby increasing the benefits and facilities from those systems, because they are designed to suit the most professional managerial operations.
- Organizations should give priority to a vendor who has the ability to offer after-implementation services that are high in quality, that keep track with the updated technological changes, troubleshooting, support, and maintenance. In this matter, the organization should assign an internal team to work with the consultants' team, where it is of high importance to have a team composition that would track all the steps on the way and enhance the internal team's knowledge.
- Mandatory training courses are recommended along with official policies set by the organization. In addition, the organization should encourage and ease the communication process between employees on an inter-personal level, top level, and ERP consultants, and manage the change at an individual basis, work groups, and levels of organization structure.

## References

- Abdelrazek, A. E. (2015). Strategic planning for successful ERP implementation. New York, 2015. *Proceedings of 7th Annual American Business Research Conference*.
- Ahn, B. S., & Choi, S. H. (2008). ERP system selection using a simulation-based AHP approach: A case of a Koreanhomeshopping company. *The Journal of the Operational Research Society*, 59(3), 322-30.

- <http://dx.doi.org/10.1057/palgrave.jors.2602365>
- Almuharfi, A. A. (2014). A hybrid approach to measure ERP systems implementation using accountants perception in Saudi Arabia. *Journal of Applied Science*, 14(22), 2925-38. <http://dx.doi.org/10.3923/jas.2014.2925.2938>
- Alsabaawi, M. Y. (2015). Critical success factors for enterprise resource planning implementation success. *International Journal of Advances in Engineering & Technology*, 8(4), 496-506.
- Basu, V., & Lederer, A. L. (2011). Agency theory and consultant management in enterprise resource planning systems implementation. *Database for Advances in Information Systems*, 42(3), 10-33. <http://dx.doi.org/10.1145/2038056.2038058>
- BDO, B. (2016). *BDO Bahrain*. Retrieved from <http://www.bdo.bh/Pages/default.aspx>
- Chao, L., Wu, S., Wu, J., & Garfolo, B. (2012). Analyzing Service-Oriented Success Factors with ERP Users' Perspective. *Academy of Business Journal*, 2, 19-39.
- Chen, Z., Chang, X., & Liu, H. (2008). *A Successful ERP system case study based on comprehensive analysis of influencing factors*. Accessed from the Internet in Mars 2016 from: IEEE Xplore.
- Chou, J., & Hong, J. (2013). Assessing the impact of quality determinants and user characteristics on successful enterprise resource planning project implementation. *Journal of Manufacturing Systems*, 32, 792-800. <http://dx.doi.org/10.1016/j.jmsy.2013.04.014>
- Dezdar, S., & Sulaiman, A. (2009). Successful enterprise resource planning implementation: Taxonomy of critical factors. *Industrial Management & Data Systems*, 109(8), 1037-1052. <http://dx.doi.org/10.1108/02635570910991283>
- eGovernment. (2016). *eGovernment*. Retrieved March 5, 2016 from <http://www.bahrain.bh>
- Garg, P. (2010). Critical failure factors for enterprise resource planning implementations in Indian retail organizations: An exploratory study. *Journal of Information Technology Impact*, 10(1), 35-44.
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2013). *Multivariate data analysis* (7th ed.). Pearson New International Edition.
- Hasibuan, Z., & Dantes, G. (2012). Priority of key success factors (KSFS) on enterprise resource planning (ERP) system implementation life cycle. *Journal of Enterprise Resource Planning Studies*, 1-15. <http://dx.doi.org/10.5171/2011.122627>
- Investorwords. (2016). *Investorwords*. Retrieved March 12, 2016 from [http://www.investorwords.com/3947/public\\_sector.html](http://www.investorwords.com/3947/public_sector.html)
- Kronbichler, S. A., Ostermann, H., & Staudinger, R. (2009). A review of critical success factors for ERP projects. *The Open Information Systems Journal*, 3(1), 14-25. <http://dx.doi.org/10.2174/1874133900903010014>
- Magal, S. R., & Word, J. (2012). *Integrated business processes with ERP systems*. NJ: John Wiley & Sons.
- Moohebat, M. R., Asemi, A., & Jazi, M. D. (2010). A comparative study of critical success factors (CSFs) in implementation of ERP in developed and developing countries. *International Journal of Advancements in Computing Technology*, 2(5), 99-110. <http://dx.doi.org/10.4156/ijact.vol2.issue5.11>
- Moon, Y. B. (2007). Enterprise resource planning (ERP): A review of the literature. *International Journal of Management and Enterprise Development*, 4(3), 235-64. <http://dx.doi.org/10.1504/IJMED.2007.012679>
- O'Connor, F. (2012). *When ERP is Botched, CFOs Must Act*. Retrieved March 10, 2016 from [http://www.cio.com/article/699120/When\\_ERP\\_is\\_Botched\\_CFOs\\_Must\\_Act?taxonomyId=3009](http://www.cio.com/article/699120/When_ERP_is_Botched_CFOs_Must_Act?taxonomyId=3009)
- Orozco, J., Tarhini, A., & Masa'deh, R. (2015). A framework of IS/business alignment management practices to improve the design of IT governance architectures. *International Journal of Business and Management*, 10(4). <http://dx.doi.org/10.5539/ijbm.v10n4p1>
- Rajnoha, R., Kadarova, L., Sujova, A., & Kadar, G. (2014). Business information systems: Research study and methodological proposals for ERP implementation process improvement. *Procedia - Social and Behavioural Science*, 109, 165-70. <http://dx.doi.org/10.1016/j.sbspro.2013.12.438>
- Salmeron, J., & Lopez, C. (2010). A multicriteria approach for risks assessment in ERP maintenance. *Journal of Systems and Software*, 83(10), 1941-53. <http://dx.doi.org/10.1016/j.jss.2010.05.073>
- Sammon, D., & Adam, F. (2010). Project preparedness and the emergence of implementation problems in ERP

- projects. *Information & Management*, 47(1), 1-8. <http://dx.doi.org/10.1016/j.im.2009.09.002>
- Saunders, M., Lewis, P., & Thornhill, A. (2009). *Research Methods for Business Students* (5th ed.). England: Pearson Education.
- Shatat, A. S. (2015). Critical success factors in enterprise resource planning (ERP) system implementation: An exploratory study in Oman. *The Electronic Journal of Information Systems Evaluation*, 18(1), 36-45.
- System of National Accounts. (2008). *Commission of the European Communities*. International Monetary Fund, Organization for Economic Co-operation and Development. New York: United Nations and World Bank.
- Usman, U. M., & Ahmad, M. N. (2012). Knowledge management in success of ERP systems. *International Journal of Advances in Engineering & Technology*, 3(1), 21-28.
- Vilpola, I. H. (2008). A method for improving ERP implementation success by the principles and process of user-centred design. *Enterprise Information Systems*, 2(1), 47-76. <http://dx.doi.org/10.1080/17517570701793848>
- Wittstruck, D., & Teuteberg, F. (2012). Understanding the success factors of sustainable supply chain management: Empirical evidence from the electrics and electronics industry. *Corporate Social Responsibility and Environmental Management*, 19(3), 141-158. <http://dx.doi.org/10.1002/csr.261>
- Ziemba, E., & Oblak, I. (2013). Critical Success Factors for ERP Systems Implementation in Public Administration. *Interdisciplinary Journal of Information, Knowledge, and Management*, 8, 1-19.

### Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).