

A survey study of the Enterprise Resource Planning system

Abdullah Bajahzar
STRL
De Montfort University
Leicester, UK
abajahzar@yahoo.com

Ali Alqahtani
STRL
De Montfort University
Leicester, UK
ali@fg.gov.sa

Abeer Baslem
STRL
De Montfort University
Leicester, UK
Baj2002@yahoo.com

Abstract— Nowadays, Enterprise Resource Planning (ERP) systems are used in several industries since it provides improved convenience to information which facilitates the decision making and managerial control. Unfortunately, the incorrect design, operation and use of this system guide to various malfunctions in the system and might be a difficulty in obtaining the required benefits from this system. ERP software applications assist activities track actual costs and carry out activity based costing. These applications are utilized in controlling and managing the product development, supplies and parts purchasing, facilitating the interacting with suppliers, offering several services for company customers and tracking orders. In addition, the ERP systems may also have application components for several business economics and human resources features.

This paper aims to study and investigate the efficiency and the security of Enterprise Resource Planning (ERP) system in the Saudi Arabian American Oil Company ARAMCO Company. Many issues will be taken into account about ERP system in ARAMCO Company as analyzing the used ERP scheme, realizing the system traps, influencing in the field of information management and cost reduction, understanding the role in the work flow, identifying the managing resources in making an incorporated infrastructure, explicating the use of Enterprise Application Integration (EAI) in evading possible ERP malfunction, exploring the work flow in large businesses, revising the use of ERP systems in supply change management, determining the role of ERP systems in achieving competitiveness, utilizing the ERP system as an indicator to the Key Performance Indicator (KPI), discovering its role in developing the operation management, discovering the continuation of ERP in e-commerce and finding out the role of ERP system in supporting B2C processes and procedures.

Index Terms— the ERP; Technology-Company Compatibility; ARAMCO company; DSS

I. INTRODUCTION

Several previous works supposed that the Information Technology (IT) has the ability to endorse the managerial performance via improving both the innovation and operational competence. In [1], the ERP systems were the most essential improvement that is used in the IT commercial utilization in the 1990s. These systems allow compacts to obtain enhanced performance via normalizing data as well as incorporating several company functions, such as marketing,

Human Resource (HR), sales, and economics. Thus, the ERP systems are the most enveloping dynamic company conditions characteristics [2].

ERP systems support companies by producing precise and approved data which is manageable and appropriate. This can be achieved by making a grouping of controls in these systems and controls in computing environments where the ERP systems work with their operating systems. These controls can be divided into two types; application and general controls. The general controls are also divided into two categories; environmental and management controls. The management controls cope with processes, policies and organizations, while the environmental controls are the equipped controls that are managed by computer group or center. ERP systems have economic or operational sensitivity for information that they develop and save. The ERP schemes security is able to considered as a pyramid as appears in figure 1 below [3].

In [4], the implementation of ERP systems exposes several challenges, such as the high implementation costs and risk factors which must be critically considered. Other problems are difficulties in restoring business processes, insufficient training, preparing and incorporating of users throughout and after the system implementation, vulnerability in employing and training competent system developers and failure in obtaining and maintaining the system expert knowledge. To solve these problems, several modifications are done in the systems implementation.

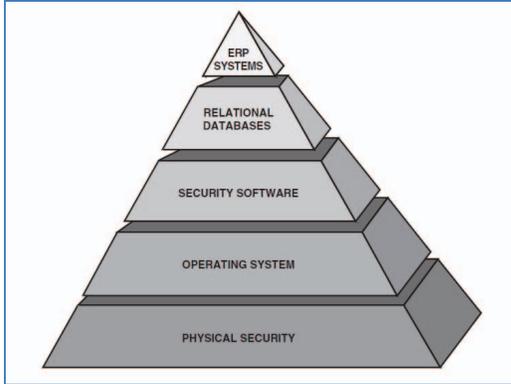


Figure 1. The ERP systems security pyramid [3]

In this paper multi sections will cover ERP systems structure advantages and dimension. The second section of this paper will contain the related works and section 3 will review the general characteristics and models of ERP systems while section 4 will summary ERP Technology-Company Compatibility and Use. Section 5 will present will present the realization of the ERP systems while Section 6 will present ERP system implementation case study and the evaluation of the ERP system will be explored in section 7. Finally section 8 delivers paper conclusions.

II. RELATED WORK

In the 1990s, the competition of companies in markets was at the utmost level. Recently, companies looked for innovative methods to obtain aggressive benefit for staying active in markets since the Material Requirements Planning (MRP) packages were not gratifying their demand. Thus, companies began utilizing Enterprise Resource Planning (ERP) systems since they were estimated to effectively construct processes of decision making and institutions' management via maintaining information in the same stage and offering information precision and consistency for the enterprise [5, 6].

The ERP systems were estimated to develop the compact performance and market worth by competence and usefulness gains. Recently, these systems are developed with the use of advanced systems, such as Client Association Managing (CAM) system and Supply Chain Management (SCM) system; figure 2 below shows the ERP systems development [5].

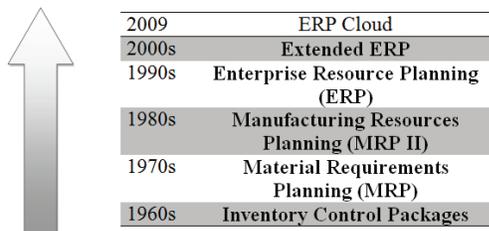


Figure 2. Development of ERP systems [7]

The ERP systems are available for industrialized sectors, but most of commercial systems have problems to relate common ERP systems because to plan the source in a precise enterprise is hard task. A new ERP system was presented in [8] for enterprises that have unique features, while in [9] the ERP systems which were adopted in many Sri Lankan businesses and the awareness in the decision making of the adoption decision making were studied. In [9], the decision making process to choose which ERP system will be adopted is viewed in software selection process and in total cultural transformation.

III. ERP SYSTEM CHARACTERISTICS AND MODELS

An ERP scheme incorporates business procedures through an association, thus this enhances efficiency and convenience of data flows. There is one advantage of ERP schemes that there is an opportunity to achieve a combined enterprise-extensive observation of the association. This advantage needs interdepartmental collaboration and management, which this may leave associations better arranged to take action to alterations in the marketplace [10, 11, 12].

ERP schemes are hard to execute due to their enterprise-wide quality. The execution of the ERP schemes is precious, time consuming and might need alterations in the managerial culture. These dangers are deficiency of experienced people, low consumer receiving, growing prices and a great degree of managerial alteration. Das Neves et al. stated that the achievement of an ERP scheme is a great-disbursement action. Kumar et al. stated that the execution of ERP schemes is a composite implement in improvement and alteration managing than any other software package or superior industrialized technology. There are significant factors which are scheme dependability and functionality. Table 1 shows the factors affecting the selection of ERP systems [10, 11, 13].

TABLE I. Factors affecting the selection of ERP systems, in descending order [27]

Most important selection criteria for ERP systems among Canadian firms [27].	Most important selection criteria for ERP systems among Turkish firms [2].
System functionality	Fit with parent/allied organizations
System reliability	Cross module integration
Fit with parent/allied organization	Compatibility with other systems
Available business best practice in the system	References of the vendor
Cross module integration	The vendor visions for its products and services
System using latest technology	Functionality
Vendor reputation	System reliability

ERP systems can offer company functions and processes incorporation. These systems are the most accepted business software in the last ten years. The importance of these systems was obtained since process information development

and precision became significant deliberate issues [14, 15, 16].

In [17], controlling of variations in a business process, choosing of a software system, realizing the system and exploring the new system realism all lead to a successful implementing of ERP system. The best ERP systems observations was explored in [14], which can be implemented by a software business operating in an associating relation with a main manufacturing customer to improve the software to achieve the industry needs.

A. ERP System Model and Hypotheses

The improved implementation of an ERP system is obtained via eliminating the inappropriateness among several ERP system parties, such as company and its main processes. This system is used via users in an effective way. This system achievement based on applying a variation management plan for all stages in which in appropriateness occurs. A new ERP system model was explored in [18] that focuses on eliminating inappropriateness among the system parties in order to obtain an improved system.

In [18], their main three study hypotheses are: hypothesis one represents that the company and technology compatibility and the system use achieving are directly related to each other, hypothesis two represents that the human and technology compatibility and the system use achieving are directly related to each other and hypothesis three represents that the human and company compatibility and the system use achieving are directly related to each other.

IV. TECHNOLOGY-COMPANY COMPATIBILITY AND USE

The main used principle in choosing any ERP system was proposed in [19] which it is the optimal fit with the recent procedures of a business. Figure 2 shows the selection of an ERP system.

Managements can choose the optimal ERP system with a managerial procedure since all the ERP systems are typical and demanding to vary their innovation does not seem sensible. Selection of Product B let the company carry out additional attempts to obtain the optimal point in which the first product which is Product A and the organization interconnect. Figure 3 illustrates that Product A is the most appropriate one for the company [19].

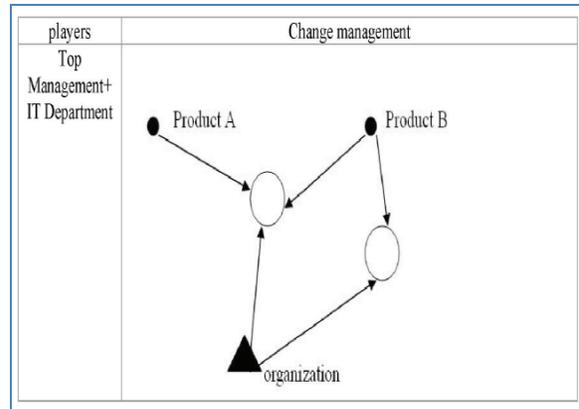


Figure 3. The selection of an ERP system [23]

After selecting the ERP system, IT management, top management and users have to adopt the selected system to their company. In [20], both the ERP system adjustment and the managerial processes are iterative procedures that depend on both the company properties and the ERP system fitted properties.

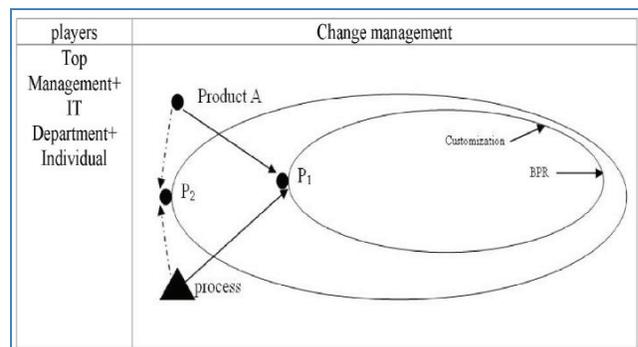


Figure 4. ERP system implementation [23]

In [20], both obligatory Business Process Reengineering (BPR) and sufficient customization where in processes of a business are implemented in the required ERP system frame must be carried out. Figure 4 shows the ERP system implementation. In addition, the optimal point in the following figure of the gap among both the company and technology is point P2.

A. Technology-Human Compatibility and Use

Individuals are imperative actors who must be considered in addition to both company and technology. There is in appropriateness among both individuals and the new software package that is proposed for them. In [21], all teams of an ERP system expose a convinced managerial resistance level because of its main troublesome variation. The main limitations of ERP system software packages are difficult implementation and complexity which let the acceptance of the packages by end users hard.

B. Company-Human Compatibility and Use

After implementing the ERP system, the company must

carry out a Business Process Reengineering (BPR) as proposed previously. Therefore, several issues take place, such as a gap among both the company and its employees and the way of making business variations. As shown in figure 5; the human side can reach to the point P₂ in a simple way [21].

Supposed helpfulness was proposed in [22] has effects on the ERP system use. When the system users are inclined to learn the implemented system, they will recognize and accept the new system managerial processes. Thus, key users must be selected from various departments in order to assemble trainings, communicate and trade the implemented system. The selected users have the ability to ease the understanding of the system processes by individuals.

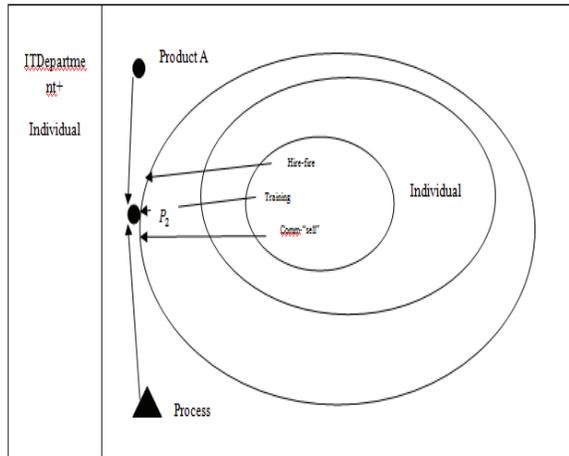


Figure 5. The management of human resources [18]

C. Effect of Man-Machine Interaction Factors on ERP Systems

ERP systems combine functions and processes by use a single data depository across the company. ERP systems now using as a center engine of a frame intended for many business functions and processes and also these systems also received as a packages of simple and easy software. Although the software sellers must distinguish their good product, the adopters of ERP systems have a huge number of substitutions when they select their process. To accomplish competitive benefit in the market, many policies must be applied by using software sellers. One of the most important applied policies is area of man machine interface [18].

The main visible feature is that the minimum memory becomes a burly circuitous impact on end client approval. This result shows that the end clients discover the scheme extra practical and are probable in order to be further contended in the midst of ERP scheme if there is a little memory load. ERP systems give simply identified with enough and essential detailed screens and provides an easy and simple solutions. Navigation and visual factors become an indirect effect on end user approval [18].

Also the interface design is considerably essential for end

user approval. So ERP vendors must take note of border plan for end client approval in order to accomplish aggressive benefit in the marketplace. Depending on these results, smart user screens and agreement of adaptive will be reviewed. Extra data will be accumulated by monitoring apparent clients, shaping specialist boards and client classes' gatherings [18].

V. ERP SYSTEM REALIZATION

The principle of the main and acceptable thesis is to make an information proposal concerning ERP implementation amid miniature and intermediate sized corporations in KSA. The principle becomes stopped to pair of queries:

Question 1: On the way to what amount contain miniature in addition to intermediate sized corporations within Kingdom Saudi Arabia assumed ERP?

Question 2: Which issues are serious for effectual consumption of ERP structures; amid contain miniature in addition to intermediate sized corporations within Kingdom Saudi Arabia?

The applicability is insufficient which it was presented in [14]; prominence be supposed to as well be pretend matter assortment, editorial's principle in addition to editorial's readability. Depending on the exceeding conversation it is essential to attempt to accomplish in cooperation rigidity in addition to significance through developing preceding investigate within an efficient approach.

The investigation was planned depends on the Swedish shape utilized in [15]. Within rotate, Selldin's in addition to Olhager's shape was depending on single shape utilized through [16] in addition to interpret toward Swedish. From the time when the attention was to examine every sort of solids within Kingdom Saudi Arabia, the industrialized exact inquiries of the investigation were absent, in addition to a novel practical region "advertising as well as trades" was additional.

VI. SAUDI ARAMCO COMPANY

The selected case study is the Saudi Arabian American Oil Company ARAMCO company; this company is focused on energy and oil investigation and processing and provide the whole world with it locally and internationally. ARAMCO Company established in 1933, the company services reach all countries; the main location of the company is Dhahran. The company does the investigation, manufacturing, treating, supplying and advertising operations. The company produces 3.4 billion barrels and controls fields of gas and oil of 100 one inside KSA that produce 253 trillion of raw gas and 264 billion oil barrels. The largest offshore field is SAFANIYA Field while the largest field in world is GHAWAR Field.

A. SAP as a Business System in ARAMCO

ARAMCO Company has constantly stressed on technologies to improve their internal controls and add enhancement on management performance. The technological advancements prepared by ARAMCO had the corer impact in global environment of economy creation and businesses operation today. To enhance the expansion of Saudi ARAMCO company branch, the finance has to have the core role with leveraging technology to increase Saudi ARAMCO company branch position, since finance within Saudi ARAMCO is concerned of all business procedures, preliminary starting the point that it provides rare materials and purchase from suppliers, to that point of sales orders are booked, and derived to the orders that made.

By working on standalone systems that based on oriented methods group, make the current information not instantly accessible to share the level and take the instant decisions. So, legacy systems using were not very wieldy found in ARAMCO Company Saudi branch which prompt to realize SAP's product specifically the ERP. The desired Enterprise Resource Planning Systems that integrate the core business process and assist in data silos elimination.

In ARAMCO Company Saudi branch, the process isn't project that may end and evolve through time passing. The process constantly improves with Business, People, Technology and Intelligence. ARAMCO Company Saudi branch has employed 45,000 employees that every employee is identified through IT authentication machines which is being part of employ to leave SAP module purchased. ARAMCO Company Saudi branch has placed security systems emphasis and consolidated employee qualifications into smart cards in addition of photo and ID security tool that allow virtual and private access to the network by sole sign on enterprise functions since security is vital issue for cost savings considerations.

ARAMCO Company Saudi branch's employees can admit company's buildings and facilities using the same cards. Firstly these smart cards are provided to 45,000 company's workers all over the world throughout process implementation. The major benefit that realized will be a lone sign on employees and to provide simplicity. A significant matter for all association is the passwords number that needed to be remembered by employees. So accordingly ARAMCO Company doesn't require containing helpdesk team to answer employees' calls that extended crosswise the world since that they have forgotten their passwords. Using smart card employees have collapse anything with single smart card.

That solution has presented an extra protection or control has been attached to firm's critical applications particularly of data existing on ERP system. ARAMCO Company has several important applications through the business means and also IT applications means like ERP system and

reporting tools. Reporting tools acts as management equipments that significant to management and it is firmly to be confined from every data corruption; therefore the security is one of the main performing drivers.

VII. ERP SYSTEM APPRAISAL

Nowadays, the broad utilization of internet is frequently supporting variations, communications improvement and data interchange. In [29], enterprises are recognizing the data systems importance as well as the ERP systems offering several managerial, strategic and operational advantages if they are productively implemented since the world turn out to be an entirety.

These days, each ERP systems contain a varied Java/ XML submission code, given that web based modules. In spite of this important development, implementing normal ERP creations still contains substantial dangers and these dangers are partially adapted when e-commerce components are utilized. Furthermore, in spite of that dangers are apparent as both weight and opportunity by danger specialists; only the unenthusiastic part is taken into account in this part of the research. Manufacturing information illustrate that more than 60% of ERP implementations be unsuccessful [23].

The implementation of ERP systems was investigated in [7] to discover the inappropriateness and insufficiency. This investigation target was individuals who had practiced an ERP system implementation procedure from the beginning. Deep interviews were done with various ERP consultants and a study that composed of six different ERP consultants was done to examine the investigation model strength. After that, a questionnaire was made and sent to specific individuals in a specific company and then their feedbacks were analyzed [18]. In [19], reliability is a tool precision for discovering if the respondent answers the same questions at the same way every time. Cronbach's alpha values were computed for constructs.

The linear regression was utilized in [7], in order to test their study hypotheses. They discovered that decreasing the inappropriateness among the ERP system and managerial processes, the system and its end-users and the end-users and managerial processes in dependently has a major effect on the ERP system use [18].

A. The acceptance of open resource Software in ERP systems

Previous investigations of the adoption (Open source software) OSS of ERP schemes have utilized several study systems. One of these adoption schemes is the technology acceptance model that is not good enough due to that this technology fails to clarify relative influences.

The adaptation of ERP schemes is affected by modernization and factors in the association and in its outside

surroundings. A modification of the Technology, Organization and Environment system will provide a complete study system for this research. Figure 6 shows the study's research system [24, 25,26].

The factors are; the environmental factors which the Swedish government's attainment procedure recommends non-prejudice as well as identical management of dealers [27].

The second factor is the organizational factors which the governmental characteristics are time and accomplished staff, governmental size and sources in economic tools, which these characteristics have been recognized to impact the acceptance of technical improvements [28].

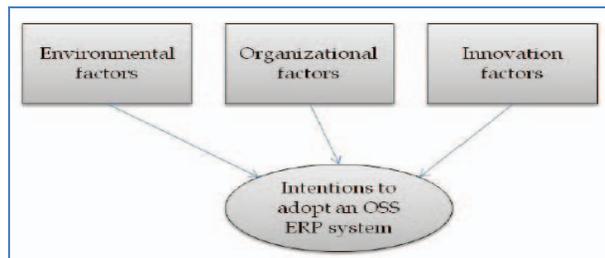


Figure 6. The study's research model [27]

The third factor is the innovation factors; the supposed qualities are the improvement's supposed qualified benefits in comparison with accessible technology or challenging improvements, which these qualities have been found to manipulate the acceptance of improvements [29].

B. ERP schemes Business significance: A serious appraisal of experiential Literature

The business importance engendered by "information and communication technologies" (ICT) has been for extended period the most important study matter. Lately, there is a rising investing attention in the commerce significance engendered with exacting categories of "information systems" (IS). One of the categories is the "Enterprise Resource Planning" (ERP) schemes, which are gradually implemented via associations for sustaining and combining key business and organization methods.

VIII. CONCLUSION

There are some advantages that have effects on the ERP system such as reduced vendor dependence and probable price savings for certify cost. These advantages so far compensated by the obstructions. There are critical issues within ERP system such as the closed information in proprietary software and the need of functionality for the cities' demands.

ARAMCO Company has an extensive IT infrastructure with the largest position of SAP implementation in globe. So the organization of this company has recognized information, transactional systems, ERP system and management

protecting need against any security threats or any regional enterprises attack that spread across the world.

ARAMCO Company has expanded from the business process standardization and knitted process in which processes' outputs act as processes' inputs to generate data that supportive components in management information generating and very useful in critical decision taking management and decision supporting system. After the standard process implementation and enterprise resource planning use, the better control is realized as product revenues.

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