

CRITICAL SUCCESS AND FAILURE FACTORS OF ERP IMPLEMENTATIONS: TWO CASES FROM KINGDOM OF SAUDI ARABIA

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ABSTRACT

Every year, the number of high-profile ERP (enterprise resource planning) project failures in the IT industry are normalized, failures that burn through mountains of cash, bring company operations to a standstill, generate bad publicity for vendors and toss careers in the trash.

This paper is a comprehensive description of how critical success and failure factors impact the implementation of two major ERP systems. In this paper we have covered some ERP systems and its major components more over we have addressed some critical success and failure factors in detail. Two case studies have been presented and mapped these critical factors with successful results. Finally we have presented a priority model to learn how these factors must be taken before starting such ERP systems.

Keywords: *ERP, Critical Success factor, Critical failure factor, integration, organization.*

1. INTRODUCTION

ERP system is an information backbone and reaches into all areas of your business and value chain. ERP integrates all departments and functions across an organization into a single computer

system that aims to serve practically everyone's particular needs. It eases the exchange of data and facilitates communication among departments. Each module works separately, performing specific data-processing functions.

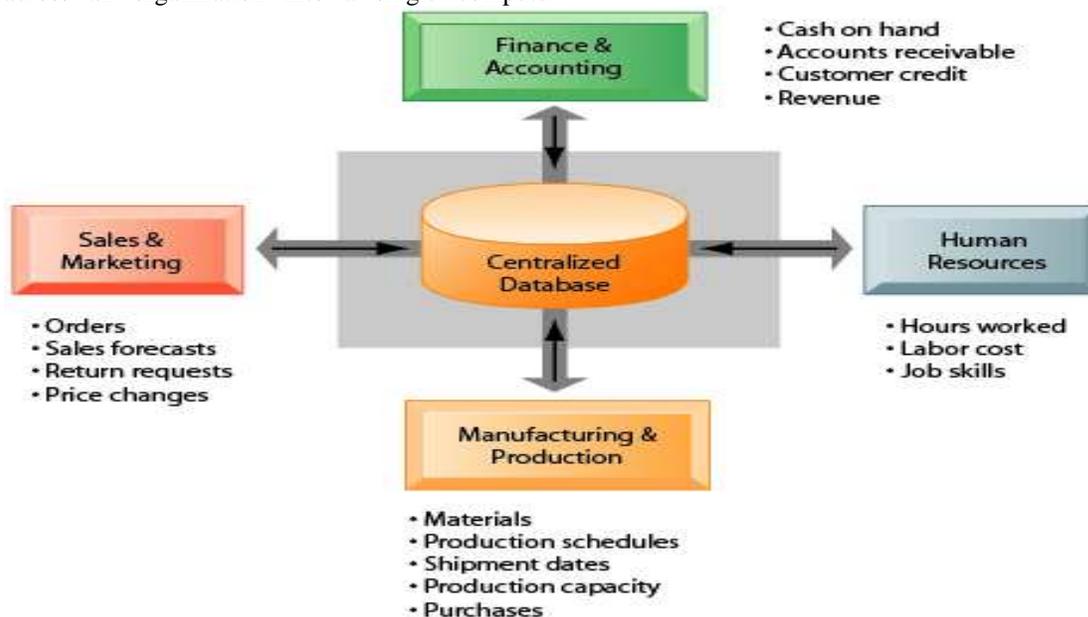


Figure 1: ERP SYSTEM (Laudon KC, 2007)



When successfully implemented, links all areas of a company including order management, manufacturing, human resources, financial systems, and distribution with external suppliers and customers into a tightly integrated system with shared data and visibility.

Potential benefits include drastic declines in inventory, breakthrough reductions in working capital, abundant information about customer wants and needs, along with the ability to view and manage the extended enterprise of suppliers, alliances, and customers as an integrated whole (Escalle et al., 1999).

ERP is not software, rather that the software is supporting ERP to be more effective. ES is an Enterprise System or Enterprise software. In his book *Mission Critical*, author (Thomas H. Davenport, 200) describes enterprise systems as "packages of computer applications that support many, even most, aspects of a company's information needs".

Let's describe Enterprise Resource Planning as: An enterprise-wide set of management tools that balances demand and supply, containing the ability to link customers and suppliers into a complete supply chain, employing proven business processes for decision-making, and providing high degrees of cross-functional integration among sales, marketing, manufacturing, operations, logistics, purchasing, finance, new product development, and human resources, thereby enabling people to run their business with high levels of customer service and productivity, and simultaneously lower costs and inventories; and providing the foundation for effective e-commerce.

The popularity of integrated software package is steadily increasing. ES software packages are experiencing rapid worldwide growth. However, ES are huge and complex systems and warrant careful plan and execution to ensure successful implementation. They are not pure software systems; they affect how a business conducts itself. The value that ES packages can bring to companies is clear to many organizations, and few will dispute its potential (Al-Mudimigh, 2001). However, numerous organizations are not putting in place the procedures to manage the changes and customizations they need to make to ES packages for establishing a competitive advantage (Turban et al. 2005; Barnes, 1999). It has been estimated that at least 90% of ES implementations end up late or over-budget, and almost half fail to achieve the desired results (Oracle, 2004; Martin, 1998).

1.1. WHY ES FAIL?

Most experts in the Information Technology agree that such failures occur far more often than they should. What's more, the failures are universally unprejudiced: they happen in every country; to large companies and small; in commercial, nonprofit, and governmental organizations; and without regard to status or reputation. The business and societal costs of these failures--in terms of wasted taxpayer and shareholder dollars as well as investments that can't be made--are now well into the billions of dollars a year. Sample of major failure in the recent years has shown in table 1.

Table 1: Number of companies failed in implementing ERP system [16].

YEAR	ORGNIZATION	OUTCOME (COST US \$)
2010	New York City	\$700 million-plus to modernize its payroll system
2008	Waste Management Co.	\$100 million-plus of legal case against SAP ERP.
2005	Hudson Bay Co.(CANADA)	Inventory System Problem contribute \$33.4 in losses
2004	Hewlett Packard Co.	Problems with ERP contribute \$160 in losses
2000	Nike Co.	A \$400 Million upgrade to Nike's ERP resulted in \$100million lost sales

A literature review was conducted to understand why ES implementation is failed? and how the critical success and failure factors was not helped in each case study. The review covered numerous published books and articles (Amoako-Gympah, 2005; Mandal and Gunasekaran, 2003; Ventura,

2003; Hong and Kim, 2002; Sandoe et al. 2001; Davenport, 2000; Gupta, 2000; Sumner, 1999; Bingi et al. 1999; Davenport, 1998). Later a map on these factors on two cases studies will be conduct. The first case is the implementation of ERP at the Saudi giant Telecommunication Company, and the



other case the implementation of ERP Modules in the Ministry of Defense Air force department. In addition that we have built a priority model of how these critical success and failure factors on these two cases.

2. CRITICAL SUCCESS AND FAILURE FACTORS

First, we will revisit all the critical success and failure factors (CSFFs) and how it classified of all ERP implementation and later, elaboration of all the CSFFs in detailed and how important are they.

A process theory approach (Markus and Tanis, 2000) was used to classify the CSFFs identified. The process theory focuses on the sequence of events leading up to implementation completion. Markus and Tanis (2000) identified the following four phases in an ERP life cycle:

- (1) Chartering - decisions defining the business case and solution constraints;
- (2) Project - getting system and end users up and running;
- (3) Shakedown - stabilizing, eliminating ``bugs'', getting to normal operations;
- (4) Onward and upward - maintaining systems, supporting users, getting results, upgrading, system extensions.

The chartering phase comprises decisions leading to funding of the ERP system project. Key players in the phase include vendors, consultants, company executives, and IT specialists. Key activities include initiation of idea to adopt ERP, developing business case, decision on whether to proceed with ERP or not, initiation of search for project leader/champion, selection of software and implementation partner, and project planning and scheduling. (Nah, Lau, and Kuang , 2001)

The project phase comprises system configuration and rollout. Key players include the project manager, project team members (mainly from business units and functional areas), internal IT specialists, vendors, and consultants. (We will refer to this group of people as the implementation partners.) Key activities include software configuration, system integration, testing, data conversion, training, and rollout. In this phase, the implementation partners must not only be knowledgeable in their area of focus, but they must also work closely and well together to achieve the organizational goal of ERP implementation. (Nah, Lau, and Kuang , 2001)

The shakedown phase refers to the period of time from "going live" until "normal operation" or "routine use" has been achieved. Key activities include bug fixing and rework, system performance tuning, retraining, and staffing up to handle temporary inefficiencies. In this phase, the errors of prior causes can be felt, typically in the form of reduced productivity or business disruption (Markus and Tanis, 2000). Hence, it is important to monitor and constantly make adjustments to the system until the "bugs" are eliminated and the system is stabilized.

The onward and upward phase refers to ongoing maintenance and enhancement of the ERP system and relevant business processes to fit the evolving business needs of the organization. It continues from normal operation until the system is replaced with an upgrade or a different system.

Key players include operational managers, end users, and IT support personnel (internal and external). Vendor personnel and consultants may be involved when upgrades are concerned. Key activities include continuous business improvement, additional user skill building, upgrading to new software releases, and post-implementation benefit assessment. (Nah and Lau, 2001)

(Nah, Lau, and Kuang, 2001) concluded 11 factors and these factors will be used as the main factors to be applied for our two cases:

2.1. ERP TEAMWORK AND COMPOSITION

ERP teamwork and composition is important throughout the ERP life cycle. The ERP team should consist of the best people in the organization (Buckhout et al., 1999; Bingi et al., 1999; Rosario, 2000; Wee, 2000). Building a cross-functional team is also critical. The team should have a mix of consultants and internal staff so the internal staff can develop the necessary technical skills for design and implementation (Sumner, 1999). Both business and technical knowledge are essential for success (Bingi et al., 1999; Sumner, 1999).

The ERP project should be their top and only priority and their workload should be manageable (Wee, 2000). Team members need to be assigned full time to the implementation (Wee, 2000). As far as possible, the team should be co-located together at an assigned location to facilitate working together (Wee, 2000).

The team should be given compensation and incentives for successfully implementing the system on time and within the assigned budget



(Wee, 2000). The team should be familiar with the business functions and products so they know what needs to be done to support major business processes (Rosario, 2000).

The sharing of information within the company, particularly between the implementation partners, and between partnering companies is vital and requires partnership trust (Stefanou, 1999). Partnerships should be managed with regularly scheduled meetings. Incentives and risk-sharing agreements will aid in working together to achieve a similar goal (Wee, 2000).

2.2. TOP MANAGEMENT SUPPORT

Top management support is needed throughout the implementation. The project must receive approval from top management (Bingi, 1999; Buckhout, 1999; Sumner, 1999) and align with strategic business goals (Sumner, 1999). This can be achieved by tying management bonuses to project success (Wee, 2000).

Top management needs to publicly and explicitly identify the project as a top priority (Wee, 2000). Senior management must be committed with its own involvement and willingness to allocate valuable resources to the implementation effort (Holland et al., 1999). This involves providing the needed people for the implementation and giving appropriate amount of time to get the job done (Roberts and Barrar, 1992).

Managers should legitimize new goals and objectives. A shared vision of the organization and the role of the new system and structures should be communicated to employees. New organizational structures, roles and responsibilities should be established and approved. Policies should be set by top management to establish new systems in the company. In times of conflict, managers should mediate between parties (Roberts and Barrar, 1992).

2.3. BUSINESS PLAN AND VISION

Additionally, a clear business plan and vision to steer the direction of the project is needed throughout the ERP life cycle (Buckhout et al., 1999). A business plan that outlines proposed strategic and tangible benefits, resources, costs, risks and timeline is critical (Wee, 2000). This will help keep focus on business benefits.

There should be a clear business model of how the organization should operate behind the implementation effort (Holland et al., 1999). There should be a justification for the investment based

on a problem and the change tied directly to the direction of the company (Falkowski et al., 1998). Project mission should be related to business needs and should be clearly stated (Roberts and Barrar, 1992). Goals and benefits should be identified and tracked (Holland et al., 1999). The business plan would make work easier and impact on work (Rosario, 2000).

2.4. EFFECTIVE COMMUNICATION

Effective communication is critical to ERP implementation (Falkowski et al., 1998). Expectations at every level need to be communicated. Management of communication, education and expectations are critical throughout the organization (Wee, 2000). User input should be managed in acquiring their requirements, comments, reactions and approval (Rosario, 2000). Communication includes the formal promotion of project teams and the advertisement of project progress to the rest of the organization (Holland et al., 1999). Middle managers need to communicate its importance (Wee, 2000). Employees should be told in advance the scope, objectives, activities and updates, and admit change will occur (Sumner, 1999).

2.5. PROJECT MANAGEMENT

Good project management is essential. An individual or group of people should be given responsibility to drive success in project management (Rosario, 2000). First, scope should be established (Rosario, 2000; Holland et al., 1999) and controlled (Rosario, 2000). The scope must be clearly defined and be limited. This includes the amount of the systems implemented, involvement of business units, and amount of business process reengineering needed. Any proposed changes should be evaluated against business benefits and, as far as possible, implemented at a later phase (Sumner, 1999; Wee, 2000). Additionally, scope expansion requests need to be assessed in terms of the additional time and cost of proposed changes (Sumner, 1999). Then the project must be formally defined in terms of its milestones (Holland et al., 1999). The critical paths of the project should be determined. Timeliness of project and the forcing of timely decisions should be managed (Rosario, 2000). Deadlines should be met to help stay within the schedule and budget and to maintain credibility (Wee, 2000).

Project management should be disciplined with coordinated training and active human resource department involvement (Falkowski et al., 1998). Additionally, there should be planning of well-



defined tasks and accurate estimation of required effort. The escalation of issues and conflicts should be managed (Rosario, 2000).

Delivering early measures of success is important (Wee, 2000). Rapid, successive and contained deliverables are critical. A focus on results and constant tracking of schedules and budgets against targets are also important (Wee, 2000).

2.6. PROJECT CHAMPION

Project sponsor commitment is critical to drive consensus and to oversee the entire life cycle of implementation (Rosario, 2000). Someone should be placed in charge and the project leader should "champion" the project throughout the organization (Sumner, 1999).

There should be a high level executive sponsor who has the power to set goals and legitimize change (Falkowski et al., 1998). (Sumner, 1999) stated that a business leader should be in charge so there is a business perspective. Transformational leadership is critical to success as well. The leader must continually strive to resolve conflicts and manage resistance.

2.7. APPROPRIATE BUSINESS AND LEGACY SYSTEMS

Appropriate business and legacy systems are important in the initial chartering phase of the project. According to (Roberts and Barrar, 1992), a stable and successful business setting is essential. Business and IT systems involving existing business processes, organization structure, culture, and information technology affect success. It determines the IT and organizational change required for success (Holland et al., 1999). (Roberts and Barrar, 1992) also argue that success in other business areas is necessary for successful MRPII implementations.

2.8. CHANGE MANAGEMENT PROGRAM AND CULTURE

Change management is important, starting at the project phase and continuing throughout the entire life cycle. Enterprise wide culture and structure change should be managed (Falkowski et al., 1998), which include people, organization, and culture change (Rosario, 2000). A culture with shared values and common aims is conducive to success. Organizations should have a strong corporate identity that is open to change.

An emphasis on quality, a strong computing ability, and a strong willingness to accept new technology would aid in implementation efforts. Management

should also have a strong commitment to use the system for achieving business aims (Roberts and Barrar, 1992). Users must be trained, and concerns must be addressed through regular communication, working with change agents, leveraging corporate culture and identifying job aids for different users (Rosario, 2000).

As part of the change management efforts, users should be involved in design and implementation of business processes and the ERP system, and formal education and training should be provided to help them do so (Bingi et al., 1999; Holland et al., 1999). Education should be a priority from the beginning of the project, and money and time should be spent on various forms of education and training (Roberts and Barrar, 1992).

Training, re-skilling and professional development of the IT workforce is critical. User training should be emphasized, with heavy investment in training and re-skilling of developers in software design and methodology (Sumner, 1999). Employees need training to understand how the system will change business processes. There should be extra training and on-site support for staff as well as managers during implementation. A support organization (e.g. helpdesk, online user manual) is also critical to meet users' needs after installation (Wee, 2000).

2.9. BUSINESS PROCESS REENGINEERING (BPR) AND MINIMUM CUSTOMIZATION

Another important factor that begins at the project phase is BPR and minimum customization. It is inevitable that business processes are molded to fit the new system (Bingi et al., 1999). Aligning the business process to the software implementation is critical (Holland et al., 1999; Sumner, 1999).

Organizations should be willing to change the business to fit the software with minimal customization (Holland et al., 1999; Roberts and Barrar, 1992). Software should not be modified, as far as possible (Sumner, 1999). Modifications should be avoided to reduce errors and to take advantage of newer versions and releases (Rosario, 2000). Process modeling tools help aid customizing business processes without changing software code (Holland et al., 1999).

Broad reengineering should begin before choosing a system. In conjunction with configuration, a large amount of reengineering should take place iteratively to take advantage of improvements from the new system. Then when the system is in use

reengineering should be carried out with new ideas(Wee, 2000).

Quality of business process review and redesign is important (Rosario,2000). In choosing the package, vendor support and the number of previous implementers should be taken into account (Roberts and Barrar, 1992).

2.10. SOFTWARE DEVELOPMENT, TESTING AND TROUBLESHOOTING

Software development, testing and troubleshooting is essential, beginning in the project phase. The overall ERP architecture should be established before deployment, taking into account the most important requirements of the implementation. This prevents reconfiguration at every stage of implementation (Wee, 2000).

There is a choice to be made on the level of functionality and approach to link the system to legacy systems. In addition, to best meet business needs, companies may integrate other specialized software products with the ERP suite. Interfaces for commercial software applications or legacy systems may need to be developed in-house if they are not available in the market (Bingi et al., 1999).

Troubleshooting errors is critical (Holland et al., 1999). The organization implementing ERP should work well with vendors and consultants to resolve software problems. Quick response, patience, perseverance, problem solving and firefighting capabilities are important (Rosario, 2000). Vigorous and sophisticated software testing eases implementation (Rosario, 2000).

(Scheer and Habermann.,2000) indicate that modeling methods, architecture and tools are critical. Requirements definition can be created and system requirements definition can be documented. There should be a plan for migrating and cleaning up data (Rosario, 2000). Proper tools and techniques and skill to use those tools will aid in ERP success (Rosario, 2000).

2.11. MONITORING AND EVALUATION OF PERFORMANCE

Finally, monitoring and evaluation come into play at the shakedown phase. Milestones and targets are important to keep track of progress. Achievements should be measured against project goals. The progress of the project should be monitored actively through set milestones and targets. Two criteria may be used (Roberts and Barrar, 1992). Project management based criteria should be used to measure against completion dates, costs and quality. Then operational criteria should be used to

measure against the production system. Monitoring and feedback include the exchange of information between the project team members and analysis of user feedback (Holland et al., 1999).

There should be an early proof of success to manage skepticism (Rosario,2000). Reporting should be emphasized with custom report development, report generator use and user training in reporting applications (Sumner, 1999).Management needs information on the effect of ERP on business performance. Reports or processes for assessing data need to be designed. These reports should be produced based on established metrics. It must include effective measurable project goals that meet business needs and are reasonable. Additionally, performance should be tied to compensation (Falkowski et al.,1998).

The review concluded the identified all the 11 CSFFs fall under one of four main categories, namely: commitment from top management, changing of the existing processes, the IT infrastructure, and deploying change management. These CSFF categories are presented in Figure 2. (Al-Mudimigh, 2001)

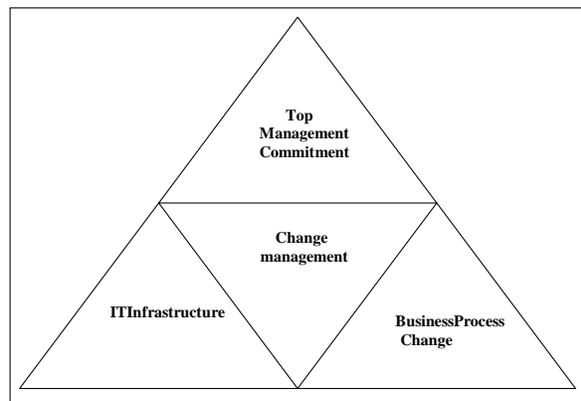


Figure 2: CSFF Categories for successful ES (Al-Mudimigh, 2001)

The following is a brief overview of each of these categories will be included in the following four main categories as per. (Al-Mudimigh, 2008):

1. Top management commitment: Management must be a part of ES implementations. The IT literature has clearly demonstrated that for IT projects to succeed top management support is critical (Bingi et al. 1999). However, top management in many organizations still view the installation of an ES as primarily a technological challenge and assign its responsibility to the IT departments. This is



seen as a dangerous act (Davenport, 1998) due to ES's profound business implications. "Only top management is equipped to act as the mediator between the imperatives of the technology and the imperatives of the business (Davenport, 2000; Bingi et al. 1999).

2. **Business Process Change (BPC):** Implementing an ES involves changing the existing business processes to the best business process standard (Sandoe et al. 2001; Gibson, 1999). ESs are built on best practices that are followed in the industry, and to successfully install ES, all the processes in a company must conform to the ES model. During the ES planning phase, companies face a question as to whether to implement the ES software "as is" and adopt the ES's built-in procedure or customize the product to the specific needs of the organization (Sandoe et al. 2001; Holland, 1999). Research (Melymukaf, 1998) has shown that even a best application package can meet only 70% of the organizational needs. An organization has to change its processes to conform to the ES package, customize the software to suit its needs, or not be concerned about meeting the balance 30%. In fact, this need to change the organization's business processes is seen as one of ES's major benefits (Bingi et al. 1999).
3. **IT Infrastructure:** Adequate hardware and networking infrastructure is required for ES application. ES can't be without sophisticated information technology infrastructure. Three primary attributions of success were identified from the descriptive statistics: willingness to change to new computer applications, effort, and persistence (Amoako-Gympah, 2005; Sandoe et al. 2001; Kelley et al. 1999). In addition to the infrastructure, clearly, the software configuration has a critical influence on the implementation process and outcome (Holland et al. 1999).
4. **Change management:** One of the main obstacles facing ES implementation is resistance to change. "About half of ES projects fail to achieve hoped-for benefits because managers underestimate the efforts involved in managing change" (Pawlowski, 1999). To successfully implement ES, the way organizations do business will need to change and the ways people do their jobs will need to change too (Koch, 1999). Thus, change management is essential for preparing a company for the introduction of an ES, and its successful implementation. However, change

management has to be structured within an overall Business Process Management methodology to achieve its goals.

3. CASE STUDIES

The two case studies have been described in the following sub sections:

3.1. AIRFORCE (1997-1999)

A team has been formed to study the current Legacy system (EMDAD), it is a logistics system (supply and maintenance), the team is responsible to decide either to go with ERP or not? After studying the current applications and IT infrastructure, they decide to go with ERP. Legacy system is not applicable any more in such sensitive organization where the data must go through on time with high accuracy. In addition, the need of online report for the management is one of the major trigger for going to implement the ERP. The committee was formed but with top management and starting the business study. the project was a mega project and might cost a hundreds of Millions in US Dollars, however, the studying phase took two years due to team manpower shortage and this leads to management changes and loss of top management support where the budget were approved before was never given. It was a very good experience to use all the available tools, build the AS IS documents, Selection technology (SAP, Oracle) after the AS IS.

The trigger of implementing the ERP in AirForce was due to legacy system, where the Legacy system has the following disadvantages:

- loss of integrity of all systems
- high cost of maintenance
- weak of management report generation
- live data availability is not existed (top management request online report for making decisions)

3.2. SAUDI TELECOM CO. (2002-2004)

As a trend of the private and profitable companies such as STC, which is the largest operator in the Middle East is improving their business process which will lead to cut the cost and increase the company profit. However, the company decided to go with self service internal systems which link all the HR system under one application server (web based). The team was formed and decided to go

with Oracle application since all the databases and applications on the company is under Oracle technology. From the figure ... you can see all the layers and applications that the company wishes to implement. Note that, most of these applications were implemented and the project was to implement the Self service application.



Figure 3. Application Family (Oracle) [15]

The team was study the market (benchmark) and decided to go with minimum customization. The committee was formed but on a middle

management level, the project was failed due to the following reasons:

- Lack of Management support
- Huge system customization
- Inadequate of the Company culture

Table 2. Case studies of failure ES

Company	Major failure factors making
Airforce	<ul style="list-style-type: none"> • ERP Teamwork & composition • Top Management Support
Saudi Telecom	<ul style="list-style-type: none"> • Top management Support • Change Mgt program & culture • S/W Dev, Testing, & troubleshooting

3.3. PRIORITY MODEL

From the two studies, we have include the main failure factors while we have other factors was badly impacting the success of the two cases,

however, we are going to build a priority model for all the eleven factors we have mentioned here with failure priorities from 1 (highly failure impact) to 11 (lower failure impact), the table below was built on our two case studies:



Table 3. Priority Factors

Factor	Royal Airfoce	Saudi Telecom
<i>ERP teamwork and composition</i>	2	8
<i>Top management support</i>	1	3
<i>Business plan and vision</i>	9	10
<i>Effective communication</i>	8	5
<i>Project management</i>	3	7
<i>Project champion</i>	4	6
<i>Appropriate business and legacy systems</i>	7	9
<i>Change management program and culture</i>	5	2
<i>Business process reengineering (BPR) and minimum customization</i>	6	4
<i>Software development, testing and troubleshooting</i>	11	1
<i>Monitoring and evaluation of performance</i>	10	11

4. CONCLUSION

Definition of the ES, ERP has been identified, the critical success factors were mentioned based on previous studies and our aim was to define all the failure factors for some of real case studies and understanding of all issues making those cases became a failure stories, we have implement a priority model for those cases (AirForce organization, and Saudi Telecom).However, we have deeply studied the organization and all factors might badly impact the ES project and defined. Well, we concluded that top management decisions are very important toward the ERP implementation and success.

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