DEVELOPING A FORMAL FRAMEWROK FOR IMPLEMENTING ENTERPRISE RESOURCE PLANNING SYSTEM TO ACHIEVE SUCCESSFUL IMPLEMENTATION

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List of Abbreviation

Enterprise Resource Planning: ERP

Material Requirement Planning: MRP

Material Requirement Planning II: MRPII

Advanced planning and scheduling: APS

Customer relationship management: CRM

Supply chain management: SCM

Information systems: IS

Business process reengineering: BPR

Theory of Constraints: ToC

Goal directed project management: GDPM

Implementing and optimal adaptation of the ERP system: IOA ERP

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Abstract

Within past years, Manufacturing Resource Planning (MRP-type) Computer systems have quickly evolved from basic materials requirement planning software to today's enterprise resource planning (ERP) integrated software packages. With such computer systems the manufacturing industry is in much better shape than ever before. ERP can be a company strategic tool to achieve the integration with the customers and suppliers in order to achieve the defined objectives. However, the process of implementing an ERP system is not easy. The process involves early planning prior to the implementation and it is also very costly. Many implementation projects have failed due to many reasons such as: lack of prior planning, employee commitment, top management support, assigning qualified project team, cultural and organization changes, bad communication, not qualified project manager, and choosing the wrong ERP system. Several implementation methodologies have been suggested to implement ERP systems successfully including: Fast-track, the total solution and Accelerated SAP methodologies. However, such methodologies are not detailed enough and do not involve effective feedback mechanism for controlling the project execution. In this research work, a comprehensive project plan based framework is developed to help achieving successful ERP system implementation

using multi-phased QFD tool to link the customer requirements with the ERP system characteristics. Moreover, QFD tool is used to link the ERP system characteristics with the different implementation activities and finally linking the implementation activities with the success and failure factors reported in the literature. A case study was done in the Households and Toiletries Factory to evaluate the suggested framework. Detailed project plan was developed determining the detailed activities for each project phase along with the timeframe for executing and the needed human resources. Moreover, QFD helps the company to select the best ERP system that meets the predefined needs and requirements, in addition to linking the implementation activities with the success and failure factors to help the company avoiding any possible failures .

Chapter one: Introduction

The traditional concept of business, in both manufacturing and service, is to create value, not only making products or providing services. Therefore, computer systems – is needed to integrate and support business processes within the enterprise - have become widespread throughout manufacturing and service firms over the past years. The purpose of these computer systems is to increase the value of the products / services provided, to enhance quality and reduce cost and production time, therefore eventually, increasing customer satisfaction. All business firms are continually overwhelmed with increasing product value, improving quality, and increasing profits. These concerns can be addressed by studying supplier relations, supplier selection, purchasing negotiations, operations, transportation, inventory, warehousing, benchmarking, third-party vendors, electronic commerce, recycling, supply-chain electronic software, customer relations, etc. (Kova´cs and Paganelli, 2003).

Today's global markets and business environments are characterized with very strong competitive pressure and sophisticated customers needs who demands innovative and valuable products and services. Understanding and optimizing the business processes is the key factor to achieve success and sustainability in these fast-changing environments (Mabert et. al, 2003).

The Key factor in managing these organizations is information technology. Over the past few years, many companies have embraced a new class of planning and resource management software systems to integrate processes enforce data integrity, and better managing its resources. These package systems are broadly classified as Enterprise Resource Planning (ERP) systems, (Mabert et. al, 2003).

In today's knowledge economy, information technology is a driving force in the organizational change. ERP systems along with other technological advances such as E-commerce are playing a major role in developing a company's strategic plan. The global competition, along with shorter product lifecycles, ever-increasing market niches, and the pressure to react quickly to the changing external business environment has forced companies to make decisions in an integrated manner. (Guptaa and Kohli, 2004).

Today, one of the major sources of competitive advantage has been the ability to speed up and optimize the supply-chain process (Gumaer, 1996). This demand led to a significant development and investment in information systems as ERP systems. Instead of developing IT system in-house, more and more companies are turning to off-the-shelf ERP solutions to plan and optimize their resources more effectively and manage their systems effectively (Holland and Light, 1999).

Enterprise resource planning systems are integrated enterprise-wide standard information systems that automate and integrate all aspects of an organization's business process. The ERP concept is that business functions incorporating manufacturing, marketing (sales and distribution), human resource, finance, and information can be supported by a single integrated system with all of the company's data captured in a central database. Through data integration, ERP eliminates cross-functional coordination problems that hinder the integration of the enterprise. ERP systems improve the flow of information among the different functions within an enterprise. Furthermore, ERP systems facilitate information sharing across organizational units and geographical locations. This enable manager to plan precisely, to make decisions promptly, and to control appropriately gaining the

flexibility in such a dramatically changing environment through the real-time information.

The ERP system enables employees to share information across the whole enterprise and also update the information as changes are being made. Consequently, the loss of information as well as information sharing is no longer the main challenge in the enterprise that successfully implemented Enterprise Resource Planning System. But since technologies are advancing so rapidly, it is very critical that every organization has the ability to adapt to changes in order to stay competitive.

Organizations that have successfully adopted and successfully implemented ERP systems view them as one of the most important innovations that have lead to the realization of substantial tangible and intangible improvements in a variety of areas (Davenport, 1998).

Most firms generally have software systems that performed much of the component functions of ERP, but the real time and integrative characteristics of ERP system are much competitive than stand-alone systems (Gattiker and Goodhue, 2000). ERP systems promise high levels of business integration and related benefits, but expenditures on ERP are relatively huge. (Gattiker and Goodhue, 2000).

Problem Definition

Companies worldwide have made substantial investments in installing enterprise resource planning systems. Zhang et al. (2005) indicated that limited studies have been conducted to identify critical factors affecting ERP systems implementation success and failures with many of them focused on ‘‘how we implemented ERP systems in our company’’.

The studies vary regarding what variables are required for implementation success or responsible for failure. It suggests that problems with the implementation of ERP systems occur for a number of reasons. According to (Al-Mashari et al., 2003) these reasons include:

(1) The need for business process change during the implementation of an ERP system is needed.

(2) Lack of top management support, data accuracy, and user involvement can attribute to system implementation failures.

(3) Education and training are frequently under estimated and are given less time due to schedule pressures, and less understanding of cross-functional business processes is often reported.

(4) When adopting an ERP system, there is a need to recognize the unique Asian context concerning cultures while the existing business models typically reflect Western practices.

Accordingly implementing ERP systems has proven unexpectedly difficult, and the final benefits have been uncertain. A successful implementation of ERP is a long task for any organization. Therefore the need for a formal approach for assessing the needs

of the company has become major need to insure successful ERP implementation and eliminating the failure reasons.

Research Objectives and aims

In this research work, we propose that successfully implementation of ERP system can be enhanced by: addressing the needs of the organization, identifying the organization strength, weaknesses, opportunity and threats (SWOT analysis). This is an elementary step followed by gap analysis for the missing prerequisite for success. The company must first analyze its current situation to identify the requirements and needs that must adopt to insure the success for the system implementation. So a formal method will be developed using multi-phased QFD as a tool to assist the companies in achieving a successful ERP system implementation. With the following objectives in mind:

1. Develop a formal scheme to assessing the strengths and weaknesses of the organizations and to assess their capabilities for implementing ERP system.
2. Develop gap analysis for determining the absence of a certain pre-requisite for successful implementation of ERP systems.
3. To develop a framework whereby implementation plan are devised to improve the status of the system and insure the implementation success.

Chapter Two: Enterprise Resource Planning System

In this chapter, comprehensive literature review was conducted to discuss the different definition of ERP system as stated by the researchers, the evolution of the ERP system starting from Material Requirement Planning (MRP) and Material Requirement Planning II (MRPII), ERP system architecture and the ERP life cycle model.

Definition of Enterprise Resource Planning

The literature about ERP systems includes different definitions, but as overall they fall within the same framework and provide same picture about the ERP system.

Watson and Brancheau (1991) described Enterprise Resource Planning as a generic term for an integrated enterprise computing system. They defined it as an integrated, customized, packaged software-based system that handles the majority of an enterprise's system requirements in all functional areas such as finance, human resources, manufacturing, sales and marketing. Gable (1998) defined ERP systems as comprehensive software packages that seek to integrate the cross-functional processes using a common database. Russell and Taylor (1998) defined ERP as an updated MRPII with relational database management, graphical user interface and client-server architecture. Today, ERP encompasses all integrated information systems that can be used across any organization (Koch et al., 1999).

Minahan (1998) explicated that ERP systems take into account every business transaction entered into the system no matter where the data is inputted. Prasad et al. (1999) indicated that ERP allows the corporate management of a business, and aims to integrate individual functional systems such as manufacturing, finance, procurement and distribution. "What ERP really does is organize, codify, and

standardize an enterprise's business processes and data. The software transforms transactional data into useful information and collates the data so that it can be analyzed" (Norris et al. 2000). According to Jacobs & Whybark (2000): "The easiest way to think of ERP is as a big information system that everybody has access to". Kapp et al. (2001) defined ERP as "a system of integrated procedure, rules and algorithms designed to function consistently time and time again. Ribbers and Schoo (2002) state that an ERP system is a tool that provides the company with consistent, reliable, timely and accurate data about internal operations and processes.

Enterprise resource planning systems have affected business processes. In that, ERP is reshaping business structures since, it promises to solve the challenges posed by integration and coordination the supposedly disconnected and uncoordinated business processes (Davenport, 1998). Enterprise resource planning system also referred to as enterprise-wide systems or enterprise systems due to their enterprise wide scope. These integrated enterprise-computing systems provide seamless integration of all the information flowing through an organization (Markus and Tanis, 2000).

According to the previous definition of ERP system, different people may interpret and define ERP system in different way, but the key point in an ERP system is the integration between all the functions within the enterprise. The purpose of ERP is to create a single database that represents a pool, where all transactions within an organization can be performed by linking all of the departments into a single database. With such integration everyone within different functional areas are able to share the same information as well as to communicate with other.

Evolution of Enterprise Resource Planning System

Bedworth and Bailey (1987) stated that the origin of the ERP applications we see today has evolved from Materials Requirement Planning (MRP) and Manufacturing Resource Planning (MRPII) systems. Materials Requirements Planning (MRP, or MRP-I) was launched in the mid-1960s**.** The term "Enterprise Resource Planning" is credited for the Gartner Group, for a concept they developed in the 1990s for the next generation MRPII systems (Dahlen and Elfsson, 1999).

Nah (2002) mentioned that MRP II was introduced in the 1980s with an emphasis on optimizing manufacturing processes by synchronizing the materials with production requirements. MRP II included areas such as distribution management, Project management, Finance, Human Resource and Engineering. Kumar and Hillsgersberg (2000) mentioned that at the end of 1980s and the beginning of the 1990s new software systems known in the industry as ERP systems have evolved in the market targeting mainly business organizations. According to Kremzar and Wallace (2001), the evolution of ERP dates back to the 1960s, when the MRP was first developed. The MRP covered what is called the universal manufacturing equation. The equation included the following four questions:

a) What are we going to make?

b) What does it take to make it?

c) What do we have?

d) What do we have to get?

After the development of the MRP was the development of the Closed-Loop MRP. The Closed-Loop MRP was a series of functions supporting both planning and execution as well as providing tools for addressing priority and capacity. MRP II was the next development, which was an extension of the Closed-Loop MRP. The MRP II

provided three new functions including Sales and Operations Planning, Financial Interface, and Simulation. Finally, ERP emerged from MRP II, which out performs MRP II capabilities and much more.

Rashid et. al (2000) stated that during the 1990s ERP vendors added more modules and functions as "add-ons" to the core modules giving birth to the "extended ERP". These ERP extensions include advanced planning and scheduling (APS), e-business solutions such as customer relationship management (CRM) and supply chain management (SCM). Figure 1 summarizes the historical development of ERP systems presented by Rashid et. al. (2002).

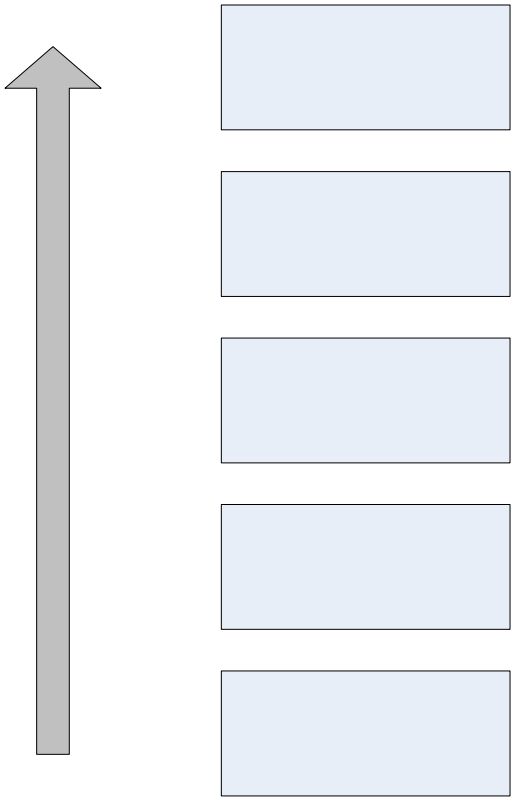

Figure 1: ERP System Evolution

Mohammad A. Rashid, Liaquat Hossain and Jon D. Patrick (2002). The Evolution of ERP Systems: A Historical Perspective

ERP Systems Architecture

According to Jacobs & Whybark (2000): "The easiest way to think of ERP is as a big information system that everybody has access to".

Kova´cs & Paganelli (2003) stated that new trends in information technologies, working environments and increasing the competitiveness between the companies, coincident with globalization and openness of economies, force many companies to realize the limitations of the old information systems used in the 1970s and 1980s. Some of these old systems were developed in-house while others were developed by different vendors using several different database management systems, languages and packages creating islands of non-compatible solutions unfit for seamless data flow between them. It was difficult to increase the capacity of such systems or the users were unable to upgrade them with the organization's business changes, strategic goals and new information technologies.

The purpose of ERP is to create a single database that represents a pool, where all transactions within an organization can be performed by linking all of the departments into one single database. With the integration of a single database, it enables everyone within different functional areas to share the same information as well as communicate with one another. The following figures display the basic concept of ERP system presented by Rashid et. al. (2002).

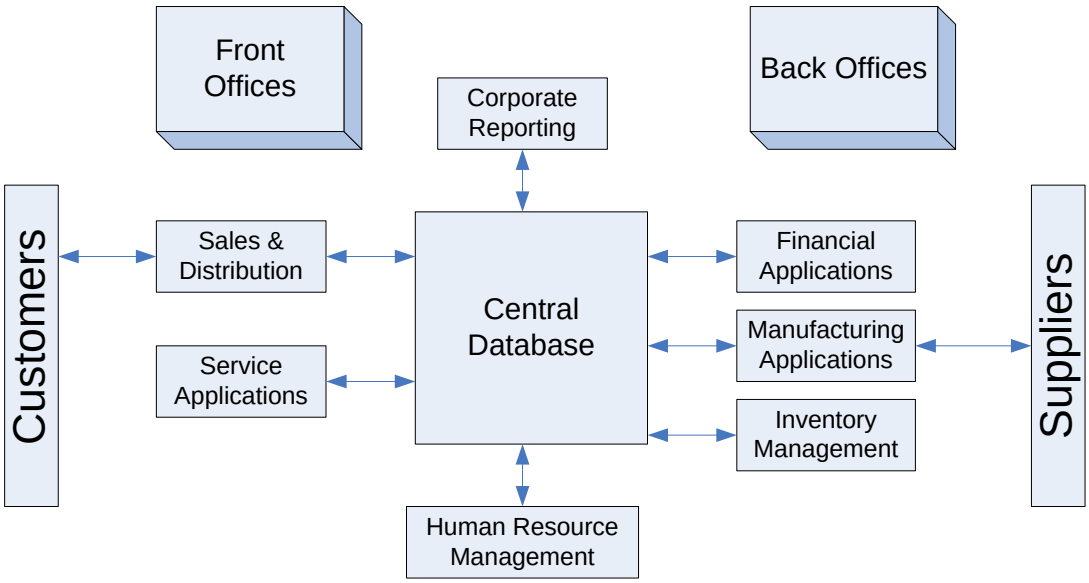

Figure 2: ERP System Concept

Mohammad A. Rashid, Liaquat Hossain and Jon D. Patrick (2002). The Evolution of ERP Systems: A Historical Perspective

The common characteristics of ERP systems may be summarized as follow as defined by Rashid et. al. (2002):

- The system comprises many business modules linked together on single data base such as: financial, manufacturing, accounting, inventory management etc.
- The system should use centralized common database.
- The Integration between the system modules should provide seamless dataflow, increasing operational transparency through standard interfaces.
- The system modules work in real-time with on-line and batch processing capabilities
- ERP system flexible and offer best business practices
- New trend in ERP system to be Internet-enabled systems.

ERP system includes different modules with some degree of specialty, but the core modules are almost the same for all of them. Some of the core ERP modules found in the successful ERP systems is the following:

- Financial management module
- Material management module
- Warehouse management module
- Manufacturing management module
- Production management module
- Sales and distribution management module
- Human resources management module

Duplaga and Astani (2003) summarize the reason for implementing the ERP system as follow:

- Improve control of information resources
- Overcome inefficiencies of legacy systems
- Integrate functional areas' information systems
- Respond to Y2K problem
- Support advanced planning and scheduling system
- Business intelligence potential
- Pursuit of business process reengineering
- Development of data warehouse
- E-commerce/E-business potential
- Support supply-chain management
- Link with customers through ERP system
- Link with suppliers through ERP system

ERP Life-cycle Model

One of the most important issues in implementing ERP system is to define the system life-cycle. Esteves and Pastor, (2005) present model which describe the life-cycle of ERP system. In this model, the life-cycle was divided into the following phases with defining the associated cost elements for each phase:

- Adoption decision phase:
- Acquisition phase:
- Implementation phase:
- Use and maintenance phase:
- Evolution phase:
- Retirement phase

During the first phase, Adoption decision phase, the main concern of the managers is to examine the need for ERP system, coincident with identifying the current and estimated business challenges. Defining the requirements of the new system will be adopted is key element of this phase, associated with identifying the goals, expected benefits, and the impact of the proposed system on the organizational level of the company.

The second phase of ERP system life-cycle is the Acquisition phase; in this phase the most important challenge for the companies is to select the best ERP system which satisfies the needs and requirements defined in the previous phase, which results in minimizing the required customization. Important issues to be considered in this phase include the system implementation plan, price of the system, employee training, and system maintenance.

Implementation phase start after selecting and purchasing the ERP system, this phase consists of customization and adaptation of the ERP system according to the needs

and requirements of the company. This phase should be planned well, and qualified consultants must be involved to insure the best system configuration. Forrester Research Inc. (Koch, 1997) estimates that in typical SAP package installation, more than 50% of the system implementation budget is spent on business process re-engineering. This results from the organizational business processes changes to needed to insure the success of the implemented ERP system and achieve the planned results.

The next phase which follow the system implementation is use and maintenance phase, during this phase the company shall running the system to insure the usability and compatibility of the implemented system with the company functions and business processes and to obtain the expected outputs . During this phase some customization requirements may be required. Integration ERP system with other systems such as advanced planning and scheduling module and supply-chain management module improve the capabilities of the system and provide the users with better performance and results, this integration is performed in the evolution phase. The last phase in the ERP life-cycle model is the retirement phase, where the manager takes the decision to replace the ERP system with other system due to inadequacy in the performance because of development of the business processes or new technology appearance.

Chapter Three: ERP System Implementation Success and Failure Factors

Companies worldwide have made substantial investments in installing enterprise resource planning systems. Yusuf et al. (2004) indicated that Limited studies have been conducted to identify critical factors affecting ERP systems implementation success with many of them focused on ‘‘how we implemented ERP systems in our company’’.

Improper implementation of the ERP system can cause considerable problems for the company. Stedman (1999) mentioned that Hershey Foods Corporation in 1999 reported a 19% drop in 3rd-quarter profits and a 29% increase in inventories over the previous year due to order processing problems caused by its faulty $112 million ERP implementation. More Over, Gilbert (1999) reported that Miller Industries reported a$3.5 million operating loss in the 4th-quarter of 1999 due to the costs and inefficiencies of its ERP system, while WW Grainger Inc. reported a $11 million reduction in operating earnings from its improper ERP implementation. According to these facts, high failure rates of ERP system implementation create strong pressure to identify and understand the implementation success and failure factors. (Somers and Nelson , 2001).

Lyytinen and Hirschheim's (1987) defined the successes and failures in IT projects into the following four perspectives:

- Correspondence success: This will be achieved through the match between the planned objectives and the IT system being implemented.
- Process success: When the project is completed within the planned time and budget the organization will achieve the process success defined before.

- Interaction success: This will be achieved through creating positive attitudes from the users towards the system being implemented.
- Expectation success: where the system match users expectations.

The studies vary regarding what variables are required for implementation success or responsible for failure. Al-Mashari et al. (2003) present framework for describing the inter-relationship between core business strategy aspects and the role of IT and associated systems can play in supporting the effective implementation through process improvement and management through regular performance monitoring and review. The following figure describes this framework:

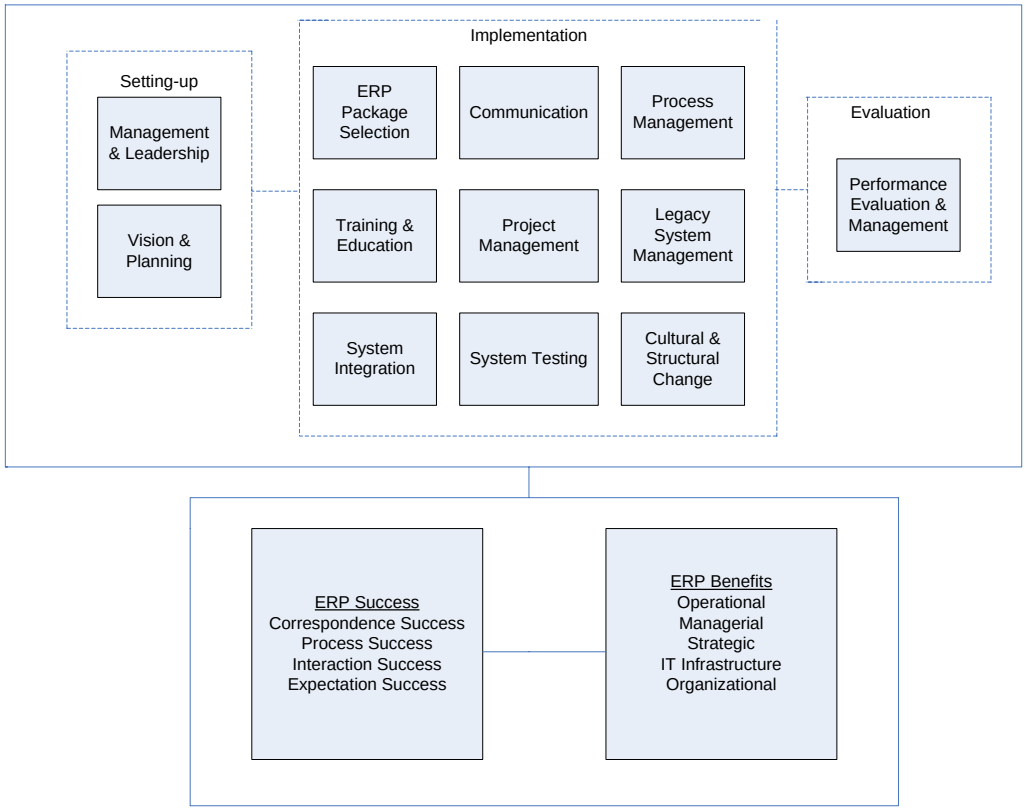

Figure 3 : Al-Mashari Framework for Implementing ERP System

Al-Mashari, M., Al-Mudimigh, A., Zairi, M.,(2003) . Enterprise resource planning: A taxonomy of critical factors.

Nah et. al., (2001) reported 11 factors as critical success factors for the ERP system Implementation. The following table summarizes these factors in addition to the other factors reported in the literature by different researchers.

Table 1: ERP Implementation Critical Success Factors

Reference	Success and Failure Factors														
	Top management support and leadership	ERP package selection	ERP teamwork and composition	Business plan and vision	Effective communication	Project management	Project champion	Appropriate business and legacy system	Change management program and culture	Business process reengineering (BPR) and minimum customization	Software development, testing and troubleshooting	Monitoring and evaluation of the performance	Data accuracy	Education and training	ERP system integration
Roberts and Barrar (1992)	x			x				x	x	x		x			
Falkowski et. al (1998)				x	x	x	x		x			x			
Davenport, 1998		x													
Minahan, 1998									x						
Hutchins, 1998														x	
Buckhout et. al.. (1999)	x		x	x											
Bingi et. al (1999)	x		x						x		x				x
Holland et. al.(1999)	x			x		x		x	x	x	x	x			
Stefanou (1999)			x				x								
Sumner (1999)	x	x	x		x	x				x		x			
Esteves and Pastor, 1999							x								
Rosario (2000)			x			x	x		x	x		x			
Wee (2000)	x		x	x	x	x					x				
Scheer and Habermann (2000)											x				
Soh et. al, 2000															x
Rao (2000)		x													
Pearlson, 2001			x												
Robey et. al. (2002)									x						
Umble & Umble 2002	x			x		x				x			x	x	

Reference	Success and Failure Factors														
	Top management support and leadership	ERP package selection	ERP teamwork and composition	Business plan and vision	Effective communication	Project management	Project champion	Appropriate business and legacy system	Change management program and culture	Business process reengineering (BPR) and minimum customization	Software development, testing and troubleshooting	Monitoring and evaluation of the performance	Data accuracy	Education and training	ERP system integration
Zhang et. al. 2003	x								x	x	x		x	x	
Al-Mashari et. al. (2003)	x			x											
Umble et. al, 2003				x					x				x		
Scott (2003)										x					
Barker and Frolick (2003)					x	x									
Al-mashari and Al-mudimigh (2003)						x			x	x					
Kraemmerand et. al. (2003)				x		x						x			

This chapter summarizes the most important factors presented in the previous studies that affect the success of the ERP system implementation.

- Top management support and leadership

To insure the successful implementation of the ERP system, the top management should provide all the possible support and encourage the employee's to adopt the new system. (Bingi et. al 1999; Buckhout et. al. 1999; Sumner, 1999; Umble & Umble 2002; Zhang et. al. 2003) stated that the project must receive the approval of the top management, and should be aligning with the business goals (Sumner, 1999). Top management needs to publicly and explicitly identify the project as top priority (Wee, 2000). Senior management must be committed to the project

involvement and have the willingness to allocate the qualified resources to the implementation efforts (Holland et. al., 1999). This involves providing the adequate resources and giving the appropriate amount of time to get the job done (Roberts and Barrar, 1992; Somers and Nelson, 2001). Al-Mashari et. al.(2003) mentioned that top management support and commitment does not end with initiation and facilitation, but it should extend to full implementation of the ERP system

- ERP package selection

One of the most important challenges that face the organization seeking ERP system is selecting the best ERP system that satisfies the organization business needs and requirements which results in minimizing the required customization (Esteves and Pastor, 1999). Usually companies fail to make the right decision about wither the system they are considering will match the defined requirements and needs (Davenport, 1998). Consequently, it is very important to make sure that the selected system will match the criteria used by the organization to select an information system. Rao (2000) mentioned that the organization should make sure of satisfying five major criteria when selecting an ERP package, these criteria include: affordability, knowledge of the package supplier, level of offered support, software upgradeability, and the use of the latest technology.

- ERP teamwork and composition

Pearlson, 2001, emphasizes the importance of teamwork and its functioning. It is importance to state the objective of the team and each person's role within. Constructing effective team is extremely important to insure the successful implementation. ERP team should consist of the best people in the organization (Buckhout et. al. 1999, Stefanou 1999, Bingi et. al 1999, Rosario 2000, Wee

2000,). The team should be consisting of both external consultants and internal team to provide the necessarily technical support for the design and the implementation (Sumner, 1999).

- Business plan and vision

Al-Mashari et. al. (2003) indicated that ERP systems are essentially considered as process- oriented IT tools for improving business performance. One of the most important elements in business improvement is having clear vision and formulated strategies that serve as road map for the organization to achieve the targeted improvement. The company must carefully define the needs for the ERP system and the business needs that the system will address (Umble et. al, 2003 ; Umble & Umble 2002; Kraemmerand et. al. 2003). Clear business plan and vision to drive the direction of the ERP system implementation is essential through out the project life cycle (Buckhout et. al. 1999). Wee (2000) mentioned that business plan that defines the proposed strategies, tangible benefits, resources, risks, cost and time frame is critical element for the project success. Clear business model of how the organization should operate behind the ERP implementation should be maintained (Holland et. al., 1999). There should be a justification for the investment based on the problem and the change tied directly to the direction of the company (Falkowski et. al., 1998). Roberts and Barrar (1992) stated that the project mission should be stated clearly and related directly to the organization business needs. The business plan would make work easier and create strong impact on the work (Rosario, 2000).

- Effective communication

Effective communication is critical for the ERP system implementation (Falkowski et. al., 1998). Management of communication, education and

expectations are critical throughout the organization (Wee, 2000; Barker and Frolick 2003). Managers need to communicate the importance of the project, and the employees should be told in advance the scope, objectives, activities and admit the change will occur (Sumner, 1999; Wee, 2000)

- Project management

Approximately 90% of ERP implementation projects are late or over budget (Martin, 1998), which results due to poor cost and schedule planning and estimation or changing the project scope (Holland et. al, 1999). Project management is extremely important in order to keep control over the project and insure the implementation success. The scope of the project should be established; defined and controlled clearly (Rosario, 2000; Holland et. al, 1999; Umble & Umble 2002; Barker and Frolick 2003; Al-mashari and Al-mudimigh 2003; Kraemmerand et. al. 2003). Any proposed changes should be evaluated against business benefits before being adopted (Sumner, 1999; Wee, 2000). Project management should be disciplined with coordinated training and active human resource department involvement (Falkowski et. al., 1998).

- Project champion

Rosario, 2000 Stated that project sponsor commitment is critical to derive the project consequences and to oversee the entire cycle of the implementation. The project leader should champion the project throughout the organization (Sumner 1999, Stefanou 1999). High level executive sponsor existence with power to set goals and control changes is critical (Falkowski et. al., 1998).

- Appropriate business and legacy system

Roberts and Barrar (1992) stated that stable and successful business setting is essential to insure the successful implementation. Business and IT systems

involving existing business processes, organizational structure, and information technology affect success; it determines the IT and the organizational changes required for success (Holland et. al., 1999).

- Change management program and culture

Umble et. al, (2003) and Al-mashari and Al-mudimigh (2003) stated that the existing organizational structure and business processes found in most companies that seeks ERP implementation are not compatible with the structure, tools, and types of information provided by ERP systems. Falkowski et. al., (1998) , Rosario, (2000) and Zhang et. al. (2003) stated that change management is important throughout the entire project cycle, moreover organization culture and structure change which include people should be managed and controlled. Roberts and Barrar, (1992); Bingi et. al., (1999) and Holland et. al., (1999) mentioned that the employee's should be involved in the design and the implementation of the business processes and the ERP system as a part of the change management efforts, this involvement should be coincident with formal education and training to help them do so. Most companies do not understand that ERP may fundamentally change the way in which the organization operates. (Minahan, 1998).

Robey et. al. (2002) mentioned that the problems occur during to the possible gaps between the old knowledge embedded in the business practice and processes and between the new business practice and process that ERP systems will support.

- Business process reengineering (BPR) and minimum customization

Zhang et. al. (2003), Scott (2003), Umble & Umble (2002) stated that when firms believe their business process are unique, they may customize ERP software instead of adopting best practices imbedded in a standard

implementation. Organization should be willing to change the business to fit the software requirements with minimum customization (Holland et. al., 1999; Roberts and Barrar, 1992). Software should not be modified, as far as possible, and modification should be avoided to reduce errors and to take the advantages of newer versions and releases (Sumner, 1999; Rosario, 2000; Al-mashari and Al-mudimigh (2003). Business processes reengineering should take place iteratively to take the advantages of the improvements from the new system and carried out with new ideas (Wee, 2000). Managing and controlling the quality of business processes redesign is extremely important (Rosario, 2000). Schniederjans and Kim (2003) mentioned that applying the concept of TQM through emphasizing the needs to change the people's behavior, attitude and philosophy of doing business to provide the essential cultural framework and foundation to enable BPR to be successful.

- Software development, testing and troubleshooting

The overall ERP architecture should be established before starting the development stage, taking into account the most important requirements and needs to be fulfilled by the system. This will prevent reconfiguration at every stage of the implementation (Wee, 2000). In some cases, integrating the ERP system with other specialized software products may be required to meet the business needs (Bingi et. al., 1999; Zhang et. al. 2003). ERP troubleshooting is critical; the organization implementing ERP should work well with the vendor and the consultants to resolve the software problems (Holland et. al., 1999). Scheer and Haberman (2000) mentioned that modeling methods, architecture and tools are critical, requirements definition can be created and the system requirements

definition should be documented. There should be a plan for migrating and cleaning up the data (Rosario, 2000).

- Monitoring and evaluation of the performance

Assessing the impact of the new system must be carefully managed and maintained throughout the project cycle, these measures should indicate how the system is running and performing to insure the successful direction of the project (Roberts and Barrar, 1992) . Holland et. al., (1999) stated that monitoring and feedback including the exchange of the information between the project team members and the analysis of the user feedback should be maintained throughout the project life cycle. Management needs information of the effects of the ERP on the business performance, reports for assessing data need to be designed, and moreover it must include effective measurable project goals that meet the business needs. (Falkowski et. al., 1998; Sumner, 1999; Rosario, 2000; Kraemmerand et. al. 2003).

- Data accuracy

Due to the nature of the ERP, in which full integration between all functions is targeted, the accuracy of the data is required for the system to function properly. If any user enters wrong data, it may have negative effect throughout the whole company (Umble, 2003; Umble & Umble 2002; Zhang et. al. 2003).

- Education and training

Employee's education / training about the new system are extremely important to insure the successful system implementation. ERP implementation requires massive amount of knowledge and experience to enable the employee's to solve any problem they may face though the implementation cycle (Hutchins, 1998).

In order to achieve the expected results from the ERP system, extensive training must be provided for the system end user. Preferably training shall start earlier than the system implementation to insure that all the users will be qualified to use the system effectively and walk side by side with the implementation consultants to solve any problem may occur during the implementation phase (Umble & Umble 2002; Zhang et. al. 2003).

- ERP system integration

One of the most important issues to be considered through the selection and the implementation of the ERP system is the ability of the system to be integrated with other existing of future systems that the organization may acquire. (Soh et. al, 2000). There are several technologies that may used to integrate the ERP system with other systems, but the main concern that such technologies are not available for all ERP systems, even through such technologies need excessive and ongoing expenditure to achieve the desired integration (Bingi et. al. 1999).

Madapusi and D'Souza (2005) stated that to insure successful ERP system implementation and to enable the company achieving its objectives after implementing the system in efficient way, the company should:

- Realize that the benefit from the implemented ERP system will be results of :
    - Careful configuration of the system
    - Well-planned and controllable implementation process
    - Efficient usage of the system capabilities
- Create an integrative thinking strategy across the company different levels
- Maintaining accepted level of the system
- Assign qualified manager to manage and direct the project

- Assign qualified project team to drive the project

According to Zhang et. al. (2005) the factors which affect the ERP success classified into four main categories:

- Organizational Environment: This relates to the organization culture, top management support, effective project management, and business process reengineering.
- User Environment: including the user training, education and involvement.
- System Environment: such as system quality, software suitability
- ERP Vendor Environment, which relates to the quality and past performance of the package vender

Tchokogué et. al. (2005) defined five threads which may have effect the success of the ERP implementation project. According to these threads, the organization must ensure the proper consideration of five key factors thought-out the project as follow:

1. Project Management,
2. Technology Architecture
3. Process and Systems Integrity
4. Change Management, and Knowledge Transfer

Chapter Four: ERP Implementation

Adopting ERP systems by organization has been offered as the solution to surviving in the emerging "e-based" economy. ERP systems have been considered as the integrating mechanism for organizations, promising enhanced efficiency and effectiveness (Teltumbde, 2000). Information systems (IS) implementations in general are notoriously difficult; however, ERP implementations pose more difficult technological and organizational challenges than traditional implementations. For instance, a typical ERP contains 8000 to 10,000 configuration tables and 800 to 1000 business processes, ERP systems require much tailoring or customization in order to configure the system to fit the organizations' requirements (Scott & Kaindl, 2000).

Despite the benefits from ERP systems and the promotion of IT advances by ERP vendors, multiple case studies were recently published demonstrating the difficulties that organizations had to go through during ERP implementations (Motwani et al. 2002). Many organizations apparently continue to underestimate the issues and problems often encountered throughout the ERP life cycle, more than 40% of large software projects fail, 90% of ERP implementations end up late or over budget, and 67% of enterprise application initiatives could be considered negative or unsuccessful (Boston Consulting Group, 2000). According to numerous publications, packaged software seems to have inherent problems generating uncertainties (Scott 1999) and hidden costs (Teltumbde 2000), leading to reluctance for overall ERP adoption (Bingi et al. 1999).

The increasing experience gained from actual ERP implementations coupled with the need for integrated applications sustaining the interest for the integrated ERP backbone has led to recent development related to solid theoretical approaches based on process models (Sabherwal and Robey 1995) and practical methodologies based

on empirical knowledge for ERP implementation, which address to some extent the issues related to ERP failures.

Wognum et. al (2004) stated that implementing the ERP system is no easy job, this is due to the fact that so many aspects must be managed and controlled on the same time. Furthermore, introducing new system into the organization will impact the organization, such impact must be considered and managed effectively to minimize the employee's resistance.

Cleland (1991), Skelton and Thmrain (1993) presented the "Concurrent engineering method" in developing and implementing ERP system. Based on this method, it requires simultaneous involvement of several functions in the development and implementation process rather than going through the process stage by stage. The objective was to shorten the implementation timeframe.

Bancroft (1998) proposed a five-phase approach: focus, as is, to be, construction, testing and actual implementation. Markus and Tanis (1999) developed a four phase model: chartering phase, project phase, shakedown phase and onward and upward phase. The “chartering phase” deals with decisions on whether to proceed with and how to fund ERP implementation. The “project phase” consists of activities intended to configure the software and roll it out to the organization. The “shakedown phase” refers to the period during which the company makes the transition from “go live” to “normal operations. The “onward and upward phase” refers to the period during which the client organization experiences the majority of the business benefits from the ERP system and starts to realize the return on investment.

Karakanian (1999) stated that the implementation strategy should focus on the following aspects of the project: project drivers, available resources, visibility and profile, components of the ERP technology to be implemented, package functionality

business fit, existing technology platforms system and data, users, implementation logistics and the available budget.

Parr and Shanks (2000) Stated three phases for implementing ERP system;

1. Planning phase which include the following activities; includes the selection of an ERP, assembly of a steering committee, determination of high-level project scope and broad implementation approach, selection of a project team manager and resource determination.
2. ERP project phase; this phase start from the identification of the ERP modules through until the installation and cut-over.
3. Enhancement phase; this phase may extend for several years and includes system repair, extension and transformation, continuous improvement and stabilization

Al-mashari and zairi (2000) stated that for effective ERP system implementation, various issues at strategic, managerial, and operational level must be addressed. Furthermore competencies in four areas must be established: change strategy development and deployment, enterprise-wide project management, BRP integration with IT, and technical aspects of the system installation as presented in the following figure

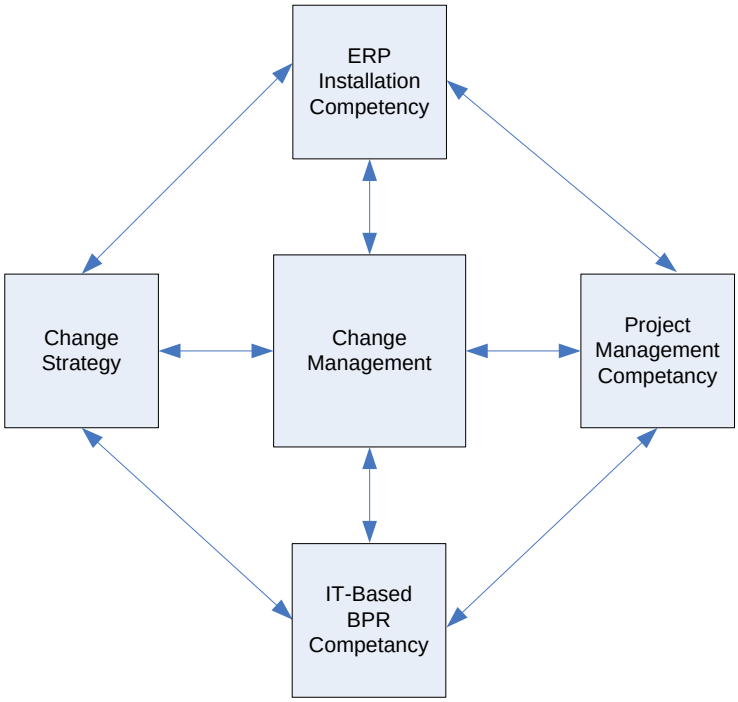

Figure 4: Al-mashari and zairi Model for Implementing ERP system

(Al-Mashari, M., Zairi, M., 2000. The effective application of SAP R/3: A proposed model of best practice).

Ross and Vitale (2000) suggested a similar methodology with five phases: design, implementation, stabilization, continuous improvement and transformation as presented in the following figure

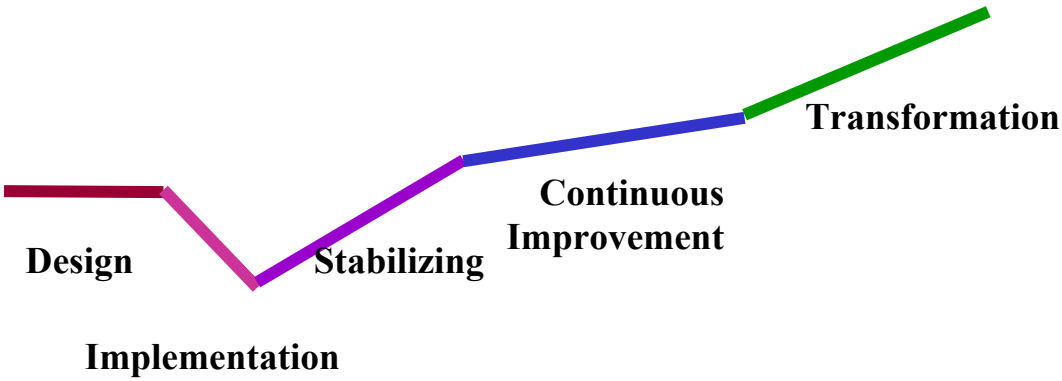

Figure 5: Ross and Vitale ERP Implementation Framework

(Jeanne W. Ross and Michael R. Vitale (2000). The ERP Revolution: Surviving vs. Thriving)

According to Ross methodology, the first phase of the ERP implementation journey is the design phase, in which the organization should make two important decisions, the first including whether or not the organization will accept the process assumptions embedded in the package, and the second decision the organization must make during this phase regarding the process standardization. The second phase is the implementation phase; most firms should carefully plane for implementation, deploying implementation teams that trained users on the new system. The third phase according to this methodology is the stabilization phase, in which the organization will face a period of stabilization immediately following the implementation phase, during which the organization attempting to clean up its processes and data and adjust to the new environment. Following the stabilization phase, will be the continuous improvement phase, in which the organization will go through stage including adding functionality through new modules such as implementing bar-coding, sales automation, warehousing and transportation capabilities, and sales forecasting. According to this methodology the last phase in the ERP implementation cycle will be the transformation phase, which involves changing the organization boundaries, particularly with regard to systems.

Kremers and Dissel (2000) stated that ERP implementation shall involve changing the business processes within the companies that implement such software. Motwani et. al. (2002) described model presented by Kettinger and Grover (1995). This model describes the implementation of ERP system and considers the aspects of business process changes that will be involved during the implementation. The following figure describe this model

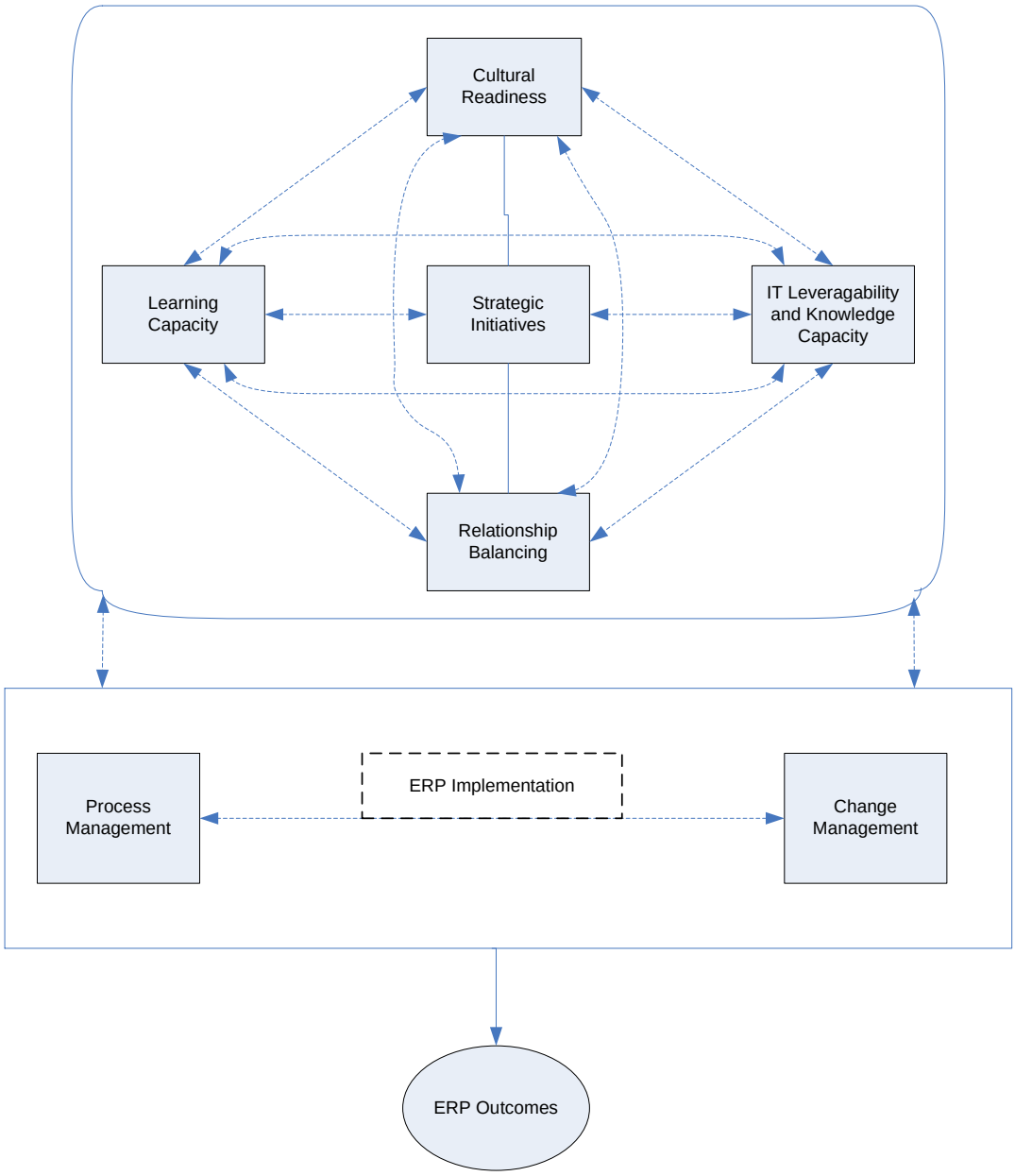

Figure 6 : Motwani et. al. ERP Implementation Model

(Jaideep Motwani, Dinesh Mirchandani, Manu Madan, A. Gunasekaran (2002). Successful implementation of ERP projects: Evidence from two case studies).

Aladwani (2001) classify the ERP implementation strategies into three categories as follow:

- An organizational strategy; which includes organizational structure and resources, strategy development, communication and coordination, change

management techniques, project management, managerial style and ideology, and IS function characteristics. (e.g. Al-Mashari and Zairi, 2000;Gable and Stewart, 1999).

- Technical Strategies; which includes technical aspects of ERP installation, ERP complexity, adequacy of in-house technical expertise, and time and cost of implementation (e.g. Al-Mashari and Zairi, 2000; Amoako-Gyampah, 1999; Russo et al., 1999)
- People Strategies; including staff and management attitudes, involvement, and training**.** (e.g. Amoako-Gyampah, 1999; Gable and Stewart, 1999**;** Russo et al., 1999).

Aladwani (2001) present methodology for implementing ERP system consisted of three phases as follow:

- Knowledge formulation phase
- Strategy implementation phase
- And status evaluation phase

Chen (2001) defined the ERP planning phases into four steps: Assessing the company needs and choosing the right ERP package, matching business processes with the ERP system, understanding the organizational requirements and the economic and strategic justification. SAP the leading company in ERP system's developed its own methodology for implementing ERP systems called Accelerated SAP (ASAP) (Hernâandez and Antonio 1999). According to this methodology, the ERP implementation consists of five phases:

Phase 1: Project Preparation; though out this phase, the organization need to develop proper planning and needs assessment to achieve the following targets:

a. Clear project objectives

b. Commitment of all company decision makers toward the project

c. Developing an efficient decision-making process, and

d. Create the willingness to accept change in the company culture.

Phase 2: Business Blueprint; during this phase, the processes engineers create a comprehensive business processes design to match the ERP system processes with the specific industry processes.

Phase 3: Realization; this phase includes two steps to configure the ERP system based on the business blueprint created in the previous phase. Initially, the system baseline will be configured, and then the system will be fine tuned to meet all the business processes requirements.

Phase 4: Final Preparation; This phase include conducting the necessary final adjustment in the system and testing the system. End-user training is completed during this phase and the audit procedures are developed.

Phase 5: Go Live and Support; during this phase, the system is running live, and the initial benefits should be obtained, auditing procedures and measurements are developed and applied to measure and control the benefits of the implemented system.

Ernest and young consulting group developed another methodology called "The Total Solution" to achieve successful ERP system implementation (Stephen, 2003). According to this methodology, the implementation of ERP system has five components or phases as follow:

Phase 1: The value proposition, before starting any new process, the firm should make sure it will benefit from it through adding values to the organization and the business activities. The firm should answer the questions clearly to make sure that it will achieve the stated benefits from the ERP system will implement,

- Is the technology investment justified?

- Does it match the company's objectives?
- Does management understands what change means, and does that change have full support?
- What is the framework for making decisions?
- What milestones will measure the project's progress?
- What are the values being delivered throughout the process?

Phase 2: Reality Check; in most firms, implementing ERP system require adopting changes within the firm, assessing the capabilities and readiness of the firm to adopt and accept such changes consider to be one of the most important success factor. During this phase, the capabilities and readiness of the firm for change will be assessed through answering the following questions:

- Is the firm ready to adopt change?
- Is their any previous plan for change, and how we can merge such plan with the new plans?
- Is the culture of the employee's able to accept and adopt changes?
- What are the management and employees expectations toward such changes?

Answering and formulating the previous questions into plans and strategies will affect and adjust the implementation methodology to insure successful implementation.

Phase 3: Evaluate alternatives and setting the expectation; during this phase, it is very important to perform the following tasks:

- Evaluate the available alternatives for the implementation of the new system
- Choosing the best-fit approach that insures the successful implementation.
- Identifying the short-term and long-term values and benefits, which consider as key element for the project success.
- Communicating the expected results with the management and the employee's.

Phase 4: Identifying and selecting the project resources; selecting the qualified management team, employee's and consultants, skills and methods is very critical element to insure the successful ERP implementation. The implementation team should include qualified employees in the following areas:

- Process Management
- Change and Culture Management
- Knowledge Management
- Industry Skills

Phase 5: Delivering Value; it is very important to measure and evaluate the results through out the implementation cycle, any projects that does not show measurable results and benefits will fail. This is due to the fact that both, management and employees will lose enthusiasm and commitment to the project.

Another ERP implementation methodology**,** called Fast Track implementation methodology introduced by Deloitte and Touch (Stephen, 2003). According to this methodology, the implementation of the ERP system includes five phases as follow:

- Phase 1: Scoping and planning: in which the project plans are prepared, resource are determined and time plan is stated clearly.
- Phase 2: Visioning and Targeting: During this phase, the firm must define its vision and targets and stated them clearly.
- Phase 3: Process Redesign, which involve the redesign and customization of the system.
- Phase 4: Configuration, during this phase, the integration between the system modules is planned

- Phase 5: Testing and Delivery, in which the system is tested as polite project, and when verifying the system functionality and performance, it's delivered to the firm.

Zanchi et. al. (2001) present framework for pre-post and during the implementation of the ERP system, to help the company achieve successful system implementation based on action port model (APM) modeling language. According to Zanchi et. al. framework, the organization should be focused during the three phases as follow :

- Pre-implementation phase; in which the organization should focus on the project planning and the business processes design and reengineering. This will be achieved through creating high-level processes flow charts.
- Implementation phase; during this phase the organization should be focused on the details of the process design and reengineering, the system configuration parts and the testing steps.
- post implementation phase; where the organization should be focused into the system improvement steps.

Weston (2001) stated four stages for implementing ERP system as follow; concept, development, implementation and operational.

Holland and Light (2001) present model called "Maturity model for ERP use" that define three main stages for the ERP systems as follow:

- Stage one: where the organization managing its old legacy system and preparing for the ERP system
- Stage two: the implementation of the ERP system is completed across the entire organization
- Stage three: the organization engaged in the process of obtaining the strategic benefits and values of the implemented system.

Krumbholz and Maiden (2001) discussed the cultural issues related to the ERP system implementation. Based on previous research which identified four models of the organizational culture during the ERP implementation: ASIS model which describes the current organizational culture, processes and systems, TOBE model which describes the required culture, processes and software, the EMM model which discuss the supplier's processes, software and culture and MIGHTBE mode which discuss the future organizational culture, processes and systems. As shown in the following figures,

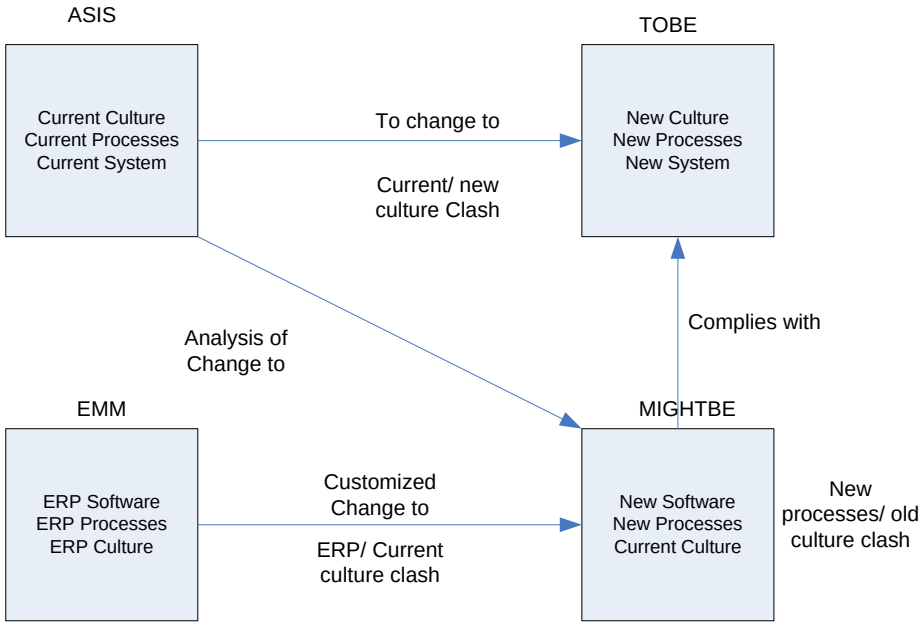

Figure 7: Krumbholz and Maiden ERP Implementation Model (Cultural Perspective)

(Marina Krumbholz and Neil Maiden (2001). The implementation of enterprise resource planning packages in different organizational and national cultures).

Krumbholz and Maiden (2001) present new implementation model that help to achieve successful ERP implementation and try to manage the previous cultural clashes shown in the previous figure, this model is described in the following figure:

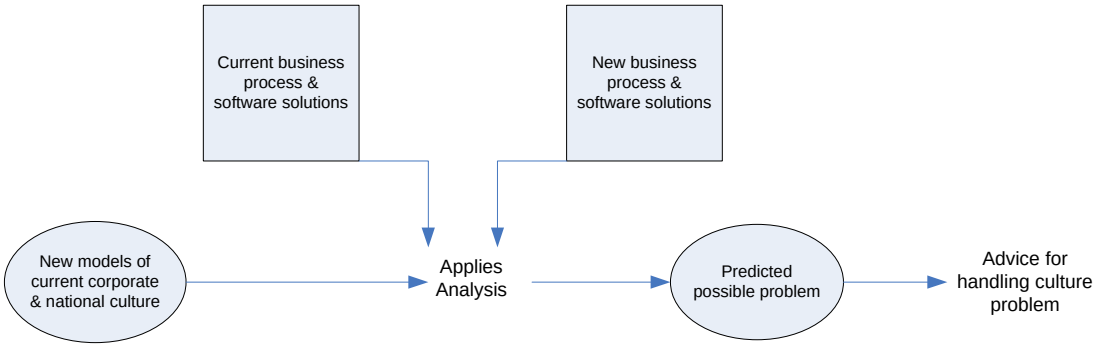

Figure 8: Krumbholz and Maiden Suggested ERP Implementation Model

(Marina Krumbholz and Neil Maiden (2001). The implementation of enterprise resource planning packages in different organizational and national cultures).

Rajagopal (2002) present framework for implementing the ERP system based on six-stage model which presented by Cooper and Zmud (1990). Based on this framework, the implementation of the ERP system includes the following stages:

1. Initiation stage; which includes defining the needs and the motivation for the ERP system.
2. Adoption stage; which includes making the investment decision, cost benefits analysis, choosing the appropriate technology, and choosing the system vender.
3. Adaptation stage; including choosing the suitable package, the implementation approach, minimizing the user resistance and running the system in the individual units.
4. Acceptance stage; this stage includes the following activities: increasing the usage of the system, modifying and customizing the system, conduct system training, achieving the functional integration.
5. Routinization stage; in which user acceptance is achieved , complete the bug fixing, and insuring the full system integration

6. Infusion stage; the last stage according to this model will includes the integration on global levels and the planning for the next innovation step.

Hong and Kim (2002) stated two alternatives for implementing the ERP systems; package adaptation to the organizational needs and organizational adaptation to the package. Adam et. al. (2002) suggests project management approach for implementing ERP systems including nine areas to focus on as follow:

1. Project Integration Management ; including
2. Project Scope Management
3. Project Time Management
4. Project Cost Management
5. Project Quality Management
6. Project Human Resource Management
7. Project Communications Management
8. Project Risk Management
9. Project Procurement Management

Kumar et. al. (2003) describe two phases in the ERP system implementation based on the "ERP system experience cycle" presented by (Markus and Tanis, 2000) which is based on Soh and Markus (1995). Kumar et. al (2003) indicated that ERP implementation cycle includes two phases; Project configuration phase and shakedown phase. Mandal and Gunasekaran (2003) mentioned that the companies must establish competencies in four core areas: change strategy development and deployment, enterprise-wide project management, BPR integration with IT, and technical aspects of ERP installation. Such competencies will enable the companies to manage the implementation process effectively and consequently achieving the defined objectives.

Muscatello et. al. (2003) stated that the ERP implementation consisted of three phases; planning activities phase, justification and selection phase, and system installation phase.

Mabert et. al. (2003) divided the ERP implementation journey into three phases, with associated activities for each phase as follow:

- Planning Effort ; these phase includes set of activities to be planned and performed before starting the actual system implementation
- Implementation Decisions; during this phase, the organization should make strategic decisions to determine how to conduct the ERP system implementation; using phased-in methodology or big-bang methodology or slam-dunk approach . Phased-in (also called Franchise Strategy in the literature) in which innovative business unit within the organization will start a polite installation of the system while the core business processes will not be disturbed to make sure there are no problems. Big- bang implementation methodology stand for implementing the ERP system with all it different modules once across the whole organization business units, this will allows the organization to switch off all their legacy system at once. This strategy is the most challenging and difficult task to ERP implementation (Holland et. al., 1999). Slam-dunk approach, with this approach, ERP dictates the process design and the focus is on just a few key business processes. This implementation strategy is most appropriate for smaller organizations.
- Implementation management; this phase includes all variables and action must be taken during and after the implementation such as; Communicating the progress, training all users, benchmarked implementation progress, and keeping suppliers/ customer informed .

Umble et. al. (2003) proposed methodology for implementing ERP system includes 11 steps to insure the successful implementation as follow: pre-implementation process review, hardware testing, software installation, system training, pilot system testing, establishing security and necessary permissions , data structuring and processing, policies and procedures documentation , running the new system on-line, celebration and continuous improvements .

Kraemmerand et. al. (2003) defined four phases for the ERP implementation journey as follow: idea and selection, future business modeling, configuration and go-life, performance tuning and changes and continuous business improvement

Bradford and Florin (2003) describe Diffusion of Innovation model which stated that the following factors will affect the ERP implementation success:

1. Innovative characteristics which includes; technical compatibility, perceived complexity and business process reengineering
2. Organizational characteristics, which includes : top management support, organizational objectives and training
3. Environmental characteristics which include the competitive pressure

Chang (2004) Described framework to insure the success of the ERP implementation, according to this framework, he stated that ERP implementation demands multiple skill consultants skilled in at least three dimensions; firstly, consultants must be skilled in ERP itself. Secondly, consultants must be familiar with the technology. Finally, consultants must acquire an understanding of the business practices.

Ioannou and Papadoyiannis (2004) present approach for implementing ERP system's , which complements standard ERP implementation methods, focuses solely on bottlenecks, motivated by the Theory of Constraints (ToC) .

Yen and Sheu (2004) stated that the companies should align their competitive priorities with the ERP implementation practice to direct the project to achieve the expected results and benefits. According to yen and sheu (2004) the alignment exists between the competitive priorities and several ERP implementation practice such as: type of adaptation, process standardization, amount of software modification /customization, level of local decentralization , the centralization of implementation decisions, information sharing between facilities, and data accessibility.

Okrent and Vokurka (2004) mentioned that the ERP implementation process could be one of the following three approaches:

- Pilot Approach, in which specific functional area is implemented first according to the company priorities.
- Parallel Approach, in which the new system is implemented along with the old system.
- Big-bang Approach, where the company should prepares it self, provide all required training and complete all the required pre-requisite to get ready then move to the simultaneously with the old system to be new system turned off.

Yusuf et al. (2004) present model for implementing ERP system consisted of three phases; strategy and direction, planning analysis & convergence, and phase three which includes three steps , focus on operation, pilot and focus on assembly.

Al-khatib (2004) presents planning strategy to help the company achieving successful ERP system implementation. According to this strategy the organization should identify the stakeholders and establish effective communication mechanism between then, conducting gap analysis to identify the gaps between the current situation of the organization and the future requirements, conduct the required awareness campaign to insure the commitment and involvement of all employee's, identifying the

requirement specification with documenting these requirements and evaluate the ERP system implementation strategy. Such strategy will help the organization to overcome the possible failures due to weak project planning.

Siau (2004) stated that the ERP implementation methodologies are classified into three categories as follow:

1. First generation methodologies; in which these methodologies are designed to support the implementation of the system in an enterprise with single site.
2. Second generation methodologies; in which these methodologies are designed to support an enterprise-wide and multiple site ERP system implementation.
3. Third generation methodologies; these methodologies supports multi-enterprise and multiple site ERP system implementations.

Wognum et. al (2004) describe model for managing the ERP system implementation called Process- based model " PMO". According to this model, each process exists in the organization and will be interact with the ERP system implementation will be specified furthermore. These processes called dimensions and classified into the following three major categories:

1. The permanent business process for which the system is implemented; including all the activities which will be affected or supported by the new system and may be subjected to the change.
2. The design and customizing of the new system; including all activities required to adopt and customize the new system to fit the organization requirements.
3. Project management of the implementation process; including all required activities to plan and control the implementation process.

Metaxiotis (2005) present methodology for implementing and optimal adaptation of the ERP system (IOA ERP) based on goal directed project management (GDPM), which separates the big picture from the details. This is achieved through focusing the management level on controllable results (milestones) throughout the project and how to achieve these milestones, and on the other side the details activities and the responsibilities to achieve these milestones. Based on this proposed methodology, the ERP implementation cycle includes five phases as follow:

1. Marketing and presales phase.
2. Proposal phase, which includes the following steps: project scope management, project planning, exceptions, resource planning, human resource, equipment and supplies, assessment of cost-budget, organization design, communication plan and progress report, danger management, and procurement management.
3. Contract phase, which includes the confirmation of the planned processes.
4. Accomplishment phase; which include the following steps: implementation of the project plan, general control change and quality and control preview.
5. Completion phase; which includes the following two components : administrative closure and contract closeout.

Chapter Five: Research Methodology

A literature review was undertaken to study and analysis the ERP system implementation methodologies proposed by different researchers and consulting companies. Through studying and investigating these methodologies, it is obvious that it lacks the following points:

- The methodologies is not detailed enough; such that they does not addresses detailed activities for each phase and how to control and monitor these activities, instead of that they focus on the whole phase.
- Lacking of effective feedback; feedback is essential components in such projects to insure achieving the stated targets according to the define objectives and to measure any occurred deviations.
- Lacking of effective mechanism for relating and linking faults and failure factors with effective corrective and preventive actions.

According to the previous analysis and study, detailed project plan based framework presents comprehensive approach for implementing successful ERP system will be discussed in this chapter, the suggested framework will detailed the phases of the ERP implementation to help the organization managing the associated activities properly and to create effective mechanism for feedback to insure suitable project control. In order to achieve the organization objectives and to insure successful ERP system implementation, it is very important to utilize one of the well known tools that link quality with the activities undertaken such as "Quality Deployment Function" and to develop effective feedback model to insure the proper control over the project phases.

Quality Function Deployment (QFD)

Quality Function Deployments (QFD) was introduced by Akao and Mizuno as tool for product development thought fulfilling the customer requirements during the 60's in Japan (Cristiano et. al. (2000). QFD consider being a tool which enables to deploy customer requirements into measurable quality characteristics in order to create products and services which satisfy those requirements (Cristiano et. al. (2000).

According to Martins and Aspinwall (2001) the common benefits that may be achieved through QFD as follow

1. Reducing the engineering changes in the products.
2. Reduce the number of customer complains
3. Minimizing the possibility of exceeding the project defined duration
4. Minimizing the total cost through minimizing the customization in the product and the reworks
5. Cost reduction
6. Increase the customer satisfaction
7. Helping the companies to products the best products that meet the customer expectation.

QFD is a systematic process for motivating a business to focus on its customers. It is used by cross-functional teams to identify and resolve issues involved in providing products, processes, services and strategies which will more than satisfy their customers. A prerequisite to QFD is the process of understanding what the customer wants, how important these benefits are, and how well different providers of products that address these benefits are perceived to perform. This is a prerequisite to QFD because it is impossible to consistently provide products which will attract customers.

Using QFD during ERP implementation will help in achieving the following main objectives:

- To improve the communication and understanding the customers needs
- To improve the completeness of the stated activities and to make them traceable directly to the customers needs and wants.
- Minimizing the customization in the ERP package, through selecting the best ERP package that meets the customer requirements
- Minimizing the reworks and failures through linking the implementation activities with the reported success and failure factors to highlight the key activities to handle the proper control and monitoring.
- Shortening the implementation life cycle.

Suggested Model Structure

The following flow charts describe the suggested framework which use QFD as tool to help achieving successful ERP system implementation

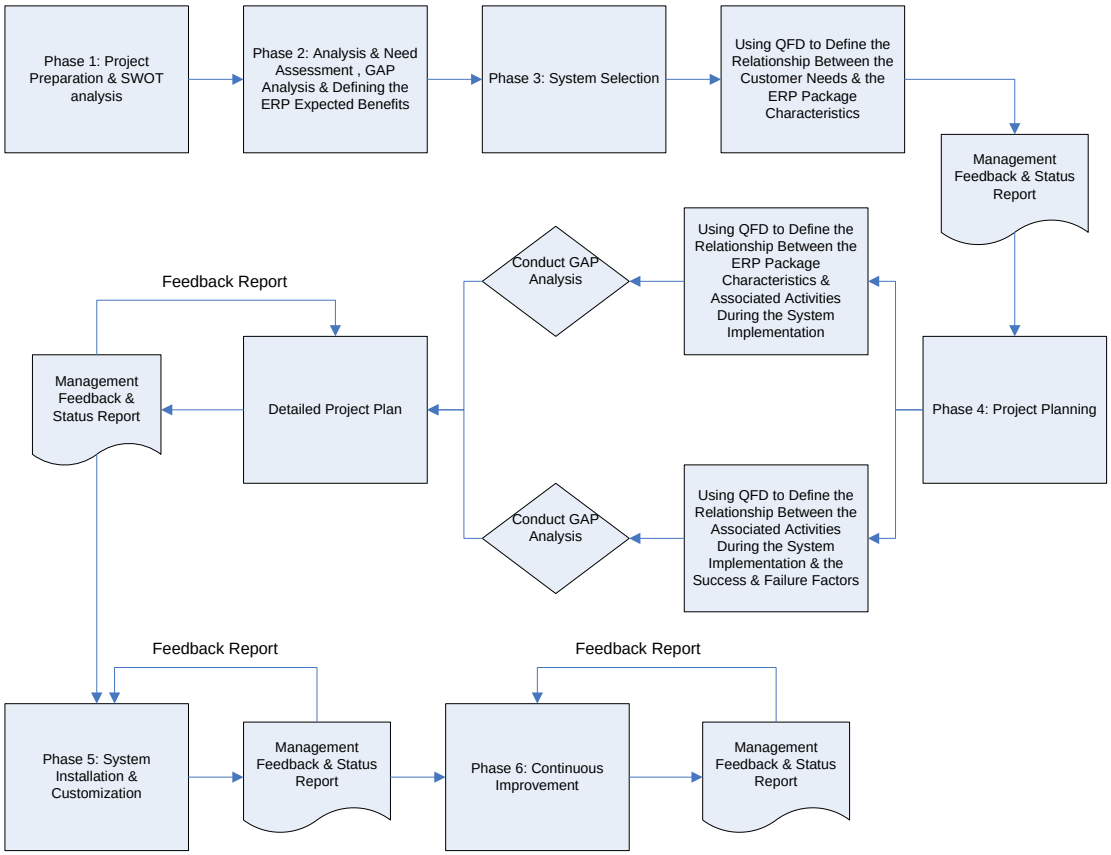

Figure 9: Suggested Model Flow Chart

ERP implementation includes several phases, and within each phase there are several activities to be done in proper way to insure the success of the projects. The previous diagram summarizes the proposed model that will help the company to achieve successful ERP system implementation. According to the proposed model, the ERP journey will includes the following phases:

Phase 1: "Project Preparation"; during this phase the company will go through preparing it self to proceed correctly in adopting and implementing the ERP system, this phase includes set of activities as follow:

- ☒ Identify clear project objectives based on the organization mission.
- ☒ Establishing project steering committee, this team will be responsible for managing and directing the organization to achieve the stated objectives during the whole life of the project.
- ☒ Create strong awareness in the organization to insure the commitment of the management and the employee's and the ability to accept changes
- ☒ Assign Initial project team including the project manager.
- ☒ Establishing effective communication channels between the project team, the management and the steering committee.
- ☒ Prepare Initial project time plan.
- ☒ Estimate the initial project cost and preparing the budget

SWOT analysis should be conducted during this phase to assess the capabilities of the organization and to identify the threats and success opportunities. This will help the company to identify the improvement opportunities and the threats that it may face during the project life.

Phase 2: Analysis and need assessments; during this phase, the organization shall determine the business needs and requirements which are consider to be essential for achieving the defined objectives , furthermore the organization should evaluate its current situation through conducting GAP analysis to insure that the requirements for success will be adopted in earlier stages. The following activities will be performed during this phase:

- ☒ Identify the organizational needs & requirements to achieve the defined objectives.
- ☒ Identify the functional and business processes.
- ☒ Conduct business requirements review (BRR), during this step in-depth and detailed review of the current and future functional processes are done.
- ☒ Creating comprehensive business processes design
- ☒ Create detailed processes flow charts that describe the detailed flow of each function.
- ☒ Conduct GAP analysis; conducting GAP analysis will help the companies to identify the requirements that must be considered to insure the success of the ERP system implementation. GAP analysis should be focused into the following areas:
    - o Evaluate the organization technological infrastructure & identifying the required upgrades and needed technologies
    - o Assessing the human resource capabilities& estimating the required development if needed. Based on that initial training plan will be prepared
    - o Assessing the current culture & the attitudes of the management & employee' toward possible changes.

The following checklist serves as guideline for the GAP analysis areas to be focused on

Table 2: GAP Guideline Checklist

Area	Evaluation	Suggestion
Technological Infrastructure		
P.C Capabilities		
CPU Capabilities		
RAM's		
H.D Capacity		
Company Networks		
Transmission Speed		
Transmission Capacity		
Company Server		
CPU		
RAM's		
H.D Capacity		
Software		
Operating System		
Human Resources		
Number of Employee's		
Current Employee's Capabilities		
I.T Literature		
Organizational Culture		
Employees Attitude Toward the Project		
Ability to Accept any Suggested Change		
Ability to Accept New Responsibilities		
Employees Commitment		

During this phase, the company should be able to realize and defined the expected benefits from the ERP system that intend to implement. Such benefit will serve as performance measure for the project success. The benefit will depend upon the objectives and the needs of each company, i.e. it may vary from company to another. The common benefits from ERP system can be defined as follow:

- Achieving better control of the company resources.
- Create strong baseline for developing data warehouse and managing and keeping the information resources.

- Enable the company members to utilize the available information in proper way that serve the objectives of the company and improve their performance through establishing effective business intelligence function.
- Integrate all the departments and consequently remove the virtual walls between them.
- Support better planning and scheduling functions
- Increase the flexibility of the company to respond with the markets and the customer requirements.
- Reduce the operational cost
- Link the company with its supplier

Phase 3: System Selection; after conducting the analysis within the organization, identifying the requirements and needs, evaluating the current organization status, planning is required to closely identifying and selects the best alternative that the organization should adopt to achieve its objectives. Using QFD will help the company to achieve the stated objectives through defining the linkage between the company needs and requirements with the ERP system characteristics. Such linkage will serve as guideline for the company to focus closely into the important ERP system characteristics that will match the company needs. Moreover, identifying this relationship will help the ERP providers to control their packages to meet the expected customer needs through focusing on the package characteristics which have the direct effect on the customer needs though giving the high score in the matrix. Such engineering characteristic must be controlled properly.

The following activities will take place during this phase:

- ☒ Identify the Available ERP Packages
- ☒ Evaluate the Available packages based different factors such as;

- The package modules and functionality to fit with the company needs and requirements.
- Degree of integration between the modules of the ERP system
- Package flexibility (Dynamic coding or fixed coding structure)
- Package Complexity
- User-friendly system and interfaces
- Technology used to build the software (client or server)
- Database capabilities
- Security capabilities
- Availability of system updates
- Amount of estimated customization
- Availability of ERP Vender reference sites
- ERP package total cost
- Ability to be integrated with other systems

☒ Select the best implementation strategy; either phased strategy or big-bane strategy.

Feedback is very important components in this model; this will be achieved through providing the top management with the status reports as indicated in the flow chart. This will insure the proper control over the entire process and to provide the management with continuous reporting to insure the proper monitoring. Just After completing this phase, the project team should prepare status report as part of the feedback mechanism to keep the top management updated with the project status. This will help the top management to keep the required commitment and focus toward the project and help in taking the proper actions as needed.

Phase 4: Project planning; after completing the analysis and system selection phase, the company should go through the project planning phase. This phase considered a very important phase which will direct and control the execution of the project. During this phase many activities should be done in proper way such as:

- ☒ Updating the project time plan to develop detailed project plan. This plan will identify the timeframe and the logical sequence for each activity will take place during the project life. The plan shall include the assigned human resources for each activity from both; the ERP vender company and the company implementing the ERP system.
- ☒ Modifying the project team as required.
- ☒ Updating the project budget
- ☒ Identifying the feedback and control mechanism.

The second phase of using the QFD will include mapping the engineering characteristic with the different activities during the phases on the ERP implementation process. This will help the ERP providers to utilize the different activities during the implementation process in modifying the packages characteristics based upon the customer needs. QFD will be used again to defining the linkage between the associated activities during the implementation journey and the ERP project success and failure factors in order to develop the needed preventive actions to eliminate the possibilities of the failures and consequently insuring the success of the implementation process.

Conducting GAP analysis after defining these relationships is required to identify the proper actions must considered eliminating the possible gaps. The project plan will be updated based on the needed actions to be considered and planned. The project

team should prepare status report to keep the top management updated with the project status and updates.

Phase 5: System installation and customization; during this phase the organization will go through installing the ERP system and customize the package according the to defined business needs and requirements, this phase includes the following activities:

- ☒ Installing & configuring the system parameters.
- ☒ Business Processes re-engineering & re-design
- ☒ Defining & entering the required data, this may include importing the old data into the new system
- ☒ Insure the integration between the system modules
- ☒ Establishing security and necessary permissions
- ☒ Provide the modular training for the employee's
- ☒ Running the system as a pilot project to reach stabilization.
- ☒ Analyzing & verifying the outputs of the system
- ☒ Customizing the system functions upon the organization business needs
- ☒ Testing & delivery of the system
- ☒ Analysis & verification of the outputs

The project team should prepare status report to keep the top management updated with the project status and updates.

Phase 6: Continuous improvements; after installing, customizing the package, and running the system, the organization should go though the improvement phase in order to improve the performance and optimize the available resources to achieve the defined objectives . During this phase the organization will have the following activities:

- ☒ System Repair

- ☒ Measuring and evaluating the system performance and comparing it with the pre-defined expectations.
- ☒ Improving the performance of the system through database tuning & resource optimization.
- ☒ Introducing new functions by the system through adding & integrating other modules to the system.
- ☒ Process and procedures improvement

The project team should prepare status report to keep the top management updated with the project status and updates.

Model Validation

In order to validate any ERP implementation model it takes more than two years, since the typical ERP system will take around one and half year to be implemented properly during which the company will not be able to measure the project success. Accordingly it needs to measure the benefits of implementing the ERP system after completing the implementation cycle. The suggested model was validated using the expert's opinion through comprehensive questionnaire that address the importance of using the QFD during the implementation cycle. The experts include 15 academic researchers from three universities in Jordan and 10 ERP consultants from the private sector. The results of the survey support using the QFD as tool which helps the company achieving successful ERP system implementation. 95 % of the sample mentioned that using the QFD during the ERP package selection phase will help the company selecting the best package that meets the predefined requirements, consequently minimizing the required customization during the system installation and customization phase. 75 % of the sample indicated that using QFD will help

achieving better understanding of the customer needs and requirements and consequently developing packages that will meet such needs and requirements. The ERP consultants mentioned that using the QFD to link the system characteristics and the different implementation activities might help achieving better results, since once the customer needs and requirements identified and linked to the system characteristics the company should be focused closely on these characteristics to be managed and controlled properly. According to the academic researcher feedback such linkage will help both the companies and the ERP vender to minimize the reworks and the non-value added activities. The most important usage of the QFD according to both the academic researchers and the ERP consultants is linking the implementation activities with the reported success and failure factors. This is due to the fact that such factors play major role in assessing the directing the ERP project, consequently managing and monitoring such factors is extremely important to help achieving successful ERP system implementation. 80% of the selected sample mentioned that using QFD will not increase the project cost and duration, instead of that it might reduce the project cost and minimize the duration since using such tool will help minimizing the required system customization an the failure possibility. As a conclusion, 95 % of the sample concludes that the suggested model will help achieving successful ERP system implementation since it helps both the companies and the ERP vender to insure proper control and monitor during the whole implementation phases. The used questionnaire is attached at the appendix for more information.

Chapter Six: Case Study

History and Background

This case study was implemented in Households and toiletries factory, which located in Amman with branch in Irbid. This factory was established in 1972 with a registered capital of 2.1 million USD for producing the liquid, paste and powder detergents and antiseptics, as well as cosmetics and oral care products. Soon this factory become one of the pioneers in the households and toiletries industry in Jordan through offering high quality products categorized as follow:

- Body Care Products: Creams, Body lotions, Sunscreens, Depilatory Creams, Whitening Cream, Foot Cream, Body Deodorants and Nail Polish Removers.
- Men's Care Products: Shaving Cream, and After-Shave Balm.
- Hair Care Products: Kids Shampoo, Adults Shampoo, Conditioners, Styling Gels, Hairspray, hair Strengtheners and Creams.
- Oral Care Products: Mouthwashes, Adult Toothpastes, Junior Tooth Gel and Cosmetic/Treatment Toothpastes.
- Baby Care Products: Cream, Powder, Shampoos, Lotion and Oil.
- Insecticides: Aerosol Insecticide, Roach Killer and Mat Insecticide.
- Detergents: Bleaching Powder, Scouring powder, Heavy Duty Detergents, , Dishwashing Liquid, Carpet Shampoo, Furniture Polish, Glass Cleaners, Computer Cleaner and All-Purpose Cleaners .
- Antiseptics/Disinfectants: Antiseptic Disinfectant Solutions, General Disinfectant, Alcohol 75%, and Bowl Cleaner.
- Personal Care Products: Hand Sanitizer Gel, Foot Powder and Antiseptic for Personal Care.

- Air fresheners and Colognes.
- Medical Supplies: Iodine, Hydrogen Peroxide and Ultrasound Gel.

The factory intended to implement ERP system in the central location in Amman and Irbid branch to improve its operation and optimize its resources effectively, which will results in improving the quality of the products and minimize the cost. To help achieving successful ERP system implementation, the suggested model in the previous chapter was implemented in this factory to facilitate the implementation of the ERP system in the factory. The following section describes the details of each phase and the associated activities.

Project Preparation

In order to achieve successful ERP system selection and implementation, the first step is to define the requirements and needs of the company that it will try to achieve through implementing the proper ERP system.

Through the meeting with the company top management the following objectives were identifies:

- Improve the quality of the products.
- Effectively utilizing the available resources and increase the productivity
- Reaching competitive market position through increasing the customer satisfaction and satisfy the market demand effectively.
- Linking the company with its supplier.
- Support better planning and scheduling functions
- Reduce the operating cost which will results in increasing the net profit.
- Integrate the business processes and facilitate the current working procedures which will results in increasing the current efficiency.

- Reduce the operational cost

The project steering committee was established to direct the execution of the project during the whole life of the project. The steering committee was including the following job titles:

- The financial manager
- The purchasing manager
- The quality assurance manager
- The production control and planning manager
- The research and development manager
- The operation officer

SWOT analysis was conducted to assess the capabilities of the organization and identify the company strength and weaknesses and the possible areas for improvement. This analysis help the company to be focused more on the weaknesses points and the threats that may affect the project success in order to avoid any possible failures. The following points were identified during this analysis:

Strengths

- Current profitability
- Good market position
- Stable labor force
- High quality products
- Strategic alliances with international companies

Weaknesses

- Inflexibility in satisfying the market demands
- Duplicated functions and waste of resources

- Ineffective communication channels between the departments
- Ineffective planning

Opportunity

- Higher local market demands
- Entering new markets (regional and foreign markets)

Threats

- Strong competition including both (local and foreign competition)
- Political and economical issues

The initial project team was established to execute the required activities during the next phases. This team includes representative from each department based on their qualifications. The initial budget for the project assigned to be about 30,000 JD based upon the available financial resources, this budget will serve as guideline in the selection phase. Since the available packages in the market differ in its price, assigning the allowable project budget will help the company to be focused more on the packages within the defined financial budget. During this phase the company prepared initial project plan which define the timeframe for executing the main phases of the project. The following plan was prepared in this phase

Figure 10: Initial Project Plan

Phase	ERP Vender Staff	Client Staff	Duration (Weeks)																																					
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Project Preparation Phase																																								
Objectives Definition																																								
SWOT Analysis																																								
Project Committee Establishing																																								
Planning and needs Assessment phase																																								
Defining the Company Requirements																																								
Business Processes Identification and Analysis																																								
GAP Analysis																																								
System Selection Phase																																								
Identification the Available ERP Packages																																								
Using QFD to Link the Company Requirements with the Package Characteristics																																								
Package Selection																																								
Defining the Implementation Strategy																																								
Project Planning Phase																																								
Developing Detailed Project Plan																																								
Updating the Project Team																																								
Updating the Project Budget																																								

Phase	ERP Vender Staff	Client Staff	Duration (Weeks)																																			
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Using QFD to Link the Package Characteristics with the Activities																																						
Using QFD to Link the Activities with the Success & Failure Factors																																						
System Installation																																						
Installing Core System																																						
Financial Module																																						
Account Management																																						
Human Resource Management																																						
Fixed Asset Management																																						
Costing																																						
Inventory Management Module																																						
Installing Core Business Processes																																						
Purchasing																																						
Sales																																						
Manufacturing																																						
Control																																						
Quality Control																																						
Quality Assurance																																						
Planning System																																						
Forecasting																																						
Material Requirement Planning																																						
Master Scheduling Planning																																						

Phase	ERP Vender Staff	Client Staff	Duration (Weeks)																																			
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Continuous improvement Phase																																						
Bug Fixing																																						
Integrated Other Systems																																						

Analysis and Needs Assessment

Based on the company objectives and the SWOT analysis, the company identifies its requirements as guideline for selecting the best ERP system that fits its needs and help the company to achieve its defined objectives. The following objectives were defined by the top management:

- ☒ ERP System that meets the company business and operational requirements, since this company specialized in the households and toiletries industry it needs ERP system that fits to this industry nature, especially the accurate chemical formulas.
- ☒ ERP system that include quality control module that effectively monitor and improve the quality of the products.
- ☒ ERP system with effective planning and scheduling module that help the company to establish effective planning function to increase the flexibility of the company to satisfy the market demand.
- ☒ ERP System that involved minimum organizational changes and able to adopt the specific business and operational cases.
- ☒ User-friendly system to help the employee's doing their jobs effectively and minimize the resistance toward the new system
- ☒ ERP system that help the company to control its inventory status and material tracking.
- ☒ System provides the management with comprehensive reporting mechanism to keep the manager updated with all needed information.
- ☒ The ERP system should be suited for a multi-products manufacturer with a number of lines.

- ☒ ERP system that will integrate all the company departments and operational functions.
- ☒ ERP system that enable better linkage with its supplier and provide the suppliers with better information to help them serve the company effectively.
- ☒ System helps the company to calculate the actual cost for its product using ABC costing method.
- ☒ ERP system that gradually will lead to the computerization of company functions.
- ☒ Successful implementation projects for the ERP company providers for the same package.

The next step was to prepare business process design and flow charts to help the project team in the next phase; ERP system selection phase. Furthermore, these flow charts will help the company during the system installation and customization phase. Since the company currently implemented comprehensive management system based on ISO 9001:2000 standard, the main operational and functional processes is documented with good level of details. Moreover, the company is currently implementing different forms for controlling the different operational activities.

GAP analysis

GAP analysis was conducted during this phase prior to the system implementation to assess the current organizational capabilities and to identify the initial requirements the company must addressed to insure successful ERP system implementation in different areas which includes;

- Company technological infrastructure
- Human resources capabilities
- Current Organizational Culture.

The following table summaries the results of this analysis:

Table 3: Company GAP analysis

Area	Evaluation	Suggestion
Technological Infrastructure		
P.C Capabilities		
CPU Capabilities	5 Computers were found P1	Upgrading the all the computers to be P3 as a minimum
RAM's	Some of the P.C's with only 32 RAM	Upgrading the RAMs of the be 128 RAM's as a minimum.
H.D Capacity	The Computer H.D's were good	No need for upgrading
Company Networks		
Company Network	The company network is very old and can't support the new system. The Company Warehouse is not connected to the current network	The company should purchase and implement new network to connect all the departments together.
Company Server		
CPU	The company currently use P4 computer as a server	Purchasing new server with up to date specification
RAM's		
H.D Capacity		
Software		
Operating System	The company use licensed operating system	No need for any new operating system
Human Resources		
Number of Employee's	The staff of the company is enough and all the key positions are occupied	No need to hire new employees
Current Employee's Capabilities & I.T Literature	Some of he key positions need training in the basics of computer skills	Prepare Training program with the basic computer skills
Organizational Culture		
Employees Attitude Toward the Project	The employees support introducing the new system to gain the benefits	No action needed
Ability to Accept any Suggested Change	The employees will be able t accept ant recommended changes to improve their	No action needed

Area	Evaluation	Suggestion
	productivity and efficiency	
Ability to Accept New Responsibilities	Some of the employees will not accept new responsibilities	The G.M should force the employees to accept any new responsibilities through offering new incentives
Employees Commitment	The employees are committed to insure the success of the project	No action needed

The company defines the expected benefits that it will gain through achieving the successful ERP system implementing; these defined benefits will serve as performance measure indicators to measure the degree of the project success. This will be measured through long term process after completing the system implementation and running, this mean that if the company achieve these benefits this will indicate that the project is successful. These benefits include the following as defined by the company members:

- Link the two branches into single database which will facilitate the integration and coordination to achieve the company objective.
- Reduce the operational cycle time and increasing the productivity.
- Achieving better control of the company resources through establishing the proper control and continuous monitoring.
- Create strong baseline for developing data warehouse and managing and keeping the information resources.
- Improve the quality of the products and minimize the volume of waste.
- Enable the company members to utilize the available information in proper way that serve the objectives of the company and improve their performance through establishing effective business intelligence function.

- Integrate all the departments and consequently remove the virtual walls between them.
- Support better planning and scheduling functions
- Increase the flexibility of the company to respond with the markets and the customer requirements.
- Reduce the operational cost and achieve accurate product cost calculation.
- Link the company with its supplier

ERP System Selection

Using QFD will help the company to achieve the stated objectives through defining the linkage between the company needs and requirements with the ERP system characteristics. According to the objectives defined by the company top management, and through investigating and analyzing the company priorities, it's very important to link each objective with the available ERP packages characteristics to facilitate selecting the best ERP package which will satisfy the company needs. The following figure present example of how to use QFD to link the company objectives with the ERP package characteristics.

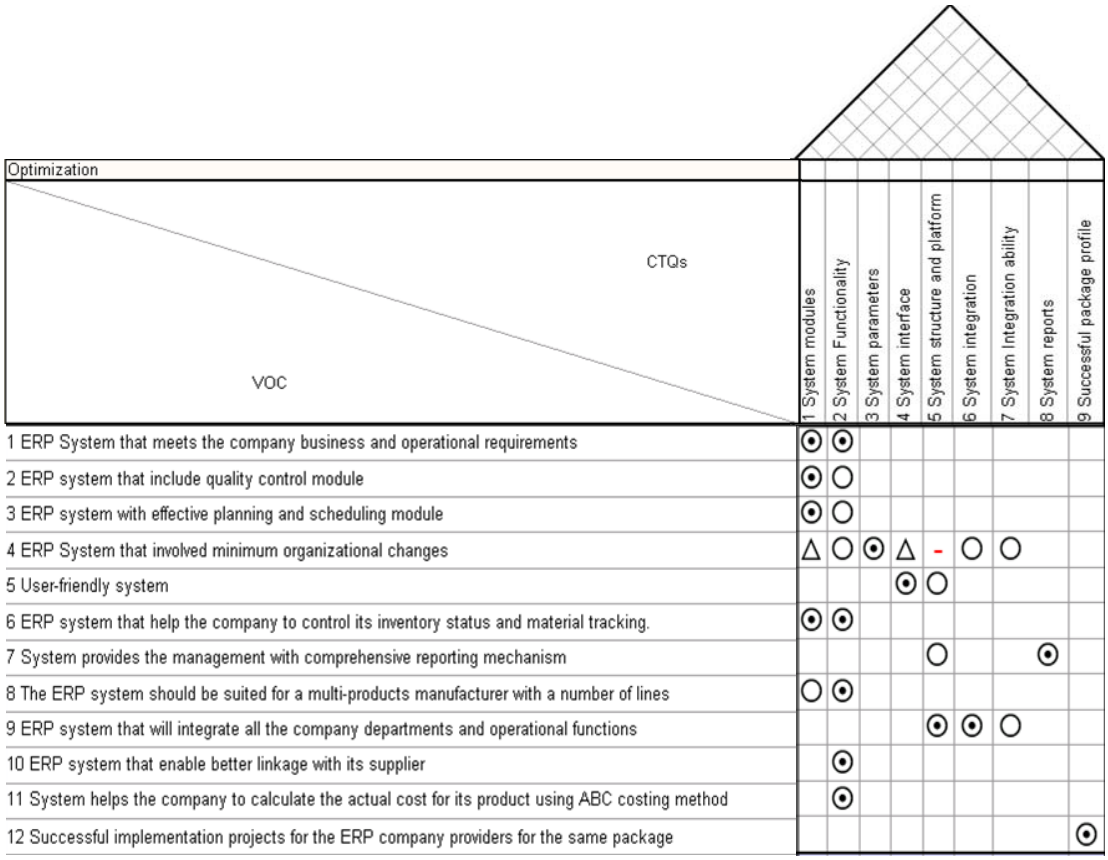

Figure 11: Linking the Customer Requirements with the System Charactaristics

Using QFD as tool to link the company objectives with the available ERP package characteristics will help the company to identify the critical characteristics in the package being studied and evaluated which will provide strong framework for selecting the best package. Based upon the company requirements and after analyzing and studying different ERP packages the company decided to contract with local ERP provider. The selected system is built on ORACLE database and includes the following modules:

- Financial Module, which includes the following :
    - Account Management
    - Human Resource Management
    - Fixed Asset Management
    - Costing

- Inventory Management Module
- PurchasingModule
- Sales Module
- Manufacturing Module
- Quality Control & Quality Assurance Module
- Planning Module, which includes the following
    - Forecasting
    - Master Scheduling Planning
    - Material Requirement Planning

The company decided to choose the phased strategy through the phase of installation the different modules of the package. This approach is the best for the company based on its available resources. The implementation started in Amman branch and after completing the whole package implementation, the implementation will start in Irbid branch. Feedback is very important to keep the top management updated with the project progress and to insure the required and needed support. Just After completing this phase, the project manager should prepare status report as part of the feedback mechanism; this report includes the project progress up-to-date; indicating the completed activities, the selected package, the next phases and its expected duration.

Project Planning Phase

In this phase, the company had clear image about the selected system to be implemented, the objectives and needs to be met. Developing detailed project plan will be essential during this phase in order to identify the timeframe and the logical sequence for each activity during the project life based on the selected system and its components which will satisfy the company needs. The plan shall include the assigned human resources for each activity from both; the ERP vender company and the company implementing the ERP system. Using QFD to link the ERP package critical characteristics which directly affect the company needs along with the activities in the project phases will help the company to better control and manage these characteristics and the proper execution for the implementation activities to insure that the system will satisfy the company requirements. The following figures present the mapping and linkage between the ERP system characteristics and the activities during the different phases of the project implementation.

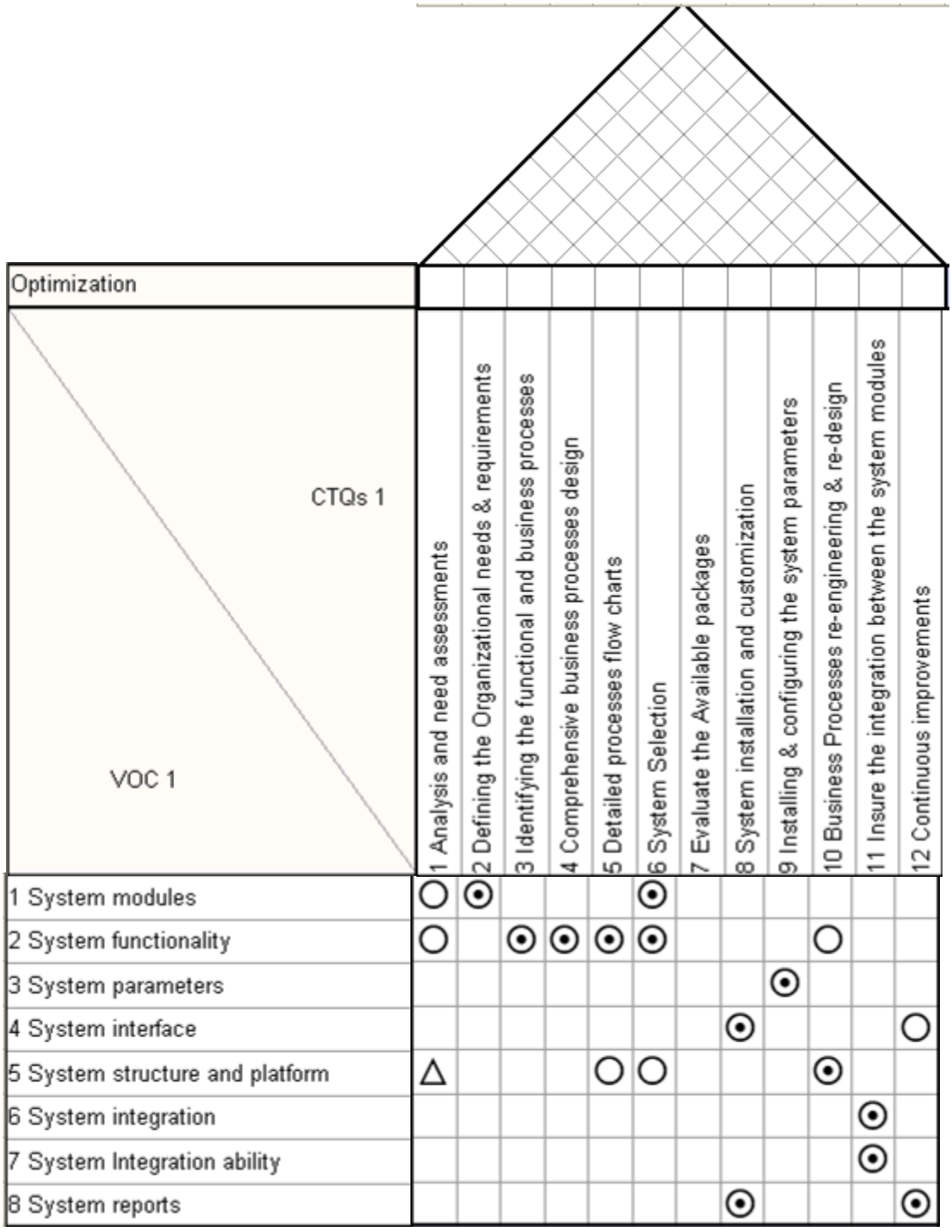

Figure 12: Linking the System Charactaristics with the Implementation Activities

Moreover, it is very important to link the activities in the different implementation phases along with the ERP implementation success and failure factors using QFD, such mapping will help the company and the implementation team to eliminate the possibility of any failure.

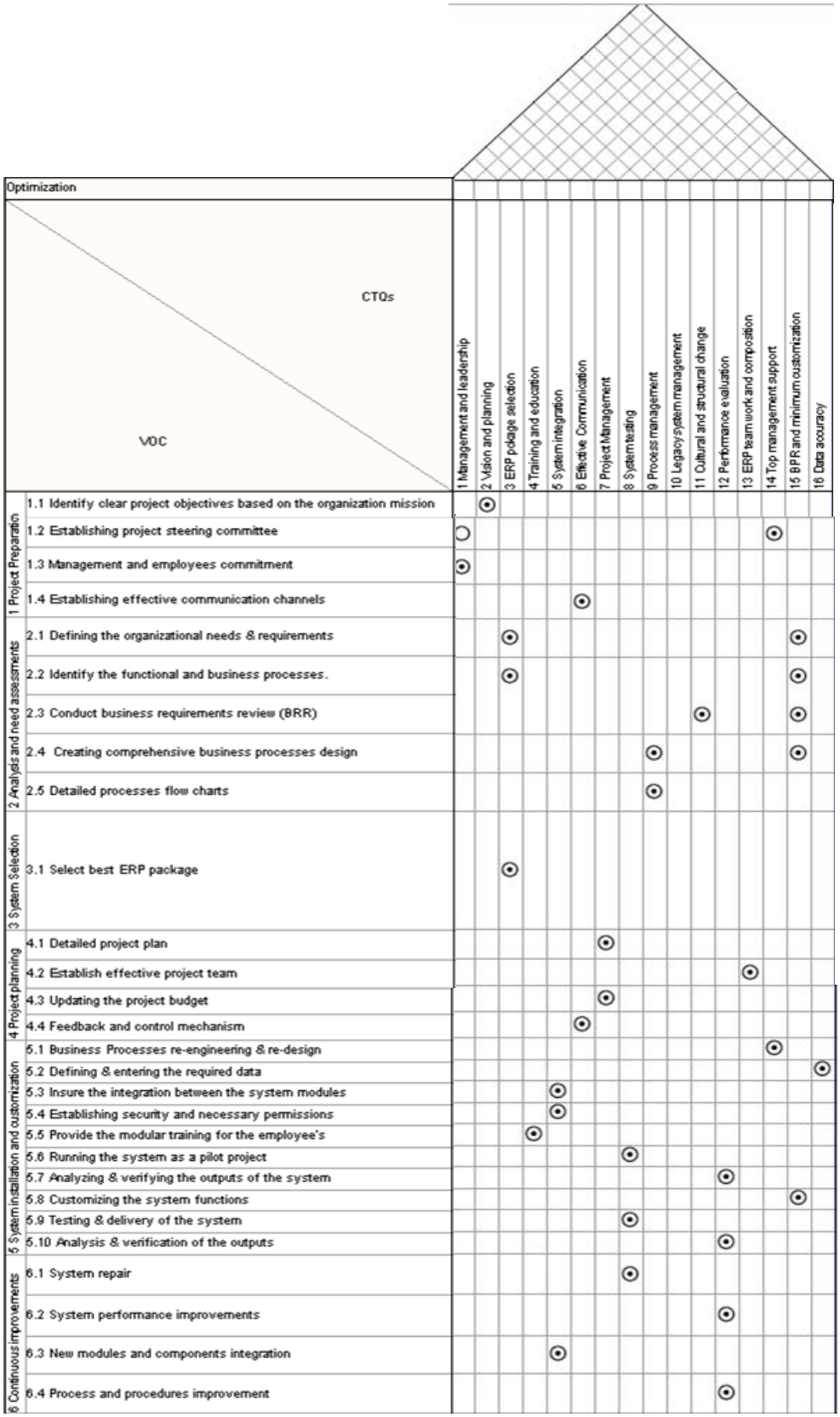

Figure 13: Linking the Implementation Activities with Success and Failure Factors

Conducting GAP analysis may be required in order to determine the required action to be taken to keep the project on the right track and insure the proper execution of the project plan. Developing detailed project plan is extremely important factor for achieving successful ERP system implementation. This plan should address the required tasks to be achieved along with the time frame and required human resources in details. The following plan was developed to serve as guideline for the project execution. In some cases, the company will need to modify the project plan to adopt some modifications. However, the company should also defined effective reporting mechanism to insure the proper control over the most activities that will strongly affect the company objectives. Such reporting mechanism will be defined according the company policy and needs, it's suggested to be periodic reports prepared by the implementation team along with the ERP vender team.

Figure 14 : Detailed Project Plan

	Project Phase	Client Team	ERP Vender Team	Weeks																												
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Phase 3: System Installation	Installing the D.B and Configuring the Work Station																															
	Installing the Core System																															
	System Parameters Setting																															
	Installing Financial Module																															
	Parameters Setting & Data Entry																															
	Establishing security and necessary permissions																															
	Employee Training																															
	Running the System as Pilot Project																															
	Output Analysis & Verification																															
	Module Customization																															
	System Testing & Bug Fixing																															
	Preparing Status Report																															
	Installing Inventory Module																															
	Parameters Setting & Data Entry																															
	Establishing security and necessary permissions																															
	Employee Training																															
	Running the System as Pilot Project																															
	Output Analysis & Verification																															
	Module Customization																															
	Integrating with Financial Module																															

Project Phase	Client Team	ERP Vender Team	Weeks																											
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
System Testing & Bug Fixing																														
Preparing Status Report																														
Installing Purchasing Module																														
Parameters Setting & Data Entry																														
Establishing security and necessary permissions																														
Employee Training																														
Running the System as Pilot Project																														
Output Analysis & Verification																														
Module Customization																														
Integrating with System Modules																														
System Testing & Bug Fixing																														
Preparing Status Report																														
Installing Sales Module																														
Parameters Setting & Data Entry																														
Establishing security and necessary permissions																														
Employee Training																														
Running the System as Pilot Project																														
Output Analysis & Verification																														
Module Customization																														
Integrating with System Modules																														
System Testing & Bug Fixing																														
Preparing Status Report																														

Project Phase	Client Team	ERP Vender Team	Weeks																											
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Installing Manufacturing Module																														
Parameters Setting & Data Entry																														
Establishing security and necessary permissions																														
Employee Training																														
Running the System as Pilot Project																														
Output Analysis & Verification																														
Module Customization																														
Integrating with System Modules																														
System Testing & Bug Fixing																														
Preparing Status Report																														
Installing Q.C & Q.A Module																														
Parameters Setting & Data Entry																														
Establishing security and necessary permissions																														
Employee Training																														
Running the System as Pilot Project																														
Output Analysis & Verification																														
Module Customization																														
Integrating with System Modules																														
System Testing & Bug Fixing																														
Preparing Status Report																														
Installing Planning Module																														

	Project Phase	Client Team	ERP Vender Team	Weeks																										
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
	Parameters Setting & Data Entry																													
	Establishing security and necessary permissions																													
	Employee Training																													
	Running the System as Pilot Project																													
	Output Analysis & Verification																													
	Module Customization																													
	Integrating with System Modules																													
	System Testing & Bug Fixing																													
	Preparing Status Report																													
Phase 4: Continuous Improvement	Full Integration Between all Modules																													
	System Testing																													
	Bug Fixing																													
	System Performance Improvement																													
	Preparing Status Report																													

Conclusion

1. The previous literature reported major rework and failures regarding ERP system implementation, looking into the details of the ERP project planning might reduce such failures.
2. Project planning based implementation framework can be used to express the details of the ERP implementation phases to help the company achieving successful project execution.
3. Multi-phases QFD can be used to link the customer requirements, ERP system characteristics, the implementation activities and the success and failure factors. Such linkage might help the company to focus closely into the critical activities and the related failure factors to avoid.
4. Using project planning based implementation framework for implementing the ERP systems might increase the implementation cost and duration. On the other hand the success possibility will be increased rather than the typical implementation methodologies.

Recommendation for future research

It is recommended to implement the suggested ERP implementation framework in different companies that seeks implementing the ERP system. To evaluate the model during the whole life cycle of the implementation. Such implementation in multi-sites will help to improve the suggested model through identifying any possible gaps . Moreover, as mentioned before QFD is used for the first time in the ERP system implementation, consequently it is recommended to evaluate using this tool in multi-sites implementing different ERP packages.

References

Aladwani, M. (2001). **Change management strategies for successful ERP Implementation**. Business Process Management Journal, 7 (3), 266-275.

Al-Mashari, M. and Al-Mudimigh, A. (2003). **ERP implementation: lessons from a case study**. Information Technology & People, 16 (1), 21-33.

Al-Mashari, M., Zairi, M., 2000. **The effective application of SAP R/3: A proposed model of best practice**. Logistics Information Management 13 (3), 156–166.

Al-Mashari, M., Al-Mudimigh, A., Zairi, M.,(2003) **. Enterprise resource planning: A taxonomy of critical factors**. European Journal of Operational Research 146 (2) , 352–364.

Al-khatib, G. (2004) .**Organization Readiness for ERP Implementation: It Takes More than Two for the Ride**. Proceedings of the International Conference on Computing, Communications and Control Technologies, Austin (Texas), USA.

Barker, T. and Frolick, M. (2003). **ERP Implementation Failure: A Case Study**. Information Systems Management Journal, 20 (4), 43-49.

Bedworth, D., and Bailey, J. (1987). **Integrated Production Control Systems**. (3rd ed.) John Wiley & Sons. Inc.

Boston Consulting Group. (2000). **Getting Value from Enterprise Initiatives: A Survey of Executives**. Boston Consulting Group.

Buckhout, S., Frey, E. and Nemec, J. (1999).**Making ERP succeeds: turning fear into promise**. Strategy and business magazine. Retrieved from **http://www.strategy-business.com/technology/99208/page1.html**.

Bingi, P., Sharma, M. and Godla, J. (1999**).Critical issues affecting an ERP implementation**. Information Systems Management, 16 (3), 7–14 .

Bancroft, N. (1998). **Implementing SAP R/3: How to introduce a large system into a large organization**. (2nd ed). London: Manning/Prentice Hall.

Cristiano J., Liker, K. and White, C (2000). **Customer-driven product development through quality function deployment in the U.S. and Japan**. Elsevier Science, 17 (2) , 286-308.

Cleland, D. (1991). **Product design teams: The simultaneous engineering perspective**. Project Management Journal 12 (4), 5–10.

Chen, .J (2001). **Planning for ERP systems: Analysis and future trends**. Business Process Management Journal, 7 (5), 374-386.

Cooper, R. and Zmud, R. (1990). **Information technology implementation research: a technological diffusion approach**, Management Science Journal 36 (2),123.

Chang, S. (2004). **ERP Life Cycle Implementation, Management and Support: Implications for Practice and Research.** Proceedings of the 37th Hawaii International Conference on System Sciences - 2004

Davenport, T. , (1998) . **Putting the enterprise into the enterprise system**. Harvard Business Review 76 (4), 121–131.

Dahlen, C., Elfsson, J., (1999). **An Analysis of the Current and Future ERP Market with Focus on Sweden**. The Royal Institute of Technology, Stockholm.

Duplaga, E. and Astani, M. (2003). **Implementing ERP in Manufacturing**. Information Management system Journal. 20 (3), 68-75.

Esteves, J., & Pastor, J. (1999). **An ERP life-cycle-based research agenda**. 1st International Workshop on Enterprise Management Resource and Planning Systems (EMRPS), Venice, Italy, 359-371.

Esteves, J. & Pastor, J. (2005). **An ERP life-cost model**. Encyclopedia of information science and technology. 1(5), 111-116.

Frédéric, A., Sammon, D. and Carton, F. (2002). **Project Management Issues in Implementing ERP – Towards an Approach more Suited to ERP Projects**. Retrieved from:

http://www.aim2004.int-evry.fr/pdf/Aim04_Adam_Sammon_Carton.pdf

Falkowski, G., Pedigo, P., Smith, B. and Swanson, D. (1998). **A recipe for ERP success**. Beyond Computing, 4 (2), 44-5.

Gable, G., (1998). **Large package software: A neglected technology**. Journal of Global Information Management, 6(3), 3–4.

Gilbert G. (1999). **ERP installations derail**. InformationWeek Journal. 22 (3), 77-81.

Gumaer, R., (1996). **Beyond ERP and MRP II**. IIE Solutions 28 (9), 32–35.

Amoako-Gyampah, K. (1999). **User involvement, ease of use, perceived usefulness, and behavioral intention: a test of the enhanced TAM in ERP implementation environment**. 30th DSI Proceedings, 20-23 November, 805-817.

Gable, G. and Stewart, G., (1999). **SAP R/3 implementation issues for small to medium enterprises**. In Proceedings of the Fifth Americas Conference on Information Systems, Milwaukee, WI, USA.

Gupta, M. and Kohli, A. (2004) **Enterprise resource planning systems and its implications for operations function**. College of Business and Public Administration Louisville.

Gattiker, T., Goodhue, D., (2000). **Understanding the Plant Level Costs and Benefits of ERP: Will the Ugly Duckling Always Turn into a Swan**. 33rd Hawaii International Conference on System Sciences, HICSS, Maui, Hawaii.

Holland, P., Light, B. and Gibson, N. (1999), .**A critical success factors model for enterprise resource planning implementation**. Proceedings of the 7th European Conference on Information Systems, 1 (2), 273-297.

Holland, P., and Light, B (2001). **A Stage Maturity Model for Enterprise Resource Planning System Use**. Database for advances in information systems, 32 (2).34 -45

Holland, C. and Light, B., (1999). **A critical success factors model for ERP implementation**. IEEE Software, 16 (3), 30– 35.

Hutchins, H. (1998). **7 key elements of a successful implementation, and 8 mistakes you will make anyway**. APICS 1998 International Conference Proceedings, Falls Church, VA. 356–358.

Harwood, S. (2003). **ERP: The Implementation Cycle**. Computer Weekly Professional Series. Oxford, Boston Butterworth-Heinemann.

Hernâandez, A. and Antonio, J. (1999). **SAP R/3 Implementation Guide**. New York McGraw-Hill Professional

Hong, K. and Kim, Y. (2002). **The critical success factors for ERP implementation: an organizational fit perspective**. Information and management journal. 40 (1). 25-40.

Ioannouy , G. and Papadoyiannisy C. (2004) . **Theory of constraints-based methodology for effective ERP implementations.** International Journal of Production Research, 42 (23), 4927–4954

Jacobs, F. and Whybark, D. (2000). **Why ERP? A Primer on SAP Implementation**. Irwin/McGraw-Hill, New York.

Kumar, V., Maheshwari, B. and Kumar U. (2003). **An investigation of critical management issues in ERP implementation: empirical evidence from Canadian organizations**. Technovation Journal, 23 (10), 793–807

Kova´cs, G. and Paganelli, P. (2003) . **A planning and management infrastructure for large, complex, distributed projects beyond ERP and SCM**. Computers in Industry 51 (2) 165–183.

karakanian, M. (1999). **Choosing an ERP implementation strategy**. Year 2000 practitioner. 2 (7), 1-6.

Kremers, M. and Dissel, H. (2000). **ERP system migrations**. Communications of the ACM 43 (4), 52–56.

Kettinger, W. and Grover, V. (1995). **Toward a theory of business process change management**. Journal of Management Information Systems 12 (1), 1–30.

Kraemmerand, P. , Moller, C. and Boer, H. (2003). **ERP implementation: an integrated process of radical change and continuous learning**. Production planning and Control Journal 14 (4), 338–348.

Krumbholz, M. and Maiden, N. (2001). **The implementation of enterprise resource planning packages in different organizational and national cultures**. Information Systems Journal. 26 (3),185–204.

Kapp, K., Latham, W. and Latham, F., (2001). **Integrated Learning for ERP Success: A Learning Requirements planning approach**. (1st ed.) New York: The St. Lucie Press.

Koch, C., Slater, D., and Baatz, E., (1999). **The ABC's of ERP**. CIO Magazine. Retrieved from: http://www.compiere.co.uk/modules.php?name=News&file=article&sid=1

Koch, C. (1997). **Lump it and like it**. CIO Magazine, Retrieved from **htttp://www.cio.com/archive/041597/lump.html**

Kumar, K. and Hillsgersberg, J. (2000). **ERP experiences and evolution**. Communications of the ACM, 43(4), 23-26.

Kremzar, H., and Wallace, F. (2001). **ERP: Making It Happen: The Implementers' Guide to Success With Enterprise Resource Planning.** New York: John Wiley & Sons, Inc.

Lyytinen, K., Hirschheim, R.,(1987). **Information systems failures—a survey and classification of the empirical literature**. Oxford Surveys in Information Technology Journal. 4 (2) , 257– 309.

Markus, L. and Tanis, C. (2000). **The Enterprise Systems Experience – From Adoption to Success.** Pinnaflex Educational Resources, Inc. Retrieved from: http://fag.hia.no/kurs/is/is5000/Entersystems.pdf

Bradford, M. and Florin, J. (2003). **Examining the role of innovation diffusion factors on the implementation success of enterprise resource planning systems**. International Journal of Accounting Information Systems 4 (3), 205–225

Martin, M. (1998) . **An ERP strategy**. Fortune Journal 2 (1), 95–97.

Motwani, J., Mirchandani, D., Madan, M. and Gunasekaran, A. (2002). **Successful implementation of ERP projects: Evidence from two case studies**. International Journal of Production Economics 75 (1-2), 83–96.

Mabert, A., Soni, A. and Venkataramanan, M. (2003). **Enterprise resource planning: Managing the implementation process**. European Journal of Operational Research . 146 (2), 302–314.

Madapusi, A. and D'Souza, D. (2005). **Aligning ERP systems with international strategies.** European Journal of Operational Research 22 (1), 7-18.

Metaxiotis, K. , Zafeiropoulos, I., Nikolinakou, K. and Psarras, J. (2005). **Goal directed project management methodology for the support of ERP implementation and optimal adaptation procedure**. Information Management & Computer Security 13(1), 55-71.

Martins, A. and Aspinwall, M. (2001). **Quality function deployment: an empirical study in the UK**. Total Quality Management Journal 12 (5), 575-588.

Mandal, P. and Gunasekaran , A. (2003) . **Issues in implementing ERP: A case study**. European Journal of Operational Research 146(4), 274–283.

Muscatello, J. , Small, M. and Chen, I. (2003). **Implementing enterprise resource planning (ERP) systems in small and midsize manufacturing firms**. International Journal of Operations & Production Management , 23 (8),850-871

Minahan, T. (1998). **Enterprise resource planning: strategies not included**. Journal of Global Information Management, 1 (2) 112–127.

Nah, F. (2002). **Enterprise resource planning solutions and management**. Hershey, PA: IRM Press.

Nah, F. and Lau, J. (2001) **Critical factors for successful implementation of enterprise systems**. Business Process Management Journal 7 (3) 285-296

Norris, G., Hurley, J. , Dunleavy, J. and Balls, J. (2000). **E- Business and ERP: Transforming the Enterprise**. New York: John Wiley & Sons, Inc.

Okrent, M. and Vokurka, R. (2004). **Process mapping in successful ERP implementations**. Industrial Management & Data Systems .104 (8),637–643.

Parr, A. and Shanks, G. (2000). **A model of ERP project implementation** . Journal of Information Technology . 15 (4),289–303.

Parr, A. and Shanks, G. (2000). **A Taxonomy of ERP Implementation Approaches**. Proceedings of the 33rd Hawaii International Conference on System Sciences. Retrieved from:

http://erp.ittoolbox.com/documents/document.asp?i=1857

Pearlson, K. (2001). **Managing and Using Information Systems**. USA: John Wiley & Sons, Inc, New York.

Pieter, M., Ribbers, A. and Schoo, K.. (2002). **Program Management and Complexity of ERP Implementations**. Engineering Management Journal,14 (2), 45-52.

Prasad, B., Sharma, K., and Godla, J., (1999) . **Critical issues affecting an ERP implementation**. Journal of Information Systems Management. 16 (3), 7–14.

Russo, K., Kremer, A. and Brandt, I. (1999).**Enterprise-wide software: factors effecting implementation and impacts on the IS function**. 30th DSI Proceedings, 20-23 November, pp. 808-10

Rao, S., (2000) . **Enterprise resource planning: Business needs and technologies**. Industrial Management & Data Systems Journal , 100 (2),81–88.

Ross, J. and Vitale, M. (2000). **The ERP Revolution: Surviving vs. Thriving**. Information Systems Frontiers, 2 (2), 233-241.

Roberts,J. and Barrar, P. (1992). **MRPII implementation: key factors for success**. Computer Integrated Manufacturing Systems, 5 (1),31-8.

Rosario, J. (2000).**On the leading edge: critical success factors in ERP implementation projects**. Business World, Philippines, 27.

Robey, D. , Ross, J. and Boudreau, M. (2002). **Learning to Implement Enterprise Systems: An Exploratory Study of the Dialectics of Change**. Journal of Management Information Systems, 19(1), 17–46.

Rashid, M., Hossain, L. and Patrick, D. (2002). **The Evolution of ERP Systems: A Historical Perspective", in Enterprise Resource Planning: Opportunities and Challenges**. Idea Group Publishing. , 35-50.

Rajagopal, P. (2002). **An innovation—diffusion view of implementation of enterprise resource planning (ERP) systems and development of a research model**. Information & Management Journal. 40 (2), 87–114.

Russell, R. and Taylor, B. (1998). **Operations management: Focusing on quality and competitiveness**. (2nd ed.). Englewood Cliffs, N. J.: Prentice Hall.

Scott, J., and Kaindl, L. (2000). **Enhancing functionality in an enterprise software package**. Information & Management, 37 (3) , 111–122.

Schniederjans, M. and. Kim, G.(2003). **Implementing enterprise resource planning systems with total quality control and business process reengineering: Survey results.** International Journal of Operations & Production Management 23 (4), 418-429.

Scott ,J. (1999). **The FoxMeyer drugs' bankruptcy: was it a failure of ERP.** In Proceedings of the 5th Americas Conference on Information Systems, Milwaukee, WI, USA.

Sabrerwal R. and Robey D., (1995) . **An empirical taxonomy of implementation processes based on sequences of events in information system development**. In G. P. Huber and H. Van de Ven, eds, Longitudinal Fields Research Methods (Thousand Oakes, CA: Sage), 228–266.

Skelton, M., Thamhain, J., (1993). **Concurrent project management: A tool for technology transfer R&D-to market**. Project Management Journal 5 (4), 41–47.

Sarker, S. and Sarker, S. (2000). **Implementation failure of an integrated software package: a case study from the Far East**. Annals of Cases in IT Applications and Management, 2 (3), 169-186.

Somers, T. and Nelson, K. (2004). **A taxonomy of players and activities across the ERP project life cycle**. Information & Management Journal. 41(3), 257–278.

Somers, T. and Nelson, K. (2001). **The Impact of Critical Success Factors across the Stages of Enterprise Resource Planning Implementations**. Proceedings of the 34th Hawaii International Conference on System Sciences. 8 pp. 8016.

Stefanou, J. (1999). **Supply chain management (SCM) and organizational key factors for successful implementation of enterprise resource planning (ERP) systems**. Proceedings of the Americas Conference on Information Systems (AMCIS), pp. 800.

Sumner, M. (1999). **Critical success factors in enterprise wide information management systems projects.** Proceedings of the Americas Conference on Information Systems (AMCIS), pp. 232-4

Scheer, A. and Habermann, F. (2000). **Making ERP a success**. Communications of the ACM, 43 (3), 57-61.

Somers, T and Nelson, K. (2001**). The Impact of Critical Success Factors across the Stages of Enterprise Resource Planning Implementations**. Proceedings of the 34th Hawaii International Conference on System Sciences.

Scott, J. (2003). **What risks does an organization face from an ERP implementation? Business driven information technology: Answers to 100 critical questions for every manager**. Stanford University Press.

Soh, C., Kien, S., Tay-Yap, J. (2000**). Cultural fits and misfits: Is ERP a universal solution**. Communication of the ACM Journal. 43 (4). 47–51.

Siau, K. (2004). **Enterprise resource planning (ERP) implementation methodologies**. Journal of Database Management. 15 (1), 1-10.

Soh, C., and Markus, M. (1995). **How IT creates business value: A process theory synthesis**. Proceedings of the Sixteenth International Conference on Information Systems. Amsterdam.

Stedman, C. (1999). **ERP can magnify errors. Computerworld**. Retrieved from **http://www.computerworld.com/news/1998/story/0,11280,33077,00.html**

Tchokogué A. Bareil C. and Claude R. Duguay.(2005). **Key lessons from the implementation of an ERP at Pratt & Whitney Canada** . International Journal of Production Economics, 95(2) 151-163.

Teltumbde, A., (2000). **A framework for evaluating ERP projects**. International Journal of Production Research, 38 (16), 4507–4520.

Umble, E. and Umble, M. (2002). **Avoiding ERP Implementation Failure**, Industrial Management Journal, 44 (1) , 25-33.

Umble, E., Haft, R. and Umble, M. (2003) . **Enterprise resource planning: Implementation procedures and critical success factors**. European Journal of Operational Research . 146 (2), 241–257.

Weston J. (2001) **. ERP implementation and project management**. Production and Inventory Management Journal 42(3), 75–80.

Watson, R., Kelly, G., Robert, D. and Brancheau, J. (1999). **Key Issues in Information Systems Management: An International Perspective**. Journal of Management Information Systems . 13 (4), 91-116.

Wognum, P., Krabbendam, J., Buhl, H. , Ma, X., and Kenett, R. (2004). **Improving enterprise system support – a case-based approach**, Advanced Engineering Informatics, 18 (2), 241-253.

Wee, S. (2000). Juggling toward ERP success: keep key success factors high, ERP News, Retrieved from http://www.erpnews.com/erpnews/erp904/02get.html.

Yen, H. and Sheu, C. (2004). **Aligning ERP implementation with competitive priorities of manufacturing firms: An exploratory study**, International Journal of Production Economics, 92(3), 207-220.

Yusuf, Y., Gunasekaran, A., and Abthorpe, M. (2004). **Enterprise information systems project implementation: A case study of ERP in Rolls-Royce**. International Journal of Production Economics 87 (3) , 251– 266.

Zanchi, M. , Su, X. and Gulla, J.(2001). **Modeling with APM in ERP projects. Proceeding of OES-SEO (Open Enterprise Solutions: Systems, Experiences, and Organizations).** Retrieved From : **http://cersi.luiss.it/oesseo2001/papers/15.pdf**

Zhang, L , Lee, K., Zhang, Z. and Banerjee, P. (2003). **Critical Success Factors of Enterprise Resource Planning Systems Implementation Success in China**. 36 th Annual Hawaii International Conference on System Science. 8 pp. 236.

Zhang, Z. Lee, K., Huang, P. Zhang, L. and Huang, X. (2005). **Framework of ERP systems implementation success in China: An empirical study** . International Journal of Production Economics, 98 (1), 56-80.

Appendix

Dear Sir or Madam,

The objective of this questionnaire is to achieve better understanding of using Quality Function Deployment (QFD) as tool during the ERP solutions implementation to help achieving successful implementation. Please give us of your worthy time and experience the opportunity to better shape such understanding. Indeed, all the information you provide will be used for academic research only and will be treated in the strictest confidence.

Section 1: Using QFD to link the customer requirements and the ERP solution characteristics

- Do you think using QFD to link the customer requirements and the ERP solution characteristics will help the company that intend implementing ERP package to select the best ERP solution that meets its requirements and needs:

  Yes No

- If the answer is no, please state why :

…….

…….

- If the answer yes, do you think using QFD will minimize the required customization on the selected package

  Yes No

- Do you think that QFD helps the ERP venders achieving better understanding of the companies needs and requirements

  Yes No

Section 2: Using QFD to link the ERP solution characteristics and the implementation activities

- Linking the ERP solution characteristics and the implementation activities will help the ERP vender to achieve better satisfying of the Companies needs and requirements through handling these requirements during the different implementation phases

  Yes No

- Linking the ERP solution characteristics and the implementation activities will help the ERP vender to achieve better control and monitoring on the different

implementation activities to be directed toward meeting the companies needs and requirements

Yes No

- Using QFD will help the companies to minimize the reworks and the non-value added activities

Yes No

Section 3: Using QFD to link the implementation activities and the reported success and failure factors

- Using QFD to link the implementation activities and the reported success and failure factors will help the companies to eliminate the failures in the project

Yes No

- Using QFD to link the implementation activities and the reported success and failure factors will help the companies to be focused more on the critical activities during the different implementation phases to insure the availability of the proper control and monitor on such activities

Yes No

Section 4: Using QFD three times during the whole implementation cycle

- QFD was used three times in the suggested model as mentioned above, in your opinion which one is the most important usage and why:

……..
……..

- Do you think using QFD will increase the total cost of the project :

Yes No

- Do you think using QFD will increase the duration of the project :

Yes No

- Do you think the suggested model will help both the ERP venders and the companies to achieve successful ERP implementation, and why :

Yes No
……..
……..

تطوير نظام رسمي لتطبيق نظام ادارة الموارد وذلك لضمان نجاح التطبيق

اعداد
مهند عبد الفتاح محمد حسين

المشرف
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ملخص

خلال السنوات السابقة، تطورت أنظمة إدارة موارد التصنيع بشكل ملحوظ ابتدءا من أنظمة إدارة الموارد البسيطة انتهاء بألانظمة إدارة الموارد المتقدمة . مع تطور مثل هذه الأنظمة تم استحداث تطور هائل في الصناعة .أنظمة إدارة الموارد تعتبر من الأدوات الإستراتيجية لأي شركة وذلك من خلال ربط الشركات مع الزبائن و المزودين بشكل فعال. إن تطبيق نظام إدارة الموارد ليس سهلا و ذلك لأن هذه العملية تطلب التخطيط الفعال المسبق . إن فشل تطبيق أنظمة إدارة الموارد يعود إلى العديد من الأسباب مثل : ضعف تخطيط المشروع ، عدم التزام الموظفين بإنجاح المشروع، عدم وجود الدعم الكافي من الإدارة، التغيرات المطلوبة في المؤسسة، عدم وضوح آليات الاتصال و التنسيق. قامت العديد من الشركات المختصة بإيجاد آليات لتطبيق أنظمة إدارة الموارد وذلك لضمان نجاح المشروع مثل: آلية التطبيق من شركة ساب و آلية التطبيق المتكامل. بالرغم من ذلك فان هذه الآليات لا تعتبر مفصلة بالشكل المطلوب و لا تحتوي على آليات واضحة لضمان ضبط و إدارة المشروع. من خلال هذا العمل تم تطوير آلية متكاملة للمساعدة في تحقيق التطبيق الناجح لنظام إدارة موارد الشركة بشكل ناجح وذلك من خلال استخدام أداة بيت الجودة " ك ف د " لربط متطلبات الشركات مع مواصفات الأنظمة، و ربط مواصفات الأنظمة مع أنشطة التطبيق المختلفة و أخيرا ربط أنشطة التطبيق مع عوامل النجاح و الفشل

مثلما تم حصرها في الدراسات السابقة. تم تطبيق هذه آلية في مصنع المستحضرات لصناعة مستحضرات التجميل و تم الحصول على خطة تطبيق مفصلة لإنجاح المشروع.