ENTERPRISE RESOURCE PLANNING SYSTEMS SELECTION PROCESS

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Approval of the Graduate School of Social Sciences

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ABSTRACT

ENTERPRISE RESOURCE PLANNING SYSTEMS
SELECTION PROCESS

Kenaroğlu, Bahar

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In this study, a research is developed to establish a comprehensive framework for ERP systems selection process and provide guidance for better ERP systems selection and evaluation by investigating all the aspects of the selection process. The research is conducted through a comprehensive study prior to key information systems journals, conferences, overall enterprise information systems materials in electronic databases, and also in practitioner journals. As a result, the study is able to present a comprehensive framework for ERP systems selection process, identify the problematic issues, reveal the ways to improve the selection activities, and present a road-map for the selection process.

Keywords: Enterprise Resource Planning, Selection/Evaluation Process, Enterprise Information Systems.

ÖZ

KURUMSAL KAYNAK PLANLAMASI
SEÇİM SÜRECİ

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Bu çalışmada, Kurumsal Kaynak Planlama (KKP) sistemleri seçim sürecine çatı oluşturması ve seçim aşamasını tüm yönleriyle inceleyerek daha iyi seçim süreçlerinin uygulanmasını sağlaması amacıyla kapsamlı bir araştırma gerçekleştirilmiştir. Bu araştırma, bilişim sistemlerine/teknolojilerine ait akademik yayınlar, konferanslar, elektronik text-veritabanları ve ticari yayınların sentezlenmesi sonucu oluşturulmuştur. Yapılan çalışmanın kapsamı gereği, KKP sistemleri seçim süreci için genel bir çatı ve yol haritası oluşturulup, seçim sürecinde karşılaşabilinecek sorunlar ve seçim aktivitelerinin daha iyi yürütülmesi için önem teşkil eden unsurlar detaylı olarak incelenmiştir.

Anahtar Kelimeler: Kurumsal Kaynak Planlaması, KKP, Seçim/Değerlendirme Süreci, Kurumsal Bilişim Sistemleri.

To Life

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I here by declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Date: 07/06/2004 Signature :

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LIST OF ABBREVIATIONS

AIS - Association for Information Systems

AMCIS - Americas Conference on Information Systems

ATS - Amount of Time Spend

ASP - Application Service Providers

B2B – Business to Business Electronic Commerce

B2C – Business to Consumer Electronic Commerce

BPR - Business Process Re-engineering

CEO-Chief Executive Officer

CM - Change Management

CIM - Computer Integrated Manaufacturing

CRM - Customer Relationship / Service Management

DDI - Decision Drivers Inc.

DSS - Decision Support Systems

EIS - Enterprise Information Systems

ES - Enterprise Systems

ERP - Enterprise Resource Planning

IS - Information Systems

ISD - Information Systems Development

IT - Information Technologies

KM - Knowledge Management

LAN - Local Area Network

MERPAP - Model for ERP Acquisition Process

MIS - Management Information Systems

MRP (II) - Manufacturing Resource Planning

OBB - Organizational Buying Behavior

PSA - Professional Service Automation

RFI - Request for Information

RFP - Request for Proposal

RFQ - Request for Quotation

ROI - Return of Investment

SHERPA - Systematic Help for ERP Acquisitions

SCM - Supply Chain Management

SWOT - Strengths, Weaknesses, Opportunities and Threats

WAN – Wide Area Network

WWW - World Wide Web

Y2K - Year 2000

CHAPTER I

INTRODUCTION

Enterprise Resource Planning (ERP) is an industry term for the broad set of activities supported by multi-module application software that helps a manufacturer or other business manage the important parts of its business. Increasingly, ERP systems came to be viewed as an enterprise information backbone over which other enterprise applications were overlaid. ERP can feed valuable data into other applications, such as logistics, supply chain or product data management solutions: there to be organized and optimized for the purposes of those processes and functions.

With the dawn of e-business architecture and the release of new concepts such as Supply Chain Management (SCM), Knowledge Management (KM), and Customer Relationship/Service Management (CRM) over the internet, ERP systems have evolved to become advanced business application paradigm recently known as ERP II[1], opening a new era in the New Economy[2] (Gartner, 2000).

However, the deployment of an ERP system involves considerable business process analysis, employee retraining, and new work procedures. Evidently, ERP selection, implementation and maintenance processes are of vital importance, and necessitates serious research and commitment since it requires certain level of process adaptation and touches corporate culture and work organization. Further, the greatness of cost and time spend during an ERP system implementation project signifies the impact of the system over the organization. Recently, one of the major reasons for ERP system implementation failures is seen as the possibility of selecting the wrong ERP system

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[1] ERP II is discussed in detail in Chapter 5.3

[2] New Economy is the term used for defining the intensive economic environment where competiceny is fed by technological phenomena such as e-business, e-commerce, SCM, CRM, or etc.

choice to begin with. Hence, this situation results in not being able to maintain organizational fit of the dedicated system during the implementation process. As a consequence, ERP system selection process and related issues has begun to gain focus by both researchers and practitioners as an area of research.

1.1. Purpose of the Study

Since ERP systems selection issues are quite new for the academic attention, it has been realized that little has been done to date to organize and summarize the findings and knowledge gained from all ERP software selection research. Thus, the purpose of this thesis is to present a comprehensive study on the ERP systems selection process by integrating the stream of research on all ERP systems selection related issues in order to provide a road-map as guidance for better ERP systems selection and evaluation.

The main objectives of this research are; to develop a comprehensive framework and a road-map for ERP systems selection process by considering future trends and importance of the phase of Business Requirements Analysis, to provide organizations with valuable knowledge that could stimulate them to make significant changes in the manner in which they proceed with the acquisition of an ERP system, which in turn could result in substantial savings in terms of cost, time and improved administrative procedures.

The following research questions are addressed:

1. What are the factors affecting the decision to acquire an ERP system?
2. Why is the ERP selection process important?
3. How is ERP system selection process done?
4. What are the methods for a better ERP selection process?

1.2. The Research Approach

In order to develop an overview of academic research on the ERP systems, key Information Systems/Technologies (IS/IT) journals, conferences, enterprise information systems materials in electronic databases, and also in commercial publications are scanned for the period 1997 to early 2004.

The conferences surveyed are those which were supported in the past by the Association for Information Systems (AIS): International Conference on Information Systems (ICIS), Americas Conference on Information Systems (AMCIS), and European Conference on Information Systems (ECIS). The intention was to account merely for ERP-related publication activity in main IS sources, which of course does not reflect the total output of ERP-related presentations and articles. Thus, other events like conferences in the area of accounting or software engineering have not been included[3].

1.3. Organization of the Thesis

Chapter I introduced the topic, the research methodology, and the objectives for this study. Chapter II provides an overview of ERP and information systems literature with focus on all the issues related to ERP systems implementation, factors that apply to ERP systems adoption. Chapter III, first investigates the importance of ERP systems selection process and presents the framework for the ERP systems selection process. Chapter IV discusses the problems and reveals the guidelines for best ERP systems selection activities.

[3] Researchers interested in the subject may search the ERP and Enterprise Information Systems (EIS) materials in electronic databases by the keywords such as SAP, BAAN, ORACE, JD EDWARDS.

Chapter V presents a road-map for the ERP Selection Process by applying the guidelines discussed in Chapter IV to the ERP selection framework investigated in Chapter III and by considering future trends and implementation of the phase of Business Requirements Analysis. Chapter VI summarizes the main points of the thesis as well as suggesting new research subjects for future studies.

CHAPTER II

INFORMATION, PLANNING & MANAGEMENT SYSTEMS

2.1. Introduction

The following presents an overview of ERP Literature in conference proceedings, and in core Information Systems (IS) journals. Despite growing prominence and pervasiveness of ERP in practice, related publications within academic community, as reflected by contributions to international conferences and journals, is only emerging. The reason behind this fact is that the topic has been mostly discussed among practitioners in industrial sector and not in the academic community until recently.

2.2. ERP Phenomena

According to Gable et. al. (2000), the term ERP appeared in the press for the first time in 1992. The article by Lopes (1992) shows how ERP had been conceived of at the time the term was coined. Under the heading Computer Integrated Manufacturing II (CIM II) the features of these new systems are laid out fully: a qualitative leap beyond Manufacturing Resource Planning (MRPII), integration across suppliers, departments and customers, relational database, and on client-server architecture.

Moreover, Lopes (1992) praises ERP systems as "better, faster, and more economical business solutions" and ascribes to GartnerGroup[4] to have defined ERP,

[4] The GartnerGroup is the leading industry provider of research and analysis services. GartnerGroup provides need expert advice and analysis on technology issues and trends.

and proclaimed it as the new information systems "paradigm", because of several differentiating factors (Skok, 2001):

- The number and variety of stakeholders in any implementation project
- The high cost of implementation and consultancy
- The integration of business functions
- The consequent configuration of software representing core processes
- The management of change and political issues associated with Business Process Re-engineering (BPR) projects
- The enhanced training and familiarization requirement

At that time GartnerGroup described ERP systems as integrated modules for materials management, finance, accounting, sales and distribution, human resources and other business functions on the same architecture domain linking the enterprise to customers and suppliers.

More than three years later, Thomas Davenport introduced the IS community to ERP systems at American Conference on Information Systems (AMCIS) 1996 (Davenport, 1996). However, instead of calling these systems as ERP, he named them as "megapackages", pointing out the challenges they allegedly posed for companies both in technical and organizational terms. One year later, ERP papers were presented at three international IS conferences, and this marked the beginning of the period of literature reported as follows.

According to ERP-related publications, ERP issues differ in many ways. Several publications attempt to determine critical success factors for implementations. However, others intend to explore pre-implementation, implementation and post-implementation evidence through case studies. Along with their investigation, some publications introduce the concept of "New Economy" and try to make predictions about the future of enterprise-enabled applications, ascribing an alternative economic

environment facilitated by the internet, enterprise applications and e-business practices.

ERP systems implementation related publications account for most of the articles reviewed. This corresponds with the focus taken on implementation and associated problems. Several publications attempt to determine the critical success factors of implementations. Scott and Vessey (2000) intended to explain why ERP implementations fail from the perspective of the critical success factors and risks approaches which are common in the IS discipline. Then the literature adopted a theory which is called as "learning from failure". Consequently, the authors examined two SAP/R3[5] implementations, one of which failed while the other succeeded. In conclusion, the authors avoided claiming that the first implementation failed because of using the approach from their theory. However, for the second implementation which turned out to be successful, they emphasized it followed many guidelines from their theory.

In addition, Hong and Kim (2002) conducted a research to determine the critical success factors for ERP implementation in the year 2001. They indicated that since the early 1990s, many firms around the world have shifted their IT strategy from developing IS in-house to purchasing application software such as ERP systems. Evidently, IT managers responsible for managing their organizations' ERP implementation viewed their ERP systems as their organizations' most strategic platform. Unfortunately, ERP projects have reported a high failure rate even jeopardizing the operations of the implementing organization. Hence, Hong and Kim (2002) explored the root of such failure rate from an "organizational fit perspective". As a result of their survey covering 34 organizations, they found that organizational fit of ERP played a major role in ERP implementation success.

[5] SAP/R3 (SAP Release 3) is the ERP system software product of SAP Inc.

Further, implementation associated issues are investigated by the following authors through case studies with various intent. Baskersville et. al. (2000) set forth a corporative case study, contributing to a theory that describes the impact of ERP on organizational knowledge. They concluded that ERP systems produce effects that make business knowledge become more focused, or "convergent" from the perspective of the organization and more wide-ranging or "divergent" from the perspective of the individual. They also implied that ERP stimulates changes to the organization's core competencies and changes in the risk profile regarding the loss of organizational knowledge.

In contribution, Askenas and Westelius (2000) indicated that the user, being influenced by the ERP system and giving it an active role, confers agency on the ERP system. It influences actions and thus the structure as well. Based on a case study, they determined five different roles played by the ERP system as Bureaucrat, Manipulator, Administrator, Consultant and Dismissed, meaning users chose to avoid using them.

Robey et. al. (2002) focus on another issue, reporting on a comparative case study of 13 industrial firms that implemented an ERP system. These firms differed on their dialectic learning process. They indicated that all firms had to overcome knowledge barriers of two types: those associated with the configuration of the ERP package, and those associated with the assimilation of new work processes. They found that both strong core teams who carefully managed consulting relationships addressed knowledge barriers. User training that included both technical and business processes, along with a phased implementation approach helped firms to overcome assimilation knowledge barriers. They also introduced two different approaches for ongoing concerns with assimilation knowledge barriers for firms. First approach called "piecemeal", meaning firms concentrated on the technology first and deferred consideration of process changes. In the other approach called "concentrated" approach, both technology and process changes were undertaken together. However,

instead of making a clear selection, respondents preferred practicing combination of these approaches.

Larsen and Myers (1999) discussed a BPR project that involved the implementation of an ERP software package. They raised many questions about the meaning of "success". They showed how a "successful implementation" can turn into failure.

Other than describing the impact of ERP on job characteristics, some authors chose to explore strategic options open to firms beyond the implementation of ERP. Davenport (2000) stated that companies were beginning to gain strategic value from the implementation and operation of Enterprise Systems (ES). According to him, contemporary dominating trends in business are sense-and-respond business models, globalization, corporate realignment, virtual organizations and accelerated product life-cycles. He analyzed the available and evolving features of ES correspond only to some extent to the new practices required to respond to these corporate challenges, and that ERP vendors strive to fill the gap. He concluded that by integrating higher management functions, ES will also influence the practice of executives.

In addition to Davenport's argument, O'Donnell and Smith (2000) proposed a research framework for examining how features of an information system affect the decision-making process. They discussed that changes in the decision process are initiated by implementing ERP systems, data warehouses, electronic commerce, virtual organizations, online financial reporting and disaggregated financial statement information.

Moreover, Sia et. al. (2002) in their corporate study, claimed ERP as a technology of power of two types. First, it tightens management control by bringing a new level of panoptic visibility to organizational activities; on the other hand, the embedded business model within the ERP may also drive empowerment of employees and greater control relaxation through the configuration of new process design. According to this hypothesis, they tried to understand how an ERP implementation

affects organizational control. In sum, their study exposed the likelihood of ERP implementation as a technology that perpetuates management power.

Furthermore, Ross and Vitale (2000) conducted another research presenting some findings from a research project that examined how firms were generating business value from their investments in ERP systems. The research described the stages of ERP implementation, the obstacles that firms encountered in generating benefits from the systems, and some critical success factors for getting business value from the implementation of an ERP system in business.

In addition to Ross and Vitale (2000), Mason and Ragowsky (2000) also indicated how past research had struggled to identify any evidence of tangible benefits from IS. They reminded that IS can facilitate the identification of less costly sources of inputs for firms by making it easier and cheaper to evaluate prospective supplier's offers; thus, they emphasized that adopting IS should connote a value of information. Consequently, the authors suggested a model relating this value to various characteristics. Their model resulted that IS provides tangible benefits and has a positive impact on the organization's performance.

Rather than exploring how to maximize the benefits from ERP, Vogt (2002) conducted a study on failed ERP projects and indicated that ERP systems come with their own difficulties. He added that their tremendous generality and enormous complexity make them prone to glitches and low performance, difficult to maintain and implement. In his study, he looked at four ERP implementation failures, all of which occurred recently in American industry. He analyzed possible causes that led to the disasters, and suggested software engineering processes that helped avoiding such outcomes.

The organizational benefits derived from an ERP system, has been addressed by Hitt et. al. (2002). They stated that ERP systems integrate key business and management processes within and beyond a firm's boundary. However, there is little large-

sample statistical evidence on whether the benefits of ERP implementation exceed the costs and risks. According to their study, they found that investment in ERP tend to show higher performance across a wide variety of financial metrics. They concluded that even though there is a slow down in business performance and productivity shortly after the implementation, financial markets consistently reward the adopters with higher market valuation.

Further to identify the issues of alignment, Koch and Buhl (2001) stated that ERP systems and team working both entail significant changes to work on the shop floor. However, in the study they compromised on 24 Danish manufacturing enterprises and showed the importance of, and micro political difficulties involved in getting companies to configure ERP systems to support team working.

Subsequently, Kraemmergaard and Rose (2002) investigated the managerial competencies required for the complex interactions required to integrate an ERP system into an organization successfully. They concluded that a wide range of competences are required: personnel, business and technical. The competence mix should be expected to vary through the journey, and is often too much to expect of one person.

On the other hand, some authors focused on various aspects of ERP, such as SCM side of ERP. Boubekri (2001) stated the contemporary problem for companies is not recognizing the competitive advantage of implementing SCM, but how to ensure that the IT they have either implemented or are planning to implement will help meet desired business goals.

Further, Robinson and Wilson (2001) used Marx's analysis of the processes of accumulation and circulation of capital in order to assess ERP systems, with the conclusion that, rather than being a fad, ERP's attempt to answer certain general problems of capital accumulation is particularly acute today.

Later, Gefen and Ridings (2002) worked on the CRM aspect of ERP, stating that previous research examining other ERP modules has shown that user perception of the responsiveness of implementation teams, as an indicator of a possible social exchange, is significantly associated with an increased favorable assessment of the new system and ultimately its adoption. However, they implied that previous research, using survey data alone, did not examine causation. Therefore, they studied whether different degrees of actual responsiveness in different sites during CRM implementation result in significant differences in the users' favorable assessment of the correctness and ultimately their approval of a new CRM.

In addition, McAffee (2002) presented the results of a natural experiment conducted at a U.S. high-tech manufacturer. The experiment involved the adoption of a comprehensive ERP throughout the functional groups charged with customer fulfillment. The adoption he considered was not accompanied by substantial business changes. He argued that immediately after adoption, lead-time and on-time delivery performance suffered just like in the introduction of capital equipment onto shop floors. However, lead and ontime delivery percentages then improved along a leaning curve. After several months, performance in those areas improved significantly relative to pre-adoption levels. He suggested this as an initial evidence of a causal link between IT adoption and subsequent improvement in operational performance measures, as well as evidence of the time scale over which these benefits appear.

In order for spanning multiple phases of ERP life cycle (selection-implementation-maintenance), another concept as knowledge management has been suggested by the academic community. Contributing to this concept, O'Leary (2002) investigated the use of knowledge management to support ERP systems across their entire life cycles, in another words, in their choice, implementation and use: both inputs and outputs. In order to support his argument, he provided a prototype system designed to support the use of an ERP system.

Fulkerson (2000) investigated Information-Based Manufacturing in the framework of "New Economy". He stated that the customer of the 1990s demanded products and services that are fast, right, cheap and easy. He added that manufacturing organizations had adopted an Information-Based Strategy that incorporates technology to maintain and deliver the information required for knowing what, when, and how to make economical products. He explored this strategy in the context of the new economy characterized in the areas of globalism, informationalism, and customer-dominated markets.

Shaw (2000) took this discussion further to suggest Information-Based Manufacturing with the Web. He illustrated how the Web technology can help to coordinate the supply-chain activities in manufacturing. Because of the need for an effective information infrastructure, the internet has the potential to further enhance Information-Based Manufacturing.

Bennett and Timbrell (2000) examined the likelihood of success for Application Service Providers (ASP) in the new economy. The authors proposed that the convergence of world of telecommunications, application software, and consulting have created the new online-services rapidly. With improved interfaces between ERP systems and internet browser technologies, coupled with cheaper telecommunications and increased bandwidth availability, a market has arisen for the delivery of ERP and other applications via the World Wide Web (WWW). This application-specific delivery service given by ASP is a new twist in the outsourcing trend of companies. The authors indicated that ASP rent their ERP packaged software to their customers predominantly over the internet. This showed why organizations might employ the ASP model to manage their ERP systems. The authors also demonstrated that financial, business, technical and political reasons apply to evaluate outsourcing. They indicated that ASP generally target the mid-market, large enterprises are also using ASP to introduce new ERP modules. They concluded that there are strong financial and technical reasons for adopting the ASP model and therefore it has a potential to succeed.

Hayman (2000) discussed the future of ERP in the Internet Economy. He defined ERP as a distinct entity which gives way to a much broader value proposition that effectively fuses different forms of business applications and services. He stated that back-office and front office applications within an enterprise will come together, along with applications and services for value-chain collaboration between business partners.

Further, Sawyer (2001) took a market-based perspective on overall information systems development and stated that information systems development was best understood as a market phenomenon: how software was developed and who performed that development and sold the related products and how they were introduced to users. He emphasized the increasing specialization of software producers as distinct from software-consuming organizations. He contrasted software product development with Information Systems Development (ISD), exploring important implications for consumers.

Boubekri (2001) claimed that choosing the right ERP system for a company is the key for gaining the competitive edge. ERP is a key technology enabler to integrate demand, supply, manufacturing, scheduling, transportation, and network optimization functions of corporations.

In sum, the new economy claims information-based manufacturing, and further with the introduction of internet economy, web technology is used to coordinate the supply-chain activities in manufacturing. Therefore, researchers suggest that the internet can enhance information-based manufacturing. The financial, business, technical and political reasons apply for outsourcing ERP packaged solutions from application service providers that can offer logistics support over the internet.

Since the new economy involves information-based manufacturing based on ERP systems, the whole software development and its release is investigated as a market phenomena. Therefore, authors put forth the fact that the market stimulates ERP

software producers to specialize further to keep up with having a competitive edge. As a consequence, choosing the right ERP system within this ERP software paradise is the key for gaining competitive edge for a company.

Once an ERP adoption decision is made, academics suggest the use of knowledge management to support ERP system implementation throughout its life cycle. Moreover, they also mention that there exist some micro-political difficulties in ERP implementation and team-working. Consequently, there also exist managerial competencies in the complex interactions required for organizational integration of ERP. Furthermore, most of the time BPR is inevitable. The critical success factors for organizational fit of ERP, and why implementations fail have long been an academic concern as well as the impact of ERP implementation on organizational knowledge, organizational structure, on job characteristics, on decision-making process, on empowerment of management control and on empowerment of employees.

Some authors also were concerned with how to assess organizational benefits and business value following an ERP implementation. They suggested that ERP provides tangible benefits and has a positive impact on the organization's performance. The real focus would be on how to maximize benefits from ERP. They showed the evidence of a causal link between IT adoption and subsequent improvement in operational performance measures in a certain time-frame.

Other aspects of ERP systems were also investigated. Some authors mentioned that companies do not seem to recognize the competitive advantage of SCM and CRM side of ERP in meeting business goals. Further they suggest that ERP attempts to answer certain problems in the process of accumulation of capital.

However issues related to ERP selection process is only emerging. According to IT/IS literature, some research has been conducted or under progress related to issues concerning ERP purchase decision, ERP selection factors, and the process itself. The

following presents an overview of the ERP selection literature review concerning factors influencing ERP purchase decision.

2.3. Factors That Apply to the Decision to Acquire an ERP System

Conventional ERP-related publications mainly focus on "Implementation Process". This corresponds with the focus taken on ERP systems by the commercial publications, also dealing predominantly with the implementation and associated problems.

According to the literature, the last decade have seen a dramatic growth in the use of ERP systems, in particular by world-class organizations eager to develop an international information systems strategy. Key drivers in this trend can be summarized as follows (Skok, 2001).

- Legacy systems and Year 2000 (Y2K) system concerns
- Globalization of business
- Increasing national and international regulatory environment
  e.g. European Monetary Union
- BPR and the current focus on standardization of process e.g. ISO 9000
- Scaleable and flexible emerging client/server architectures
- Trend for collaboration among software vendors

Companies' tendency of adopting ERP systems depends upon several reasons. First, as a surprising motivator, the trade press cites Y2K problem as the major reason in the upsurge of the demand for ERP systems in the mid-1990s (Caruso, 1998). Another reason for the need of ERP systems implementation is stated as to simplify and standardize IT systems as well as to provide accurate data flow from operations

and business functions in order for improving the interactions with their customers and suppliers as their new strategic advantage (Caruso, 1999). On the other hand, the major underlying consequence is, of course, the improvement in the business process that would stimulate the overall productivity for the enterprise.

Therefore, ERP systems are described as business solutions rather than solutions for information systems problems such as Y2K (Caruso, 1998). While IT staff are closely involved, the size and scope of these systems also required senior executive support in setting priorities and allocating resources since the adoption of ERP systems is a top-down decision (Hansen et al, 2001).

For companies, the factors driving the investment search are implied as improving the performance of existing activities, an awareness of new and better ways of doing things is an incentive for new investment. Progressive organizations show tendency not to be seen as being technologically backward; in fact there is kudos in being perceived in the vanguard, at the so-called cutting-edge (Oliver and Romm, 2000) (Rooney and Bengart, 2000).

Further, information systems investments are in of three categories. These are infrastructure, business operations, and market influencing (Oliver and Romm, 2000). Consequently, ERP systems fall within the middle category as they are designed to support core business operations. The driving forces for investments in this type of system are as follows: improving the performance (speed, accuracy, economics) of existing activities, integration of data and systems to avoid duplication, inconsistency, misinformation, and avoiding business disadvantage or allowing a business risk to become critical (Oliver and Romm, 2000).

It is evident that for an ERP system to be considered as a solution it is necessary that an organization looks beyond its own software development resources to those available in the market. In their study Oliver and Romm (2000) quotes that

> Since designing and implementing integrated software packages is not the business of most companies or a focus of their executives, the systems their internal personnel come up with will never equal the quality, scope, or technology of those created by software firms whose business is. Building a cost-effective software application that rivals the functionality available in the market place would be nearly impossible (Oliver and Romm, 2000).

ERP software acquisition tendency for companies are separated in two types: **support-ERP purchases**, and **value-chain ERP** purchases (Brown et. al., 2000). Support-ERP purchases involve acquisition of just the support modules of an ERP system-software such as human resources and/or financial/accounting modules etc. On the other hand, value-chain ERP purchases involves purchase of any combination of value-chain modules of an ERP system-software such as materials management (purchasing and inventory management), production and operations, and/or sales modules etc. But it may also include the purchase of one or more support modules. Subsequently, Brown et. al. (2000) indicates that there are four business and four IT factors or qualities affecting this tendency, or in another words, the ERP purchase decision.

Business qualities of ERP can be listed as the ability to better meet various competitive business goals, the desire to re-engineer business processes, the desire to access integrated data, and increased business flexibility. IT qualities of ERP are the desire to replace aging mainframe systems with more modern, enterprise-wide client-server architectures, the desire to replace the legacy systems that no longer meet firms' need, the desire to reduce information systems costs by buying rather than building software, and avoiding Y2K problems. In their study Bernroider and Koch (2001) identify 29 inquired ERP selection criteria by applying the Delphi Method[6] to the combination of 138 organizations having the distribution of 22 small or medium-size companies, and 116 large companies. Their results are listed in Table-2.1.

Subsequent benefits of ERP are stated as the reduction of general administration costs related to the support and maintenance of multiple system, the global visibility of information across company such as available material or sales backlog, and the increased efficiency in manufacturing, and being an enterprise information backbone over which other applications were overlaid such as providing a central repository for the accurate and real-time data which sets the foundation of an e-commerce solution (Brown et. al., 2000).

[6] Delphi Method is a qualitative forecasting technique where the opinions of the experts are combined in a series of iterations. The results of each iteration are used to develop the next, so that convergence of the experts' opinion is obtained (Cox et. al., 1995).

Table 2.1. ERP systems selection criteria (all organizations, ordered by a percentage of importance).

	Very Important (percentage)	Important (percentage)	Rather unimportant (percentage)	Irrelevant (percentage)
Increased Transparency and Better Information Flow	65.8	30.8	1.7	1.7
Well Tried Software System	60.3	36.2	2.6	0.9
Good Support	56.0	40.5	3.4	0.0
Y2K Problem	54.2	22.9	14.4	8.5
Adaptability and Flexibility of Software	52.6	41.4	5.2	0.9
Shorter Cycle Time	52.1	39.3	7.7	0.9
Process Improvement	48.7	41.4	5.2	0.9
Currency Conversion (i.e. Euro)	47.0	29.1	13.7	10.3
Increased Organizational Flexibility	46.2	39.3	11.1	3.4
Increased Customer Satisfaction	42.2	36.2	16.4	5.2
Internationality of Software	36.8	27.4	20.5	15.4
Other Strategic Considerations	36.2	35.3	22.4	6.0
Modular Architecture of Software	35.7	52.2	10.4	1.7
Higher Reliability	32.5	51.3	9.4	6.8
Market Position of Vendor	32.2	49.6	13.9	4.3
Implementation of Desired Business Processes	31.6	47.0	16.2	5.1
Short Implementation Time	31.0	52.6	12.1	4.3
Operating System Independency	28.4	37.1	28.4	6.0
Availability of Tools for Software-Adoption	27.7	45.5	21.4	5.4
Ergonomic Software	27.4	55.6	15.4	1.7
Availability of Special Solution for Branch of Business	26.3	28.1	30.7	14.9
Improvement of Organizational Structure	22.0	45.8	29.7	2.5
Guidelines from a Controlling Company	21.9	19.3	14.9	43.9
Improved Innovation Capabilities	19.3	38.6	33.3	8.8
Increased Know-How	12.0	36.8	40.2	11.1
Customer and Supplier Needs	11.2	19.0	27.6	42.2
Better Application of Management-Style	10.4	40.0	40.9	8.7
Improved E-Commerce Support	5.1	23.1	43.6	28.2
Improved Internet Services	4.3	34.2	38.5	23.1

Source: Bernroider and Koch, 2001

2.4. Conclusion

According to the observations gained from information systems literature, it is recognized that academic efforts corresponding to ERP focus on implementation and associated problems. As it was mentioned earlier, some publications tend to identify critical success factors of implementations. Other publications investigate implementation phenomenon through case studies. These were either to describe the impact of ERP on organizational structure and job characteristics, or to explore strategic options open to firms beyond the implementation of ERP systems.

Evidently, some publications attempt to make recommendations on how to maximize benefits from ERP, or how to avoid failures. Some studies intend to identify issues of ERP alignment with business processes, as well as BPR and Change Management (CM) concepts. Other publications set focus on global SCM and CRM issues.

On the other hand, suggestions of an ERP knowledge management and ERP performance assessment are also implied. Furthermore, latest publications have introduced new economy, triggered solely from enterprise-enabled applications over the internet and e-business practices. Finally, from the quite few publications released about ERP selection issues, it is observed that academic attention on this issue is emerging.

As a matter of fact during the ERP literature review, it was apparent that there has been little and shallow interest paid for the ERP selection process. Evidently, the importance of ERP selection has long been underestimated not only in academic perspective but also in practice. It is also clearly seen from the mentioned literature that problems occurred during implementation and post-implementation were caused by improper ERP selection. Therefore, the key point in the organizational fit of ERP lies beneath the selection of the right ERP system at the right time. Consequently, to fill the gap between academic point of view and practice, from now on the focus will be on ERP selection process.

CHAPTER III

ERP SELECTION PROCESS

3.1. Introduction

ERP is an industry term for the broad set of activities supported by multi-module application software that helps a manufacturer or other business in order to manage the important parts of its business, including product planning, parts purchasing, maintaining inventories, interacting with suppliers, providing customer service, tracking orders, configuration management, quality management, process management, data management, project management, financial accounting management, treasury management, enterprise controlling, investment management, plant maintenance, sales and distribution and human resources management. Increasingly, ERP came to be viewed as an enterprise information backbone over which other enterprise applications were overlaid.

ERP sets up standard processes by which companies handle transactions and has proven itself particularly adopt at consolidating the purchasing functions and in tracking the total costs of transactions. ERP can feed this transactional data into other applications, such as logistics, supply chain or product data management solutions; there to be organized and optimized for the purposes of those processes and functions.

No other basic technology platform has yet emerged to rival ERP as an enterprise systems architecture and business process controller (Gartner, 2000). However, the deployment of an ERP system can involve considerable business process analysis, employee retraining, and new work procedures. While ERP can really pull companies' business functions together to work more efficiently, it has a down side

of time and cost. The selection of the right ERP system, implementation and maintenance processes are of vital importance, and necessitates serious research and commitment since it requires certain level of process adaptation and touches corporate culture and work organization. The most critical part in application of ERP systems for ERP developers and user companies is the implementation period, and implementation success factor is critical. Most of the ERP projects were judged to be unsuccessful by ERP implementing firms. The main focus of practitioners and academics have long been on determining and analyzing critical success factors in ERP implementation, post-implementation, and other organizational issues. And the acquisition process for ERP software is for the part mostly being ignored (Verville and Haligten, 2003). However, this issue is important as the stage preceding the implementation process; it presents the opportunity for both researchers and practitioners to examine all of the dimensions and implications of buying and implementing ERP software prior to the commitment of formidable amounts of money, time, and resources (Verville and Haligten, 2003). In another words, lately it is recognized that the main point in ERP implementation failures is the lack of selecting the right ERP system at the very beginning. Therefore, it happens to be impossible to provide an organizational fit of the dedicated ERP system. Neither the field of MIS nor the field of Organizational Buying Behavior (OBB)[7] has adequately considered the acquisition of ERP software (Verville and Haligten, 2003). OBB is one of the research subjects of specialized fields of Management Science such as International Business Strategy, Strategic Marketing, and Business to Business Marketing. Basically, OBB tries to reveal the forces shaping the buying behavior of organizations and the major elements of organizational buying process (Auh, 2004). It discusses individual influences, environmental (economic and technological) influences and strategic role of purchasing. Further, it analyzes how organizations screen alternatives and establish evaluation criteria, and it also discusses formation of individual preferences, organizational preferences and risk reduction strategies (Auh, 2004). However, as far as ERP systems selection process is concerned, little insight

[7] OBB is a marketing term for buying decision-making process of an organization rather than an

has been provided from any of these areas. According to the literature, it has been observed that ERP systems selection issues are quite new for the academic attention so that little has been done to date to organize and summarize the findings and knowledge gained from all ERP software selection research. The purpose of this thesis is to develop a comprehensive research on the ERP systems selection process and take the first step toward integrating the stream of research on all ERP systems selection related issues.

3.2. Why is the Correct ERP System Solution Selection Important?

Since early 1990's, the ERP software market has been and continues to be one of the fastest growing segments of the information technology industry with growth rates averaging from 30% to 40% per year (Verville and Haligten, 2003). With worldwide sales of ERP software estimated to exceed US $22 Billion by the year 2001, packaged applications would represent a significant portion of most IT portfolios (Meta Group, 1998). With costs equaling several thousands, hundreds of thousands, and even millions of dollars, ERP packaged software purchases are high expenditure activities for organizations that consume significant portions of their capital budgets. While overall IT expenditures already represent a significant portion of ongoing capital expenditures for many organizations and will continue to increase, little is known about how these expenditures are made, or what organizations go through when they buy IT such as ERP packaged software, what processes do organizations use and what are the specifics involved in those processes (Verville and Haligten, 2003).

Unfortunately, user companies are behaving very unconscious about choosing the ERP systems without recognizing the socio-technical challenges they bring along with them. Even national cultures of companies may play a major role discouraging

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individual customer (American Marketing Association, 2004).

their members to invest through a selection process. Most of them avoid to engage in a true selection process, because the ERP market is dominated by a few 'giant' companies which market their products as one system fits-all perspective. Thus, despite the significant risk involved in purchasing and implementation of ERPs, companies are implicitly discouraged by vendors from engaging in a true selection process. However this argument is not true. There is no one generic ERP solution that fits all organizations. In order to find a system that is appropriate for an organization, a true selection process needs to be undertaken (Livermore et. al., 2002). Further to provide a unique ERP solution, it is inevitable for the user to introduce customizations on the system. ERP selection process is a serious business since ERP system implementations differ from installing dedicated software packages, because ERP software is process-based rather than function-based (O'Leary, 2002). Hence, users may have to make changes to business process and procedures. Most of the time ERP necessitates BPR in order for satisfying organizational-fit perspective, and as a result it requires change in organizational culture.

Next, ERP system implementation projects are expensive and complex since they bring large financial costs along with them. They are considered as a large capital investment for an organization, though the decision to choose one is not purely financial (Shakir, 2000). Last, ERP projects are huge and have no end. It is an endless journey making the user become dependent on the vendor for assistance, technical support and updates. Moreover, they are not just IT projects but business projects. Therefore, ERP projects require serious commitment, comprehension and support from the top-management and dedicated staff throughout the project.

Even though, management of a firm is conscious about choosing an ERP system, the selection of the appropriate solution is still a semi-structured decision problem because only part of the problem can be handled by a definite or accepted procedure such as standard investment calculations and on the other hand the decision maker needs to judge and evaluate all relevant and intangible business impact aspects.

There is no agreed-upon and formal procedure for this important task, while nevertheless the corresponding decisions strongly influence long-term business success (Bernroider and Koch, 2001).

Moreover, the decision to install an ERP system may be taken for political, tactical, or strategic reasons. In his study, Shakir (2000) reveals six Decision-Making Models and describes the assumptions and the decision-making process for each. Each model can be reviewed briefly as follows.

In **classical model**, decision-makers seek the best alternative to maximize goal achievements. The process is a series of sequential steps, which are: 1. Identify the problem, 2. Diagnose, 3. Develop alternatives, 4. Consider consequences, 5. Evaluate, 6. Select best alternative, 7. Implement and evaluate.

In **administrative model**, decision makers look at alternatives that meet minimum standards. The decision-making process is cyclic and learning is a part of it.

In **incremental model**, decision makers make small incremental changes by making successive limited comparisons starting from the present situation with no set of clear objectives. Successive comparison is thought to be an alternative to using theory, which guides the decision making process for both the classical and the administrative models.

The **adaptive model** is a mix of the administrative and incremental models. Incremental decisions are made within a framework for existing mission and policy.

In the **irrational model**, a decision does not begin with a problem and end with a solution. Decisions are a product of organizational events. The decision making process relies on chance rather than rationality. Decision-makers scan for matches among solutions, problems and participants. A decision is not made until a problem matches an existing solution.

And finally, **political model** is the one in which politics replace organizational goals. The decision making process is influenced by decision-makers. In his study, Shakir (2000) tries to apply these six decision models to the different phases of the ERP project using the data from a case study of a health service provider organization in New Zealand. He suggests that only three decision models out of six apply to it.

These are the **administrative**, **adaptive**, and **political** models. His findings further suggest that decisions during the lifecycle of the ERP project are structured or semi-structured, and personal and group politics influence decision-making. In that case, neither the classical nor the incremental or irrational models were present. This implies that decisions are least likely to be exhaustive, complicated or accidental.

On the other hand, the difficulties of installing such a complex software system are often underestimated. In most cases, a vendor or a consulting company presents an organization with a methodology that is to be followed. How well an advising vendor can analyze a user company or the appropriateness of the suggested procedures is a continuing debate in information systems community.

Obviously, selecting and managing an Enterprise system requires a wide range of knowledge. In their study, Rosemann and Chan (2000) list five different types of knowledge for successful management of enterprise systems. These types of knowledge during an ERP system software implementation project to be kept in mind are: **business knowledge**, **technical knowledge**, **product knowledge**, **company-specific knowledge**, and **project knowledge**.

Only **business**, **technical**, and **company-specific** knowledge are necessary during selection process. **Business knowledge** covers the business issues that should be addressed before the implementation of the ERP system. It includes functional knowledge in areas like general ledger accounting, purchasing, sales, human resource management, or strategic planning, organizational knowledge like business process

management, communication policies, or document management, educational knowledge, and knowledge about enterprise culture. **Technical knowledge** represents knowledge that is necessary in conjunction with the selection and use of database management software, network management, add-on programming, client-server architectures, performance measurement, etc.

From the selection of the ERP system to its configuration, all the ERP system management is done in a specific company with characteristics and organizational population peculiar to it. **Company-specific knowledge** takes this into account. An enterprise system can not be managed successfully without having a precise understanding of these company individual factors. This type of knowledge is related to business and technical knowledge (Rosemann and Chan, 2000).

Product knowledge, on the contrary, reflects the need for knowledge specific for one ERP's solution. Most ERP solutions are comprehensive packages with a high degree of complexity. Consequently, ERP systems became an area with an enormous importance of product-specific knowledge. It includes the understanding of the architecture of the product, knowledge about its functionality and constraints of applications, the implementation methodology, the release strategy or knowledge about the ERP system's programming language (like SAP's ABAP). Therefore, this type of knowledge combines from a product-individual point-of-view business, technical and project management knowledge.

Project management knowledge covers the management of human resources, time and cost to achieve the objectives of a project. The implementation of an ERP system approximately requires a time between 6 to 24 months, hence project management involves planning, organizing and controlling a project with various time and cost constraints (Rosemann and Chan, 2000).

3.3. A Framework for ERP System Selection

The origins of ERP systems are the MRP systems. The MRP families were focused mainly on manufacturing operations while the ERP systems support the integration of other functions like sales, marketing, human resources and others. ERP systems have evolved to support other functionalities that were offered separately such as SCM, CRM, professional service automation (PSA) and others (Shakir, 2000).

The market for ERP is growing rapidly at an annual growth rate of 32% with an expected annual revenue of US $66.6 Billion by 2003 (Shakir, 2000). Despite the fact the high-end of ERP market is saturated because the Y2K problems are thought to be resolved by now, but future growth is predicted and electronic commerce is its new driving force for the future (Shakir, 2000).

There are two important issues to be considered in developing a framework of ERP systems. Given the organizational, technological and behavioral impact of ERP, a broad perspective of the ERP systems adoption/implementation process is needed. Technological, business and organizational contexts should be studied in a unified way, which encourages the examination of interrelated key success factors.

Certain issues specific to these systems have to be taken into account, such as the unsuitability, most of the time, of ERP software modifications to meet institutionalized business operations and the extent of BPR required prior to the implementation of the software. In traditional IS development theory, the software has to fit in to certain business processes, probably adopting and reproducing organizational inefficiencies.

In ERP systems implementation the reverse course is usually effective. Accepting the fact that the ERP product models the standards of best practice, and due to complexity of the system, enterprises prefer to adapt their business processes to software's in-built best business practices (Shakir, 2000). Modification of the

standard ERP configuration options to fit business processes is costly, risky, time consuming and difficult (Davenport, 1996). (Stefanou, 2000).

Therefore, attempting to micro-manage ERP customization, denying BPR needs, forgetting about change management and optimization of their own structure are the major signals for wrong ERP selection process (QMI, 2003).

While the IS/IT literature is rich in study of various aspects of ERP phenomena, none of these were focused on the selection process itself until recently. Three contemporary studies have been found to formalize ERP selection criteria and suggest a model for ERP Selection Process.

In the year 2000, a study released by Stefanou proposed ERP selection model consisting of three phases (Figure-3.1). **The first phase** considers the business vision as a starting point for ERP initiation. **The second phase** consists of the detailed examination and definition of business needs, and of the various constraints. Before proceeding, the desire and commitment to change by all people in the organization, needs to be evaluated; it is a significant force required to fill the gap between business need and constraints. **The third phase** considers the selection of modules of the core system that support critical business practices and of any additional applications the enterprise may need in view of the requirements analysis performed in the previous phase. Certain criteria for vendor, product, and implementation partner selection are examined. This phase also includes the estimation of the cost of the investment required for purchasing, implementing and maintaining the proposed system throughout its life-cycle (Stefanou, 2000).

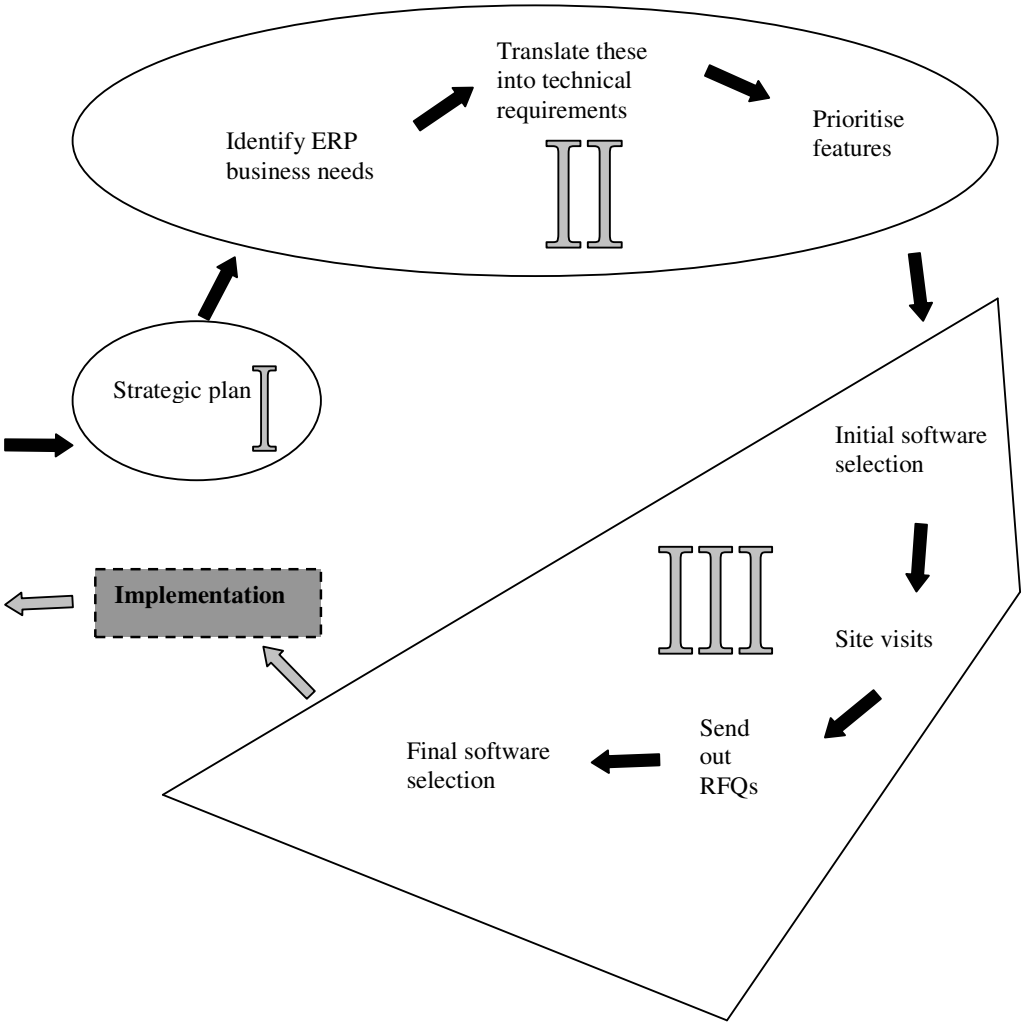

Figure 3.1. ERP Selection Process Phases
Source: Author's presentation of the model proposed by Stefanou, 2000.

Later in the year 2000, another study presented a proposal for selecting ERP products from a formal description of their characteristics. This effort resulted a systematic methodology called SHERPA (Systematic Help for ERP Acquisitions). SHERPA is a methodology tailored for small to medium-sized companies for which it is difficult to apply other existing, more sophisticated methods. It covers all the ERP acquisition process, from the search for candidate ERP systems to the signature of

the contract with the provider of the selected ERP and related services. It consists of **five phases** that involves: 1. Defining the need that should be fulfilled with the help of an ERP product and/or related service, 2. Finding suitable products and services in the market that may help in the fulfillment of such a need, 3. Establishing appropriate criteria for the evaluation of ERP systems, 4. Evaluating products and services in the light of these criteria, 5. Selecting the best available product and service, and 6. Negotiating the final contract with the vendor or service provider (Illa et. al., 2000). They further used a formal language, which dealt with components and packages selection criteria, as a support of the SHERPA methodology. Hence, they proposed formal resulting descriptions of selection criteria which they considered to be satisfactory.

Further in the year 2003, another study was conducted on how organizations cope with the task of acquiring ERP packaged software applications. Although the study is focused on the buying process itself, it also reveals several issues relevant to the need and readiness of the organization both for the acquisition process and for the new ERP software. Moreover the results of this study prove, contrary the wide-standing belief that IT acquisitions are routine and fairly simple, that acquisition of this type (for ERP systems) are complex, involved, demanding and intensive (Verville and Haligten, 2003). In this study, authors present a model for ERP software acquisition process called MERPAP (Model for ERP Acquisition Process). This model includes a six distinctive but interrelated processes as; planning, **information search**, **selection**, **evaluation**, **choice** and, **negotiations**. Among these processes, the authors indicate that **planning** is the essential part of MERPAP since it involves with the formation of acquisition team, acquisition strategies, requirements definition, selection and evaluation criteria, acquisition issues such as BPR, marketplace analysis, and deliverables such as the construction of Request For Proposal (RFP) (Verville and Haligten, 2003).

Having considered all these three models and other studies relevant to ERP selection issues, it is possible to construct a framework for ERP selection process. This

framework would have three main phases: business vision, business requirements, and ERP software selection.

3.3.1. Phase I: Business Vision

This is the fundamental phase if an ERP selection team is to evaluate how well each ERP adapts to the organization (Illa et. al., 2000). Herein the project team studies the business mission, strategy, its departments and business processes. Stefanou (2000) states that effective IT/IS project implementation requires a clear business vision, which clarifies the organization's direction, the goals, and the business model behind the implementation of the project. Enterprises are transforming their IT infrastructure in order to meet changing conditions in business worldwide and to take advantage of new developments in IT and communications. Therefore, business processes should be aligned to IT strategy and accordingly, and ERP systems must fit in to this strategy. Davenport and Short (1990) argue that the first step in IT- enabled process re-engineering is to develop the business vision and process objectives. The extent to which ERP systems have shaped the IT industry are captured in the following comparison. Oliver and Romm (2000) quotes that twelve years ago, IT people identified their organizations as IBM or Digital shops but now more likely to be SAP or PeopleSoft.

3.3.2. Phase II: Requirements, Constraints Analysis and Change Management

In this phase a company decides whether it has to acquire an ERP. This decision requires analysis of each alternative such as internal or external custom development, integrating best-of-a-breed packages, maintaining existing systems, etc. (Illa et. al., 2000). In their study, Sammon et. al. (2001) state that the quality of analysis carried out at the earliest stage of ERP projects, which has received so little attention from researchers so far, is the primary factor in enabling companies to derive benefits from ERP over and beyond other firms. In other words, the only way to get more benefit from an application is in successfully analyzing the distinctive competence

and the specific needs of the firm (Sammon et. al., 2001). This phase consists of an important business exercise in change management.

The decision concerning the adoption of an ERP system has to be made according to both the current and the future status of the enterprise, which is constrained by various technological, organizational and financial inefficiencies (Table-3.1). The project team, consisting of users, managers and consultants should develop a detailed critical ERP functionality and enhancements requirements matrix, followed by a list regarding the organizational and technological changes required for the successful implementation of the system.

This team plays an important role in the success of the acquisition projects; therefore, the formation of each acquisition team is the key issue (Verville and Haligten, 2003). In the planning phase of the MERPAP, acquisition team formation is proposed as follows. In the formation of each acquisition team, first a project leader is selected. The project leaders are not always from the organizations' IT departments (i.e. they can be from finance, quality control, etc.). Second, the skills; user-area defined, or function-specific, technical, leadership; managerial, organizational; problem solving; decision-making; administrative; negotiation etc, that are required for the acquisition team are identified. Each individual team member needs to have skills that enabled them to assume a specific set of tasks or responsibilities within the project. Third, cross-functional or multidisciplinary team members are selected. Next, for each of the roles of the individuals that were on the team are identified. Some of which includes project leader, task-specific roles such as for the information search, the role of liaison between the vendors and the acquisition team, department or user-area-specific roles such as for finance, human-resources, manufacturing, etc.: the role of technical team leader, the roles of users on the team, the roles of departments like purchasing, etc. Each individual team member needs to perform a functional and/or advisory role based on their abilities or past experiences. Each team member also needs to understand each role as it belonged to each team member, as well as those roles, which were shared among members. Next, an assessment is made as to

whether outside experts or consultants were needed to complement the acquisition team members' skills. Next, both users and IT staff are selected. Members of the acquisition team are drawn from the various departments that are to be impacted by the ERP. Next, a representative from the Purchasing Department is selected to be on the acquisition team and they are involved right from the earliest stages of the acquisition process. Next, the long-term availability of individuals is considered when they are being recruited for the acquisition team. Finally, the crossover involvement of many of the acquisition team's members from the acquisition project to the implementation project is also considered. The primary reasons for this are project memory and continuity (Verville and Haligten, 2003).

In decision-making process, organizations of small and medium size use for the most part only static investment methods, while large organizations also employ dynamic methods, or utilization ranking analysis. The use of these methods correlates significantly with the size of the organization (Bernroider et. al., 2001). The methods or strategies that a team develops for the ERP acquisition help to reduce some of the uncertainty associated with this process. Among the strategies to be developed, the team can choose to bring all of the vendors on the long list together in one location for an information session, or the team can choose to have product demonstrations at the vendors' sites, or they can choose to visit vendors referrals, etc (Verville and Haligten, 2003). Organizational flexibility and internationality are less of an issue for smaller organizations compared to cost and adaptability of the software. For small or medium sized organizations, the decision process took in the mean 19.3 weeks and resulted in mean costs of 414,000 Amount of Time Spend (ATS), while large organizations incurred expenses of 984,000 ATS during the 26.8 weeks duration (Bernroider et. al., 2001).

Table 3.1. Requirements vs. Constraints

Requirements

- Operational Efficiency
- Supply Chain Optimization
- E-commerce
- Other

Constraints

- Technical
  - Legacy systems
  - IT architecture
- Organizational
  - Business processes
  - Management structure
  - Leadership
  - Commitment
  - Communication
  - Training
- Financial
  - Budget limitations
- Time constraints

Source: Stefanou, 2000

3.3.2.1. Business Requirements

The main concern of the ERP selection team is to define the organization's requirements for the ERP solution. Therefore, they need to analyze their organization's existing technological environment, the functional requirements, the technical requirements, the organizational (business, procedural, and policy) requirements, the different user areas and functions, existing processes in the areas that were to be affected by the new software, and as many problems and opportunities as possible (Verville and Haligten, 2003).

Both current and future business needs, arising mainly from external competitive pressures, have to be balanced against various technological, work and organizational constraints. Companies engaging in E-Commerce or supply chains operate in a sophisticated business and technological environment and they can be

heavily computer-intensive. In such cases, the effectiveness of ERP systems, which span beyond traditional organizational boundaries, require collaboration between partners, coordination of decisions, as well as accurate and real-time information flow in a network of enterprises. The examination of needs and constraints will reveal that for a successful ERP system implementation, a radical change in business processes, towards simplification and efficiency, must take place. Such is the case, for example, when developing systems with a customer perspective or adopting best practices from industry. Therefore, a critical factor that should be considered at this stage is the desire and the commitment to continuous change not only by top management but also by the steering committee, the systems' users and by all members of the project's implementation team. It is also likely that ERP acquisition will have to be postponed or rejected in view of the high risks involved.

3.3.2.2. Constraints

Constraints are categorized into five aspects: technical, organizational, human, financial and time constraints. Technical Constraints consists of costs incurring from using multiple hardware and software platforms. These costs could be significantly reduced if there is a common IT architecture, including software and hardware platform, development. Scalability and flexibility of the IT infrastructure is critical in order to support additional applications and systems and it should be assured before proceeding to the ERP procurement process. Software, hardware and LAN/WAN costs can be quickly calculated based on the total number of ERP modules implemented and the number of end-users of the new system (Komiega, 2001). Chan (2000) highlights the integrated ERP systems features and the market trends. Moreover in his study, the author examines architecture choices for ERP systems.

According to Chan (2000), the common features of ERP systems are as follows. First, they are online systems with no traditional batch interfaces. They involve with

one integrated, relational database for all data and each data having a clear definition and documented in a data dictionary. They provide efficient support of back-office transition processing, such as accounts payable, but weak in decision support and analytical support. They are also templates for processes performed by best practices in a specific industry sector, and client-server computing, network infrastructure, relational databases, and graphical user interface. Several market trends influence the architecture of leading ERP systems: integrated database, client-server architecture, three-tier thin client-server architecture, web client-server, web enablement and Electronic Commerce technologies, and open systems environment (Chan, 2000).

As mentioned previously, an organization's current technology environment will influence the selection and implementation of ERP systems. Generally, an IT environment falls into one of the following categories signaling different generation of technology architecture and organizational maturity.

First, the mainframe-centric environment is characterized by centralized legacy systems, fragmented LANs, limited use of desktop computing and data access. There is still a predominant environment in the not-for-profit sector and many small companies. Second, the network-centric environment is built on the WAN and client-server computing. Data sharing and efficient use of work stations and productivity tools and groupware characterize a high degree of user competency and interactive organization supported by networks, common tools, and database. Last, internet-centric environment adopts Internet and Web technologies to accelerate the sharing and distribution of information within and outside of the enterprise boundary. This environment is achieved when a distributed network is in place and users are adequately trained (Chan, 2000).

Chan (2000) also suggests a framework to assess the gaps between architecture requirements and current IT environment to develop implementation strategies. The architecture components and the gap analysis in a mainframe-centric

environment is illustrated in Table-3.2. A checklist for ERP Technology requirements is also presented in Table-3.3.

Table 3.2. A Framework for Assessing ERP Implications

Architecture Components	Requirements	Current Environment	Implications
Network Infrastructure	Wide Area Network	Fragmented LANs Lack of a single network Lack of LAN standard Lack of common email No integrated WAN	Delay ERP until infrastructure is in place. Build infrastructure as a capital project or as part of ERP proposal. Outsource infrastructure development and construction to accelerate timetable.
Server OS/Platform	Open Systems Unix Based Non Unix Based	Mainframe or midrange hosts Proprietary OS	Challenge in managing an open system environment. Reluctance of mainframe IS group to change platform.
Database	Relational DBMS	Mainframe flat files Duplicated reports and applications Multiple data entries Lack of query capability	Relational database allows flexible query and reporting. Shifting responsibility in information management to users.
Data Ownership	Integrated Database Clear ownership and data sharing	Unable to share data Duplicated data capture	An integrated database demands significant process re-engineering and data policies.
Client OS/ Workstations	High-end workstations Common standard	Low-end PCs Lack of software and OS standards	Easy to achieve a compatible client environment if funding is available.
Web Enablement	Common Web Browser Intranet and Firewall Bandwidth	Lack of knowledge and skills in Internet technology Firewall and high speed network not in place Uneven use of Web browsers Lack of policies and standards	Presents creative opportunities for e-government Need Internet strategies, security and firewall.
Prerequisite User Skills	Windows, GUI,desktop Productivity tools	Uneven knowledge of packages and operating systems	Target basic training prior to FMIS implementation.
IT Capacity	ERP Package Client-server OS	Skill gap in ERP, c/s, and relational database	May need a two-tier IS support structure: Central IS

	Relational database Network management Transaction Processing Process Reengineering User training and Support	Absence of a strong network group in IT division Inability to manage distributed environment	support infrastructure and database, User group support help desk, training, and application maintenance.

Source: Chan, 2000

Table 3.3. A Checklist for ERP Technology Requirements

Software Release	Does the current release support full client/server architecture? Does the current release support a mixed environment of mainframe and client/server? Does the current release have only a mainframe version?
Architecture	3-tier(or n-tier) thin client architecture 2-tier fat client architecture Both 3-tier and 2-tier client/server architecture Mainframe or midrange hosts only
Server Operating Systems	UNIX, Windows NT, OS/400, other
Server Platform	UNIX-based, Multi-platforms, Mainframe as Enterprise Server, Other
DBMS	Oracle, Sybase, MS SQL Server, DB2, Other
Client OS	Windows NT, Windows 95, Windows 3.x, Character screen with host software
Client Workstations	Pentium, 486 minimum, <386, 3270 terminals
GUI	% of GUI (% of screens are in full GUI)
Web Browser Enablement	% of Web Browser Enabled (% of software can be accessed via a browser)

Source: Chan, 2000

Despite of technological constraints, organizational constraints include, among others, the degree of the decentralization, the management structure, the style of leadership, the rigidity of business processes, and the company's culture. Resistance to change, prestige, job security feelings and departmental politics are also involved. It is argued that organizational factors are more important than the technological ones for successful implementation of ERP systems.

Another type of constraints is of course human resources constraints. Even though, the base costs of software licenses, hardware (server and client) and network infrastructure, the greatest costs are obtained from consulting services, training and internal resources (Komiega, 2001). A cross functional implementation team consisting of both business and IT/IS people and of internal personnel and external consultants can be very effective in implementing ERP software.

However, the lack of experienced external consultants and trained and educated employees in ERP philosophy represents a serious constraint that could jeopardize the implementation project. Consulting costs generally equate to fifty percent of the total project cost. Second, training of an entire organization equates to ten to twenty percent of the total project cost (Komiega, 2001). On the other hand, the costs that seemed to be overlooked or underestimated are those resources from the operations necessary to assist in the design and testing of an ERP solution, and certainly a dedicated staff who would internally support ERP organization.

The major down side of ERP Implementation process is of course, time and financial costs that it brings along which constitutes financial and time constraints. Any project of the scale of ERP systems implementation should have adequate financial resources. A lot of hidden costs, such as the period of training required and unanticipated fees of external consultants, may prove to be a barrier to successful implementation.

One final constraint is the time allowed for the selection and implementation process. Unrealistic time frames and deadlines may add unnecessary pressure and lead to project failure. Time cost of ERP implementation is approximately nine to eighteen months (Komiega, 2001).

3.3.3. Phase III: ERP Software Selection and Evaluation

ERP selection process should be undertaken by the usual means of determining the mandatory and desirable features required in a system, and then evaluating the various products according to these requirements. However, these so-called 'usual means' can only be undertaken if the organization has an unambiguous and complete set of selection criteria and a clear understanding of the products on offer (Sammon et. al., 2001). Table-3.4 lists some examples of selection and evaluation criteria.

Table 3.4. Selection and evaluation criteria (examples)

- Improvement over current systems
- Customization
- User interfaces
- Is the platform that the organization intends for the proposed solution to operate on ideal for optimum performance?
- Is the organization's existing DBMS compatible with the proposed solution?
- Can the proposed solution integrate into the organization's existing hardware architecture?
- What is the architecture of the proposed solution: client/server, two-tier, three-tier, or other?
- What is the capacity (minimum and maximum) of the proposed solution?
- Scalability of the system
- Training (in-house or external to the organization: does vendor conduct the training or is outsourced?)
- Performance
- Security features
- Implementation
- Etc.

Source: Verville and Haligten, 2003

These criteria are used in part of marketplace analysis and for the selection process. They are also used to create questionnaires and matrices that are used during the evaluation process.

3.3.3.1. Software Selection

The factors that apply to the decision to purchase an ERP system once companies emerge it as a contender for adoption can be stated as the mentioned qualities of the ERP system, the vendor profile, and economics and financial risk that the company is willing to take. At this stage marketplace analysis comes into question as part of the information search process as it is mentioned in the MERPAP model. This is a market research initiative based on the knowledge obtained on business requirements and strategies analysis looking for ERP systems suitable for the organization (Illa et. al., 2000). During this analysis, the acquisition team is able to determine who the major players are in the marketplace for ERP that they are seeking. This analysis is conducted by high-level criteria to evaluate both the vendors and the functional and technical features of the software and results in a short long list of potential vendors and solutions (Verville and Haligten, 2003). As it is mentioned earlier, the decision to install an ERP system may be made for political, tactical, and strategic reasons (Knapp and Shin, 2001). The decision to purchase and install an ERP system is often made by high level executives who may not understand information systems (Knapp and Shin, 2001). Evidently, what consumer companies want is basically; getting the software up and running as quickly and inexpensively as possible; a manageable system: most smaller vendors say such manageability is the biggest benefit of going with their products because implementations go more smoothly and customers can more easily master the system; better understanding of their corporate cultures and the way decisions got made: midmarket vendors also tend to satisfy this ;and they also have a reputation for offering more hands on service and support, and consumer companies also do not want to take a chance on a smaller vendor whose product is not scalable and who could not support their growth. Bigger vendors pitch the fact that smaller customers can grow with their systems adding functionality on an as-

needed basis, second or third-tier supply chain partners having as strong a technological tie as possible to first tier players, and having reliability to deploy the same ERP software as the first supplier successfully (Stein and Carillo, 1998).

Having highlighted what user companies demand from an ERP system software, third phase in the selection process can be investigated. This phase consists of the selection and evaluation of the appropriate vendor, product and supporting services to fulfill business needs
(Table-3.5).

Table 3.5. ERP Selection.

- Core modules selection
- Extensions (e.g. SCM) acquisition method
  - From same ERP vendor
  - From third party
  - From third party cooperating with ERP vendor
  - Built-in-house
  - Outsourced
- Vendors selection
- Consultants selection

Source: Stefanou, 2000.

The selection process is the intermediary stage between the planning process and the evaluation process according to MERPAP model (Verville and Haligten, 2003). In principal it consists of only two principal elements: “Evaluate RFI (Request for Information) / RFP / RFQ (Request for Quotation) Responses” and “Create Short List of Vendors/Technologies”. The first one deals with the review of the RFI/RFP/RFQ responses from the vendors, and the second pertained to the deliverable of a short list of vendors or products. This is where there exists a recursive activity by the selection team revisiting their plan and refining their criteria.

This lets the selection team to recontact the vendors with requests to resubmit in part or in full, their RFI/RFP/RFQ responses according to team's refined criteria. Then the amended responses are received from the vendors, the teams would conduct a second evaluation, thereby revisiting once again the evaluation process.

The evaluation process, on the other hand, consists of three distinct areas of evaluation: vendor, functional, and technical. As to the vendor evaluation process, it is carried out, in part, during the marketplace analysis and is ongoing throughout the rest of the selection (during the review of the RFI/RFPs), evaluation (with client referrals and input from other sources), and business negotiations (ongoing dealings with the vendors) processes (Verville and Haligten, 2003). Further, the criteria and strategies that are established during the planning process are used to implement functional and technical evaluations. Table-3.6 lists some of the vendor evaluation criteria.

Table 3.6. Vendor evaluation criteria

- Ability to assist the organizations with the implementation
- Association with or the availability of third party vendor/partners
- Vision (future plans and trends regarding the direction of the technology and or strategic positioning)
- Financial strength
- Market share (sales volume, size)
- Annual growth rate
- Customer support
- Product recognition
- Range of products
- Ability to meet future needs
- Ability to provide references
- Reputation
- Vision and/or strategic positioning of the vendor
- Longevity of the vendor
- Qualifications, experience, and success in delivering solutions to organizations of a similar size, complexity, and geographic scope
- Quality of the vendor's proposal
- Demonstrated understanding of requirements, constraints, and concerns
- Implementation plan that properly positions the proposed solution to achieve the maximum level of business benefits
- Implementation services
- Implementation strategy
- Support services
- Etc.

Source: Illa et. al. 2000

Although every one of the established ERP packages offers a broad functionality, they certainly exhibit individual strengths and weaknesses compared with individual business requirements. Certain packages are regarded as having an exceptional functionality in some of their modules, as is the case, for example, with PeopleSoft's

Human Resources module. Other vendors are regarded as specializing in certain industries, supporting industry-specific best practices, as for example SAP in Chemical and Pharmaceuticals, Oracle in Energy and Telecommunications and BaaN in Aerospace and Defense industries. The availability and functionality of additional applications to support current and future business needs such as SCM or CRM is an important factor in ERP software selection.

It should be also examined if the packages under consideration support a certain business practice or operation, which is considered critical, such as make-to-order or make-to-stock manufacturing. Certain characteristics, such as multilanguage and multicurrency capabilities can be the key drivers for selection of an ERP system. Among other factors considered in selecting an ERP system is the availability of experts in the system, the partnering company that will assist in the implementation, the training courses available by the vendor or third parties and vendor's financial position and pricing models (Table-3.7).

Table 3.7. ERP Product/Vendor Selection

- Requirements fulfillment
- Functionality of ERP system's critical core modules
- Industry-specific solutions offered
- Extended applications availability/compatibility
- Critical business processes supported by ERP system
- External experts availability in ERP system
- Implementation partner availability in ERP system
- Implementation partner availability/expertise
- Training offered by vendor or third party
- Vendor's financial position
- Pricing models offered

Source: Stefanou, 2000

There is also a continuing debate over all-in-one vs. best-of-breed ERP software for enterprises searching for competitive advantage. They have the option of acquiring an all-in-one or a best of breed ERP system. Additional applications can be acquired from the same vendor the ERP system was bought, from another vendor closely collaborating with the first, from a third party vendor, built-in house or outsourced. Stefanou et. al. (2000) highlights the advantages of best-of-breed and all-in-one software can be listed as follows:

All-in-one ERP software;

- Consistent integrated processes
- Upgrades compatibility
- Lower cost
- Implementation simpler
- Maintenance easier

Best-of-breed ERP software;

- Functionality enhanced
- Flexibility
- Possible competitive advantage
- Extended applications (SCM, CRM, DSS, etc) widely tested
- No dependence on one vendor.

3.3.3.2. ERP Systems Evaluation and Justification

Any IT/IS investment of such magnitude as ERP implementation needs to be evaluated and justified in a number of ways. A key factor for the justification of the effectiveness of the proposed project is the identification of the extent it contributes to business strategy. Various performance indicators, techniques and approaches, such as Return Of Investment (ROI), value and balanced scorecards have been proposed for the evaluation of ERP software.

One difficulty of ERP evaluation is the intangible nature of both costs and benefits. Despite the difficulties, identification of various non-tangible costs and benefits is possible and should be made at the outset. For example, reductions in transaction systems and technical support personnel, cost savings resulting from better inventory management or value chain optimization, and savings from not upgrading legacy systems can be calculated.

Other benefits, such as perceived customer satisfaction and benefits arising from rapid decision making are more difficult to be calculated, but nevertheless existent. However, describing the benefits arising from the transaction processing improvements is not sufficient to justify ERP package acquisition; for benefits to be realized, organizational change is required. Therefore, a detailed, in-depth investigation of the processes that should be changed in combination with the system and an assessment of the commitment of the top level executives to change management should be the firm base on which to support the decision of acquisition or rejection of an ERP package.

As a result of the selection and evaluation processes, a final recommendation is presented to the steering committee who authorized the final choice (Illa et. al., 2000). It can be argued that "choice" is the natural outcome of the evaluation process and should have been included as a deliverable of the evaluation process.

Following the evaluation justification, the negotiation process is divided into two types of negotiations. These are business and legal negotiation processes. The business negotiations process is continuous throughout the selection process. At this stage the project team negotiates the contract with the selected ERP provider, including the estimation of the cost and the overall implementation plan, and a contingency plan. Finally, IT management and top management give their final approval and the signature of the contract with the ERP provider may proceed (Illa et. al., 2000). Once tentative agreements are reached, and the choice is made, legal

negotiations ensued and let to the completion and sign off of the final contract (Verville and Haligten, 2003).

3.4. Conclusion

As it is mentioned earlier, ERP System selection is of vital importance since it requires various levels of business process adaptation and touches corporate culture and work organization, not to mention the down side of time and cost. The subject is lately gaining attention from academic community as a serious matter of interest. It is not possible to have sound implementation process and the organizational fit of an ERP system if it was the wrong choice from the very beginning.

As there is no one generic ERP system solution that fits all organizations, each ERP selection process is as unique as the company in demand. Therefore, the uniqueness claims the selection of the appropriate ERP solution as a semi-structured decision problem because only part of it can be handled by a definite procedure. However, there is no formal procedure for this essential task. Most of the time, a vendor or a consulting company, or an ASP presents a methodology to be followed for the organization. There are several decision making models that can be categorized as political, strategic, or tactical reasons. Further, in each decision-making model, there is a wide range of knowledge involved. As a matter of fact, this type of knowledge is applied throughout the ERP system implementation project from the beginning to the end. These are business, technical, product, company-specific, and project knowledge. However, only business, technical, and company-specific knowledge applies during the selection process.

After the decision to acquire an ERP system software is reached, ERP selection process can be followed within a framework of three main phases. First phase is also the fundamental phase where the selection team analyzes the business vision,

strategy, its departments and business processes. Second phase involves declaration of business requirements, constraints analysis and change management. These activities enable a company to put forth a clear ERP selection and evaluation criteria. Table-3.8 shows the results from a study conducted by Decision Drivers Inc. (DDI), a GartnerGroup company specializing in IT product selection which puts forth the top criteria for mid-market ERP Selection as product vision, currently deployable application functionality, professional services offerings, vendor's financial, development, and management team viability, technical architecture, and initial/ongoing cost (Lebinsky, 1998). Hence, according to these criteria, selection team can perform marketplace analysis and can create questionnaires to be used in the evaluation process.

Table 3.8. Top Criteria for Midmarket ERP Selection

Product vision	6%
Currently deployable application functionality	23%
Professional services offerings	22%
Vendor's financial, development, and management team viability	18 %
Technical architecture	17%
Initial and ongoing cost	13%

Source: Lebinsky, 1998

As far as the ERP system purchase decision is concerned, the vendor profile and financial risk involved are the major factors. These factors in mind the vendors, products and services are investigated to fulfill business needs. After evaluating RFI/RFP/RFQ responses received from the vendors, a company can create a short list. This practice is also called as second evaluation where functional, technical and vendor-specific features are examined further. Subsequent to evaluation process, a

sound decision should be reached and the choice must be justified to identify how it contributes to business strategy and planning. Various indicators, such as performance, technical and ROI should be purposed as in priority of importance.

Following the evaluation justification, the negotiation process starts. First, the business negotiations are conducted. At this stage, the contract, the cost estimation, the implementation and a risk management plan are negotiated. Finally, following these agreements, legal negotiations take place leading to the sign off of the final contract.

As this task finalizes the overall selection process, there is still a catch for a successful selection process. There are various activities such as researching literature, contacting salesman, surveying vendors, checking references etc. that requires certain level of knowledge, experience, and expertise. In other words, having certain know-how is always for the advantage of the companies in demand for ERP systems implementation. This know-how includes some dos and do nots of the selection process or assist on highlighting the issues to be cautious in order to avoid false starts, or misdirection. Hence, from now on the focus will be on this subject, and we will refer to it as ERP selection tips.

CHAPTER IV

ERP SELECTION TIPS

4.1. Introduction

Selection process is a set of activities which is so vital that a company in search for new software in the market has to take it seriously. That is certain procedures such as choosing a standard way-researching literature, making comparison tables, contacting salesman, checking references, purchasing the possibly overpriced package that is considered to satisfy company's needs, and exerting such afford for the staff to accept it can easily turn into its worst nightmare. In these times selection process guidelines or the suggested model can only provide a general perspective of what is to be done. However, in order to get best results there are tricks to the trade. When a company is aware of these tricks, it is possible for them to avoid false starts, eliminate salesman domination, streamline system installation, and craft a reliable and supportive software package to be used successfully.

These tricks or tips can be categorized into three as being general, functional, and aftersale services aspects. These aspects cover needs assessment, resellers and vendors, organizational challenges, package characteristics, unforeseen expenses, and implementation procedures which are discussed in more detail in the following sections.

4.2. General Aspects

A new ERP system will have a major impact on most parts of the enterprise, therefore top management needs to set the objectives and steer the project. The

project team needs to represent all functional areas and work to an agreed selection methodology. This methodology includes requirements specification covering the next 3-5 years, decision criteria, objective scoring of functionality and other aspects. Decision criteria should be agreed early with top management sign-off, and may include supplier and software developer viability, functional compliance, software architecture, user interface, support and pricing (Homer, 2002). Evaluation is based on proposals, demonstrations and research into the products, the local suppliers and the software developers.

The requirements specification should focus on the applications functionality required, and generic checklists may be used to speed up the process (Homer, 2002). Other aspects include software architecture, training and support, documentation and maintenance, computer hardware and communications.

Further, the firm's key business drives need to be considered, and the team should assess how each software solution supports these drivers. Key drivers are typically two to three, drawn from the delivery speed, delivery reliability, price, quality, innovation, flexibility and aftersale service. For medium to large organizations, it is normal to issue a RFP for ERP software and services. The RFP ensures that comparable information is gathered, and reduces the amount of time spent with suppliers.

At this stage, a filtering method is needed to produce a short list of around four to five suppliers to whom the RFP will be sent. Filtering may be based on a combination of number of users, industry expertise, support locations, applications coverage, computer environment, support, price range and customer service reputation. Following receipt of proposals, demonstrations and presentations from short listed suppliers will allow them to highlight their strengths and the potential customer can then evaluate 'ease of use'.

Companies should search the internet for forums, case studies and comments about their short list companies. As well as the software vendor's own user group, there are independent user groups for the bigger packages. If there is no info out there about the package, the software package may not have enough users to make it viable. Some ERP forums allow companies to ask around about specific packages.

During decision making process, the biggest mistake consumer companies' would make is not to understand the true significance of what they have taken on. When a company decides to implement an ERP system, this is more likely the last time it will replace its major business systems. Even though future changes are probably to be upgrades or enhancements to the chosen platform, the basic platform and design will remain stable.

Investing in an ERP solution is a major commitment since it means the partial delegation of a company's IT strategy to the software vendor. Thus, a company will be both restricted and enabled by the future direction defined for the product (Manoeuvre, 2001). Then again the significance of choosing the right package for the organization becomes apparent. Therefore, user companies should first consider aspects such as business vision and viability of the software vendor other than cost and functionality when making their choice.

It is evident that ERP implementation projects are huge and complex. The project affects every part of a company's business and every person within the organization. In order to acquire the most benefit from the project everything in the organization should be scrutinized in detail.

Likewise, ERP systems are business projects not IT projects and as a consequence require sound business sponsorship and ownership. It is wrong to perceive them as IT initiatives and thus fail to have business support necessary to guarantee success.

Underestimating the scale and impact of the project and lack of paying full attention causes certain conflicting parallel initiatives within the organization. It is important to prioritize and provide coordination among initiatives to avoid adverse impacts on the project.

Integration of business planning with software selection is another key issue. For some firms, this will mean nothing more than to pick the brain of the CEO to see what his vision of the business is 3 to 5 years out. It surely will involve issues that are not even being thought about by those who use the software now. It may involve customers, markets, channels, e-commerce and other issues that should be factored (Robinson, 2002).

As a starting point, a firm is to do real needs assessment before it begins to software search. Most companies wait until a prospective vendor comes in before they really start evaluating their requirements. This approach does not give a firm enough time to carefully consider priorities and to work out compromises with staff on what must be done. A real needs assessment can involve some or all of the following: strategic plan, SWOT analysis, internet positioning statement, E-Commerce planning, department by department assessment of current information requirements and opportunities for improvement, statement by key management of data requirements, needs of operational personnel in the areas of data entry, audit trails, operational reporting, current and anticipated financial reporting needs.

On the other hand, firms should avoid using product resellers to their needs assessment (CTS [2], 2003). Unfortunately, no matter they usually do it for free but the old axiom "you get what you pay for" applies. It is obvious that the product reseller is biased toward his own product.

Firms are more likely to eliminate their chance of learning and comparing when they use a vendor for needs assessment. There are a few who are truly objective even when they sell a product but they are few and far between. Therefore, it becomes

risky for firms since the above axiom usually applies. As an illustration, a product reseller mentions that he performed a needs assessment for a company that was looking at spending $300, 000 - $400, 000 for an expensive system, and that he found a solution for them for $100,000 that was every bit as good. But his consulting fee came to $15,000 (Robinson, 2002).

Second major mistake a customer company would likely to make is not committing the right resources to the project (Manoeuvre, 2001). Allocating the wrong people from the organization puts ERP projects in to difficulty. It is very important to have a project staff with adequate knowledge about the business. This project team should also be creative and capable enough to challenge the status quo when required.

Put together an organizational chart of the company and find someone in each functional area or division to get some feedback so they feel they made a contribution. In most cases, they make a positive contribution. Poll these people on what their departmental problems are, which products they think the company should be looking at and later on what they think of the short listed products. Some people will indicate that they do not need to be involved in the selection but others will want to be consulted (Navision, 2002).

Organizational commitment is another issue. Project Management needs to provide respect within the organization so that their decisions are trusted (Manoeuvre, 2001). One of the most important points concerning the project team is that they must be empowered to make key business decisions, and at the same time the Steering Committee must have enough faith to let them do this without tight supervision.

Companies should notice the fact that if the project team does not hurt the organization in anyway, then probably the team involves wrong people from the organization. Then allocation of the best people from the organization is advised, since an ERP project is a fabulous opportunity to reshape and streamline a company's business (Manoeuvre, 2001). The project staff should also beware of the

importance of their role and must be given a clear vision of their future importance to the organization. The selection of project staff should be sanctioned at Steering Committee level. The expected resistance should be overcome in the interests of the project.

Unfortunately, project management needs to hire key members of the organization. It is not enough for management to say - ok, we are getting this new whiz bang accounting system that will make life easier. They must sell it to employees by getting their active participation in the decision making process, otherwise they will not feel that they "own" the system. This fundamental principle of human nature is especially important when bringing in software since almost anyone who is involved in the business operations can sabotage the new system either by ignoring it, being afraid of it, or misusing its capabilities. Ignoring middle management and operational staff during the software selection process is a cardinal mistake (Robinson, 2002).

Further, after allocation takes place, a company should not expect people to continue their normal organizational roles as well. Any resource involvement should be a full-time nature. In order not to interrupt project work, it is necessary to back-fill designated people's position with new suitably skilled resources (Manoeuvre, 2001). Rather involvement in this sort of project typically expands the horizons and capabilities of each and every team member. Throughout the course of the project, the team members develop a broad and deep understanding of many business processes. Therefore, their value to the company will be greatly enhanced by their project participation. The motivation and retainment of the team members is another aspect to be considered. The flexibility is taken essential in these matters.

The stage two of the ERP selection process concerns with change management as it is mentioned previously. Unfortunately the problem with change management process comes from companies not having managed the change within their organization. It is evident that many organizations underestimate the impact that

their ERP project will have on people, roles, skills and the organizational structure as a whole.

Successful change management is one of the most important factors in determining the success of ERP projects, but it is rarely handled effectively. Many organizations act uncomfortably with the psychological nature of the change management and therefore do not give it the support it requires (Manoeuvre, 2001).
Effective change management ensures that the organization and personnel are ready, willing and able to embrace the new business processes and systems. Staff will typically resist change unless given a good reason not to. In order to avoid resistance, various strategies need to be employed to both communicate and influence. Blanket approaches to communication are ineffective and tactics need to be varied according to people's level of influence and ability to impact.

When good consulting becomes invaluable, the leaders of the change management effort need to be well respected individuals with healthy personal networks within the organization (Manoeuvre, 2001). They need to be trusted at all levels of the organization. In addition to a dedicated Change Management Team, the Project Director will typically also pay a significant part in the Change Management Effort.

Another problem may come from not embracing integration. While functional departments are retained and senior management roles remain unchanged, there exists certain level of integration delivered by ERP systems. The integration challenges the boundaries between functional departments and places information directly at the fingertips of operational staff, thereby reducing the reliance on administration support staff (Manoeuvre, 2001). Further, integration may challenge existing power bases and change the nature of some senior roles within the organization. In order to extract the maximum benefits from the new system, it is recommended to consider significant changes to the organizational structure and management roles (Manoeuvre, 2001). Roles may need to be redefined along process lines, giving key indivduals responsibility for end to end business processes.

For example, one person may need to be responsible for all aspects of the Purchase to Payment process. This may redefine the roles of purchasing managers, inventory managers, and the accounts payable department.

Not planning for the end of the project before the start is another major problem. Lack of consideration for the long term implications of introducing an ERP system and degrading the outcome of the project can be avoided by considering certain aspects in advance. It helps the project team to clarify and maximize the benefits obtained from the project. It is obvious that organizations need to consider how they will support their new system in the long term. Which aspects will be outsourced and what capabilities will be required in-house to maximize the return on the original investment. Internal support organizations can become a key strategic facilitator for the organization. Building internal centers of expertise can help to dramatically reduce consulting costs in the future. If this sort of support organization is incorporated into the project's vision, then the project management can start to position individuals for these key roles as the project progresses. Other project staff may return to their old roles within the organization, or may be suitable for other challenges. It will help the project greatly if there is a clear plan for this transition back into the organization. If people's future situations are not clearly defined, then this will become a major source of distraction at a crucial stage of the project. Above all, organizations need to realize that the original implementation project is simply a springboard and that no longer term the organization needs to embrace a continuous improvement mindset. Transitioning from "project mode" into this structured improvement phase is a major problem for some organizations and requires a great deal of planning (Manoeuvre, 2001).

Using an independent consultant can cut a lot of the ground work. The drawback is that many consultants only recommend the one or two products they know. So the selection of a certain consultant can automatically narrow the field. If a firm can not find a suitable consultant locally or cost or fear of bias is a stopper for using one, then the one has to do it himself. Internet makes it easier to find information. There

are also independent seminars, vendor-sponsored seminars and trade shows. Newspaper and magazine articles can also be valuable. Companies should find out what the competition uses and seek the advice of industry and professional associations (Navision, 2002).

The main point in implementing ERP systems is that the relationship between an ASP and a company is like a marriage (long lasting venture involving daily interactions) (Apicella, 2000). A firm's decision should be driven by business not technical motivations. Outsourcing ERP applications can yield financial gains but the real reason for doing it is to give the business enough flexibility and freedom to steer the company where the opportunities lie (InfoWorld, 2000).

While assessing vendors, it is advised to hold two rounds of meetings with prospective resellers. The first round lasts on the average 90 minutes and provides an opportunity for the two sides to get to know each other (Navision, 2002). If they do not get along then neither has wasted much time on a long product demonstration. The session should also be used to outline the company's specific needs enabling the reseller to prepare a relevant presentation. If project management is particularly important to a firm then it is better to give the reseller some data from the company and ask them to demonstrate how their product handles a particular scenario. This is called as a "Scripted Demo"[8]. A firm should qualify the reseller/vendor by having them follow a scripted demo.

A company should never believe anything the salesman says until he proves it (CTS [2], 2003). Having kept in mind that they contract the salesperson along with purchasing the product, a company has to be smart enough to look past the pleasant personality to what substance there is behind it. The relationship between a company and the salesperson is a long-lasting venture; some even liken it to a marriage. Therefore, contracting a salesperson is not a decision to be taken lightly (Apicella,

[8] See section 4.3 for detail.

2000). Often sales specialists are not good product specialists. In many cases, when the salesperson misrepresented his product not so much because he was dishonest but because he simply did not really know and was never challenged on it. Firms should always make them prove it. That is what scripted demos are good at.

Before the demonstration is over user company should bombard the reseller with tough questions. Inquires about their installation methodology and their track record for getting the system up and running properly and on time would be fine. A list of three to five referees to get in contact with should be asked from the vendor. The software company should be able to give some reference sites in user firm's area. Also specialist implementation consultants who have a database of ERP users are worth contacting. Certain staff should be assigned to do this work. Also an evaluation copy of the product should be gathered so a firm can test it further on their own time (Infoworld, 2000).

Armed with a knowledge of what is demanded from a package, the next essential stage of the software evaluation process is to visit a site with the same type of manufacture (make to stock, make to order, or engineer to order) and, preferably, of a similar size, where the software is being used well. When evaluating software on a visit, it is important to try to get user hands on the keys (Robinson, 2002). Users should try to do this on the terminal in stores or the planning office, as far away from the product 'expert' as possible. The person who suggested buying the package will be almost as biased as the software salesman although any comments must be taken into consideration. Robinson (2002) lists the points to be covered as follows:

- Why they chose the software
- Hardware and software configuration specified at implementation
- System's actual performance vs. Expectations and any more hardware or software required.
- Quality of training, preferably the names of any good trainers who are still available

- Availability and performance of implementation team
- Ability of vendor to meet schedules and deadlines
- Attitude and responsiveness of vendors staff (friendly, adversarial, etc)
- Problems during implementation, how they were resolved and any outstanding issues/bugs now.
- How new releases/upgrades are handled
- Unexpected surprises (good and bad)
- Challenge of finding and retaining IT talent to support the system
- Major benefits of the system
- Major limitations of the system
- Hidden costs
- Customization issues

Just before leaving users should ask the referee company the killer question, whether they had to do it again, would they use the same software (Navision, 2002).

At all times during the software evaluation process the cost of one month's delay (estimated annual benefit divided by 12) should be borne in mind. It is often far more cost effective to buy a safer if more expensive package than spend time evaluating a 'budget' package (Robinson, 2002).

Possibly the single biggest risk today for software buyers is not buying a bad system but overspending for what they need. Buying a prestige brand name product may bring a sense of security but if the product is way beyond real needs and requires more training and support than a simpler product a firm could wind up spending double or even triple the amount necessary to meet the needs. Companies should avoid overbuying.

Introducing a new system brings many costs a firm may not have considered. These include maintenance of software, purchase of new hardware, conversion costs, staff

training, and more. A rule of thumb is that a firm can expect to spend two or three times the cost of the software itself for the entire installation (CTS [1], 2003).

Moreover, planning for implementation and allowing enough time for it is very important. Many users get tripped up when they try to rush their software installation. The fact is that there are few things in life more complex than a new software installation. This is true even for small businesses with relatively simple operations. There are just so many details to keep in mind that it takes time to plan everything. The cooperation of all staff to put this over is necessary.

A firm is to designate one or two individuals from the organization for more sacred job (Manoeuvre, 2001). These are persons whose main goal is to make sure the system goes in and works for everyone. These individuals must have good human relations skills as well as some technical computer skills. They also need to be current with IT issues so that they are not blown away with techno-junk spouted by software vendors (Homer, 2002). It is worth attention that vendors may spread fear, uncertainty and doubt to try and get a firms business. Therefore it is necessary to have someone on staff who can see through the maze.

Finally, it should always be remembered that ERP system software is no superman. They are great at mathematical calculations and remembering data but they do not solve organizational problems (CTS [2], 2003). Firms should not rely on the software to fix their business problems. Software is only as good as the organization behind it.

4.3. Functional Aspects

Although it is not necessarily a priority, companies must decide on the importance they put on the various functions of an ERP system at the start of the selection

process (Rooney and Bangert, 2000). This would allow companies to evaluate different systems objectively. It is important to choose a vendor whose product is scalable and who could support the company's growth (Stein, 1998). It is also essential to find a company that has experience dealing with situations similar to the user company. User companies should question whether vendor company is familiar with their industry (i.e. manufacturing, distribution, wholesale, retail, or service) sector, organizational structure, business goals, and technological environment. As an example, for a Chemical Industry firm having process-oriented manufacturing system, it is wrong to choose an ERP vendor whose expertise in discrete-manufacturing sector such as Aeronautical and Aerospace manufacturing. Otherwise, it is inevitable to face the truth that user companies could find themselves financing their application service provider's education and possibly paying for mistakes (Apicella, 2000). Companies therefore need to do some forward thinking to ensure that their ASP provides a wide range of software that can manage both their current and future needs such as e-commerce. According to a survey conducted by DDI in 1998 (a Gartner Group company specializing in IT product selection), there are severe deficiencies in the processes customers use when choosing an ERP package. Sixty four percent of the ERP application-selection teams who used a traditional RFP selection process reported a low level of confidence with that effort, the resulting decision, and the selected vendor's ability to deliver on promised functionality (Lebinsky, 1998).

Before it is worth visiting a company using the software, companies must have a clear understanding and vision of what they want the software to achieve, what they are looking for and so what questions they need to ask. In his study, Robinson (2002) states that it is only necessary to check with a user, the areas of software functionality that a company need but that are sometimes missing, as well as any of the special futures that are not always included are: pegging or drill down-to be able to check the source of a requirement, queue compression-to keep shop tracking in line with schedules, bill of material affectivity date-to control bill of material changes, capacity planning by work center includes both released and planned

orders, availability checking of components before a work order is released, back flushing supported (if required), master production scheduling has a number of specific requirements including time fences, the use of configurators if required, available to promise, firm planned orders, distribution resource planning if required and consumption, all the modules are properly integrated-which means that an entry in one module is automatically transferred to all other modules, instantly, without any manual intervention. For instance, the entry of an order in the sales order processing module appears in the master schedule module as soon as it is entered, not after an overnight update.

A report generator functionality is the one very helpful for managers to use so that, in the event of a standard report not being available (e.g. an input/output report), it is possible to extract the necessary data from the files (Robinson, 2002). Likewise, a warning to indicate when a transaction would create a negative inventory is a nice feature but not essential either. Other essentials functions may be listed as follows: for a company that plans to work in continuous flow mode, the possibility of creating a manufacturing schedule without creating individual work orders, for companies where the sequence in which orders are carried out is important, the ability perform finite capacity scheduling is required.

It is necessary to make sure that the software selected has the functionality to do what is needed. If a company is willing to completely revise its system, then choosing a packaged solution would be adequate to fulfill the goal. Further, for companies anticipating to add more ERP modules as time goes by, a standard ERP package solution is recommended. However, bolting new applications onto personalized ERP system can be a complicated and expensive process. But if a company is working with a standard interface it can generally plug in new applications from the same vendor without too much trouble. Or as another alternative, companies may find a service provider that gives them the flexibility to integrate their standing applications with its own software.

As far as functional aspects are concerned, underlying technology, configuration, and customization capabilities of ERP systems are also important. Some popular products have been around for years and appear to be a good choice. However closer inspection reveals that they are based an old and limited technology (Collins, 2002). This shortcoming may prevent the vendor from adding new functionality such as supply chain integration customization internet-enabled reporting support for wireless devices or remote access.

Stable code is another key issue concerning ERP software. Short listed vendors should have a reputation for clean stable code (Collins, 2002). Even though priority of a company should be to choose a system that required no customization (Rooney and Bangert, 2000), good customization capabilities on the other hand is very important. Some products are easy to customize. And others require a major project with plenty of experts to come in unlock the source code and make the changes. More customization a system requires also means less suitable the system is for a company. Because, it becomes evident that the system cannot handle all the transactions a company carries out (Rooney and Bangert, 2000). The transactional, or operational-fit of the system can be observed clearly by having short listed vendors follow a scripted demo.

A scripted demo is really nothing more than a detailed script for the vendor to follow when they demonstrate their product (CTS [1], 2003). It documents and clearly communicates a comprehensive list of steps, processes, and compliance guidelines that a vendor must execute during a live presentation of its application. In this manner, the project team, rather than the vendor, determines the content of a live application demonstration and clearly sets expectations (Lebinsky, 1998). Ideally, a scripted demo includes a firm's actual data including vendor master data, transaction data, product codes, reports and the like. In other words it simulates a company's actual operational needs. According to DDI Survey, scripts generally focus on organization-specific business processes, or technical requirements and are developed by a selection team in cooperation with functional or technical champions

(Lebinsky, 1998). Further, scripts must be specific enough, including the use of sample data, to custom-tailor a vendor's demonstration of its application capabilities. Scoring occurs during the vendor's response over a two to seven-day presentation, on a pass-fail basis, and includes a value that correlates the suitability of the process used to the organization's requirements. The list of steps to be performed during a demo includes the data that the transactions must be based on, and is typically designed along process-flow boundaries. Between 20 and 200 scripts are created in a typical selection, and their scope includes application-specific processes (e.g., the order-to-cash cycle) and technical requirements (e.g., security, disaster recovery, and backup strategies). Standard guidelines must also be developed and should include a requirement for a live presentation using the architecture being evaluated (Lebinsky, 1998). It does take time prepare a scripted demo and it takes time for the vendor to respond. But it should be kept in mind that this exercise would force an organization to think through the details of what is necessary and force the prospective vendor to do some serious preparation for the demo. It goes without saying that the vendor who puts the most into scripted demo has prequalified himself as someone desired to do business with. This activity consumes a bit more time and effort but a firm will be able to pick the winner more confidently.

Further, customization of a system has a downfall of financial costs. Rooney and Bangert (2000) states that customization costs money in so many ways. The initial programming is just the start. It has to be repeated at every upgrade, or a company faces the choice of falling behind and continuing to use an older version of the software. Also having chosen a system that required modification to fit business processes would cause delays in implementation, excess system costs and bugs in the custom code that would let serious business problems. Software also should have broad range of modules. Companies therefore should favor the products with a wide variety of modules to avoid having to replace the system when the company grows. Therefore, the ability to implement rapidly should be another priority for anyone choosing a system. In order to be implemented quickly, system software must be relatively simple and robust (Rooney and Bangert, 2000).

Moreover, vendors need defined testing procedures and dedicated personnel. Without them they are virtually open for trouble (Collins, 2002). A company should have a broad user group test system capabilities carefully (Rooney and Bangert, 2000). Companies should not expect the vendor to point out the weaknesses of his or her product. They will have to dig into the details of every point that is important to them (Rooney and Bangert, 2000).

After gathering comfort with the short listed selection based on prioritized functionality and manufacturing type, it is time to send out RFQs to the vendors, carefully stating all of firm's requirements. Now is the time to explore more intricate issues such as whether users will be granted access to the software source code, or whether the software is available with floating licenses.

As a consequence, crossing the products off the list that do not pass criteria such as the ones that are too costly, and that have key functionality missing leads to another stage. This is the stage at which comparing functional details makes sense. A software can be used to produce a short list (Navision, 2002). There are some programs that let the user to enter the features required and it tells how the short list goes. Once the low scoring products have been eliminated, it means that the company is ready to contact vendors.

While choosing a software vendor, the first stage of software selection is to draw up a short list of packages to be evaluated. The first item on the short list will be an upgrade to any existing software, since the first stage when considering an upgrade to the planning system is to see what can be salvaged from the present software in use (Robinson, 2002). The next short list item will be packages that can use existing hardware. As it is mentioned before, problems with unfamiliar hardware during implementation are the last thing desired. Using existing hardware is also usually cheaper overall. The second short listed package is therefore likely to be one of the major pieces of software that runs on the existing hardware although it will be

necessary to check that the hardware does not need an expensive upgrade at the same time. It is worth having 3-4 packages to evaluate in the short list.

Robinson (2002) also mentions that other short listed packages will often be determined by personal experiences of packages if there are some people in the company who have experience of a package this should also be considered. Another useful reference point when choosing software is a package used in a familiar company, customers and suppliers in particular, because different types of manufacturing will require different software attributes or features. For example, most furniture and engineering businesses are "Make to Order" and require ability to backward schedule, with inventory usually held as work in progress.

On the other hand, process industries such as foods or chemicals would usually "Make to Stock" based on forecast requirement, with inventory held as either raw materials or finished goods. For divisions of large companies, the advantages of using software already in use elsewhere in the company usually outweighs the disadvantages of using software that may not the first choice (Robinson, 2002).

Visiting and/or phoning customers of the short listed suppliers may be used to assess their support capability through prepared questions. For the final one or two contenders, a software validation task may be set based on the specific company's data. Software validation enables a deeper understanding of how the software operates and the validating of claims made related to key business processes (Homer, 2002).

During site visits, it is also necessary to ensure that the release the visited company is using is the same release that the company will get. There are no prizes for pioneering software and software houses will often try to sell the next (untested) release to fix all the visited customer's problems.

If a company wants a functionality that the visited company was not using, it is worth trying to get a visit to a company that is using this function. If no company is using this function claims for it should be treated with extreme caution (Robinson, 2002). A software company demonstration of the function is a very poor last resort but even this is better than reading about it in a brochure. On the other hand, size is everything in a software. It is very risky to pick a software that has few successful implementations within a reasonable distance.

The little features as well as the big ones deserve attention. There is often the tendency to focus on the big items (e.g. financial reports and inventory control purchase orders integration), but what about some of the little details (e.g. what it takes to find records during a search lookup) (CTS [2], 2003). Some systems are decidedly better at doing that than others. Another important but often overlooked item is how to void transactions in the system. Voiding invoices, vendor checks or purchase receipts may be quite easy or a royal pain depending on the product (CTS [2], 2003). These are repetitive type transactions that a firm would want to make easy for operating personnel. The best way to uncover the less visible but important features is to talk to operating personnel.

Users should use "off-line" customizations to accomplish complex computations. For example, it is possible to have a very complex commission structure which involves unusual calculations. Hence users may be tempted to try to find a system which does it exactly the way needed but it may be much simpler to make an off-line custom change. This could, for example, involve exporting essential data to a spreadsheet for the calculations and then printing out the commissions on an external report. It may not be exactly pretty but it could be far less costly to do that than to change program code (CTS [2], 2003).

Users should also avoid source code changes whenever possible. Changes to program code mean that upgrades may be more difficult to accomplish and that the company will be dependent on outside programmers (CTS [2], 2003). It is less risky,

and usually less costly, to use "front end" or "back end" custom changes than to rewrite code (CTS [2], 2003). An example of a front end solution might be a custom invoicing program which lets the user enter the data the way he want to and pass the information to the data fields in the accounting system. A back end solution might involve extracting the data for a special report or analysis that cannot be performed within the accounting system itself.

Another point in functional evaluation is that users should pay close attention to data conversion issues. When choosing software, users often assume that they can get their data moved from their old system to the new system without much of a problem. Sales people are quick to confirm this. The fact is that data conversion often is the single biggest headache when putting in a new system and often requires a custom data conversion program to do it (CTS [1], 2003). Even then there is no assurance that the data will come over properly without something getting screwed up. Be sure to get a specific proposal on exactly what data is going to be moved and check it carefully after it is moved. Conversion can get very tricky with the need for converting data codes and the like, and it is a rare conversion where something does not go wrong (CTS [1], 2003).

Report functionality is another key issue. Users should evaluate the report writer very carefully. An often stated reason for purchasing new software is better data access or easier maintenance. Well, data access depends heavily on the report writer. Users may ask the vendor how they could prepare a particular report. One of the more frequent complaints of companies is that the custom report writer is anything but easy to use. In fact, some of them practically require some level of programming skill.

As always, users should not confuse what they want with what they need. Many companies get caught up with looking for a lot of advanced features they might see offered by vendors but are really not needed by them. An example might be some advanced cash management abilities or fancy inventory control algorithms (CTS [2],

2003). But unfortunately companies end up paying for these in many ways the cost of software, training, etc. It is better to compromise and know what is truly needed to operate the business.

Moreover, users should not try to automate when the current system is in chaos. Many companies assume that they can solve their software problems simply by bringing in a new system. This will only add to the confusion. It is a huge mistake to get a new system until the one already obtained is working smoothly.

Finally, ERP systems demand great data accuracy, which in turn calls for a disciplined approach to all company activities involving data. Too much mixing and matching of ERP with 'best of breed' solutions can lead to trouble as well as getting overwhelmed by technological junk.

4.4. Aftersale Services Aspects

As it is mentioned previously, firms should use a professional consultant when necessary. Just as any professional knows he needs help from experts, there are times when a consultant can make a profound difference in the process of choosing software. When a firm wants to perform a through evaluation of all systems and procedures, and is completely unsure of the priorities and what software it should be looking at, then engaging outside help can be its best move.

Further, it is not enough to look at features of the ERP software when it comes to evaluation. First of all vendor strength is one of the key issues. The company behind the product should have a strong financial position (Collins, 2002). Acquiring the best product is no good in the world if the vendor is going to be out of business next year. It would be appropriate to visit the supplier offices, meet the staff, research the supplier and software developer. Second, the vendor should have

a large customer base. A small customer base may not provide enough revenue to support the longevity of the product or users to debug it. For example, a firm would want to have those 35000 customers out there debugging the product before it installs it (Collins, 2002). Third, the vendor should have a well developed reseller channel. There should be plenty of knowledgeable resellers to support the product. While identifying good resellers companies seek recommendations on who are the most experienced and capable resellers for each product. And they are to go for the support driven companies rather than the sales driven companies. In most cases the bigger resellers are more likely to always be around. Most of the time it is better to invite them in to find out if they have the ability to do the job.

And last, ease of use another issue. User training is another essential part of the change management initiative. Training should be wide enough to explain the business objectives of the project and explain the new business processes, people's new roles and all aspects of the system. Training sessions also provide a valuable opportunity to communicate and influence personnel to increase acceptance of the delivered solution. Further, firms should keep in mind that training is a heavy implementation cost. Picking a reseller with a good training methodology is crucial because the reseller has to train everyone on how to put the new system in how to gather data from the old system how to navigate the new system print reports how to process the daily and monthly activities. The billings almost 90 percent is on training (Collins, 2002). If a firm has identified good trainers and support staff, it should specify these people by name on its order for support and training.

The final stage of the software evaluation is a credit check on the software house and distributors. The software industry is changing fast. No one wants to be in a situation where they find out that they have struggled to install a package only to discover that the manufacturer or distributor has gone out of business. Stick to the popular packages with a large support network.

The fact remains that between 10 to 20 percent of these systems are doing 80 percent or more of the business (CTS [1], 2003). Because, these systems have proven themselves over the years by providing constant improvements and proving to the buying public that their product is stable, supportable and has a following of consultants and resellers who are dedicated to selling and supporting the product. If a company ever becomes dissatisfied with its local vendor (or they go out of business) the firm wants to be able to find someone else to support it. This does not mean companies are foolish to consider anything but the most popular products. However, the risk of making a bad choice is greatly reduced when they wander off the trail to the lesser known products.

It is a vital process when it comes to checking out resellers, so that it should be done carefully. Companies should know who they are dealing with on the software installation. There is a great difference in quality and competence between software resellers. Therefore, companies are to make sure to get references from several customers and there is a personality fit between their staff and the primary interface person. The biggest goal must be choosing the most appropriate software/supplier combination.

4.5. Conclusion

As it emphasized previously, ERP selection tips help a company to avoid false starts. They eradicate vendors' or consulting firms' domination and craft a reliable software package installation. As an outcome of accumulated know-how, these tips are categorized as being general, functional, and logistics. The general selection tips consists of subjects as business strategy and planning, long-term organizational and top-management commitment to the project, needs assessment, formation of the selection team, consultation, time and cost constraints of the project, business requirements and technical requirements specification, integration of business

planning with the ERP system, change management and organizational resistance, resource allocation to the selection process, the selection and evaluation methodologies etc.

The functional tips on the other hand involve the issues such as the scalability, modularity and the functionality of the product, the underlying technology of the system as well as configuration and customization capabilities of the system, upgrade and maintenance issues, vendors' expertise on the industry, and also the functional aspect of the evaluation methodologies etc.

Further, issues about consulting, vendor profile and strength, customer-base, reseller channel, training and support are the major concern of the logistics selection tips. The pre-cautions taken with respect to these aspects would sustain the ERP selection process as a whole.

CHAPTER V

A ROAD-MAP FOR THE ERP SYSTEM SELECTION PROCESS

5.1. Introduction

This chapter will present a road-map for the ERP Systems Selection with the application of the ERP Selection Tips discussed in Chapter IV and the ERP Systems Selection Framework presented in Chapter III. Section 5.2 will present detailed diagrams for ERP System Selection Phases highlighting dos and do nots for each phase. Also it will present a detailed discussion over the Business Requirements Analysis Phase being the most vital phase of them all, and the new and future trends in the ERP market will be highlighted.

5.2. A Road-Map for the ERP System Selection Process

In 2001, a study conducted by Özdemir suggested a road-map for ERP pre-installation phase as a combination of ERP selection process and the pre-implementation issues. Figure-5.1 presents the ERP system selection related portion of the road-map suggested by Özdemir (2001). Herein, a complete set of ERP system selection activity chain will be presented. Figure-5.2 represents the fishbone diagram of the overall flow of the ERP system selection phases starting from the deciding on company's business vision to the sign off of the final contract with the chosen vendor. Figure-5.3 shows detailed fishbone diagram of the ERP system selection process by indicating dos and do nots of each phase.

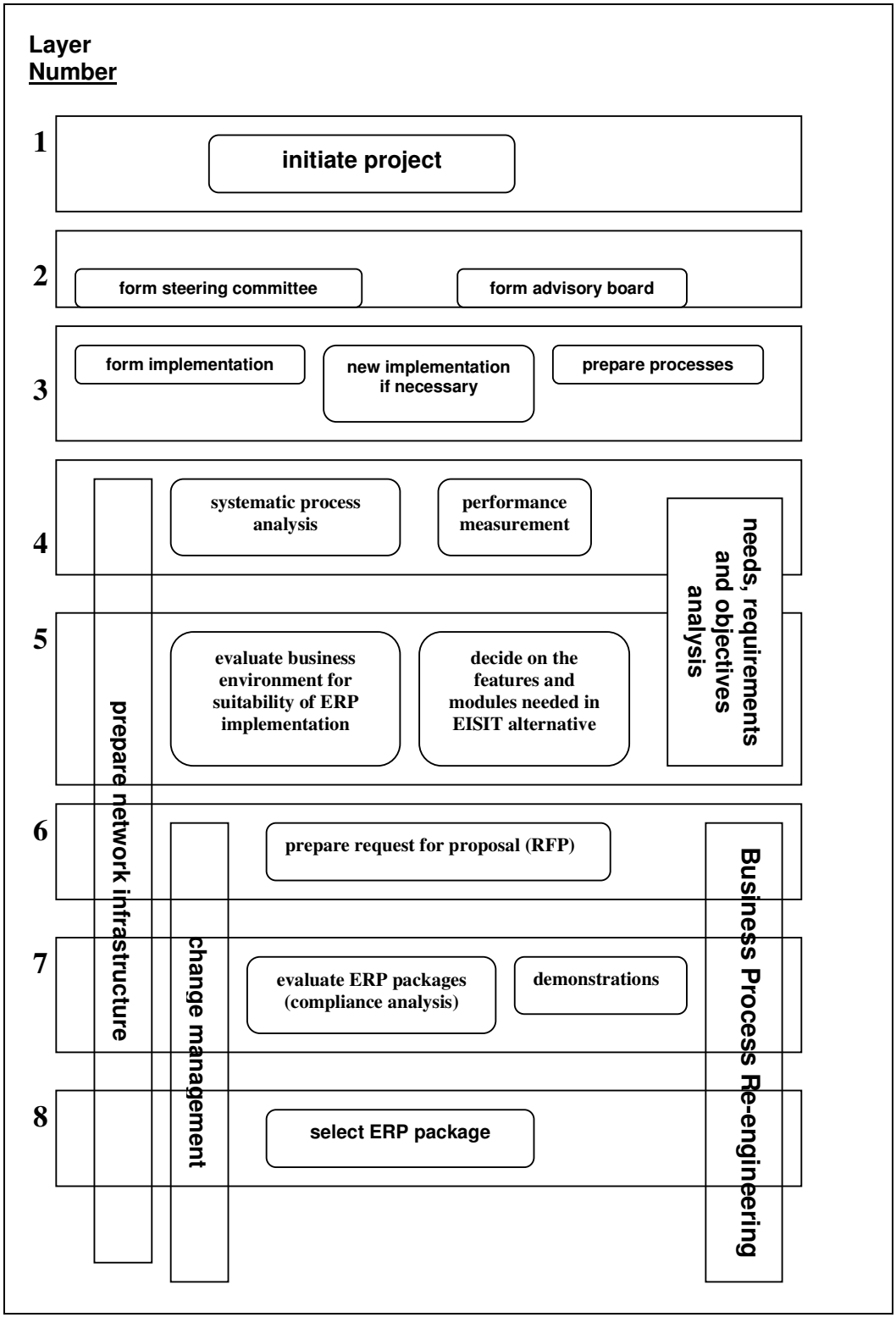

Figure 5.1. Road-Map for ERP pre-installation phase. Source: Özdemir, 2001.

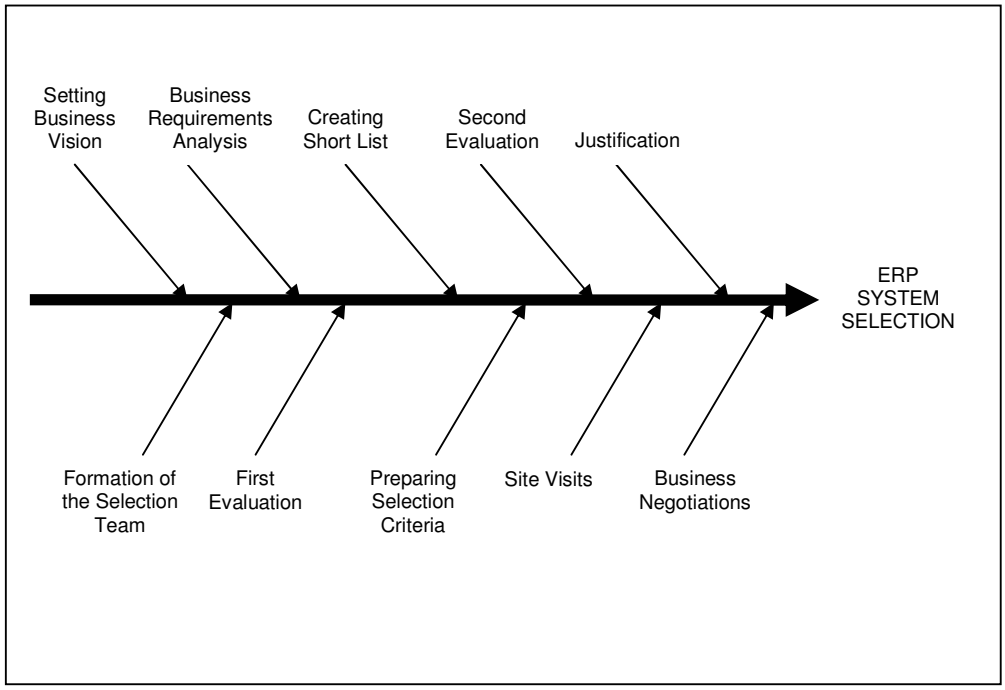

Figure 5.2. Fishbone Diagram of the ERP Selection Process Phases

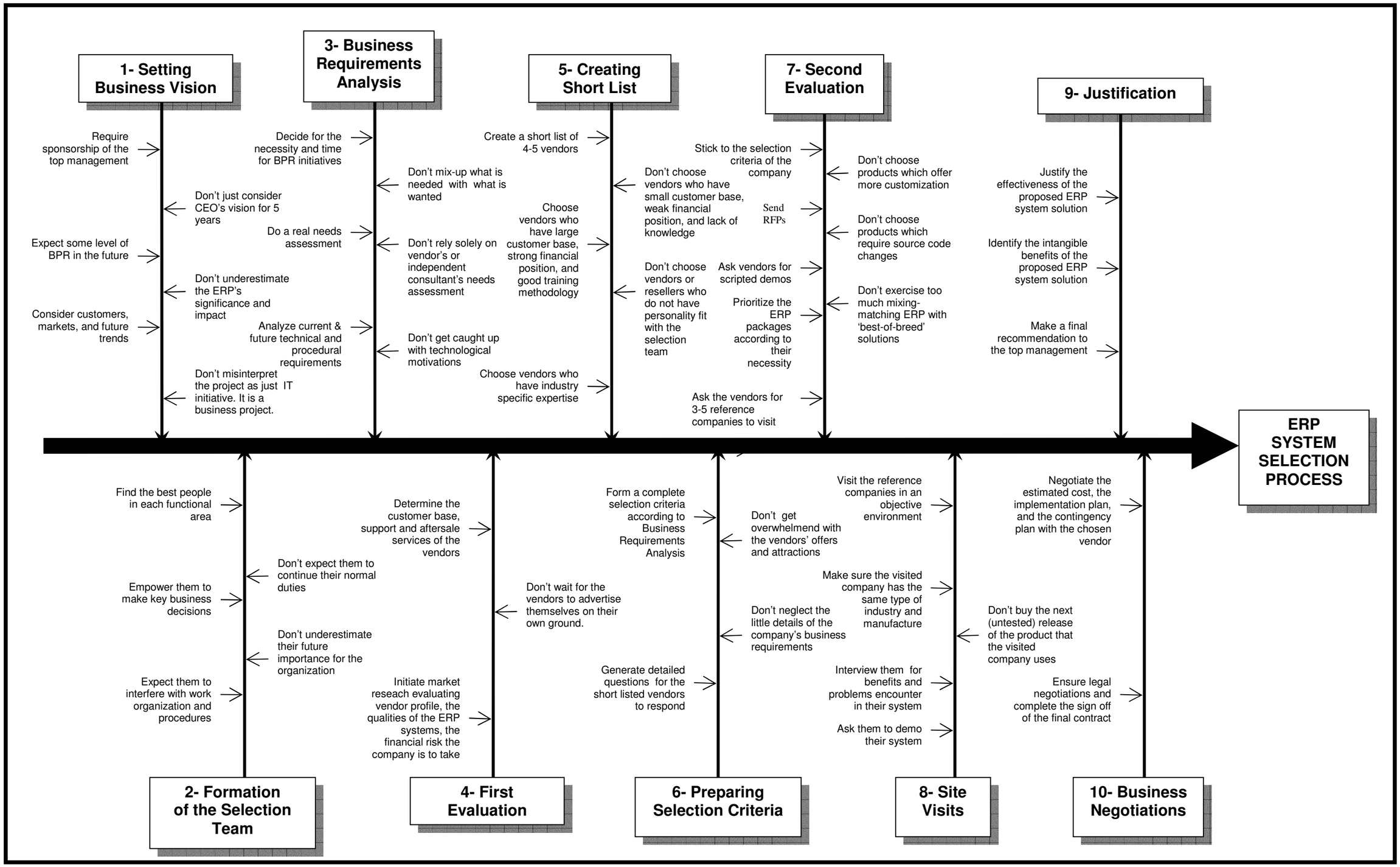

Figure 5.3. ERP System Selection Process Path indicating dos and don'ts of each phase (detailed discussion of the dos and don'ts of the ERP System Selection Phases are discussed in sections 5.2.1 - 5.2.10)

5.2.1. Setting Business Vision and Strategies

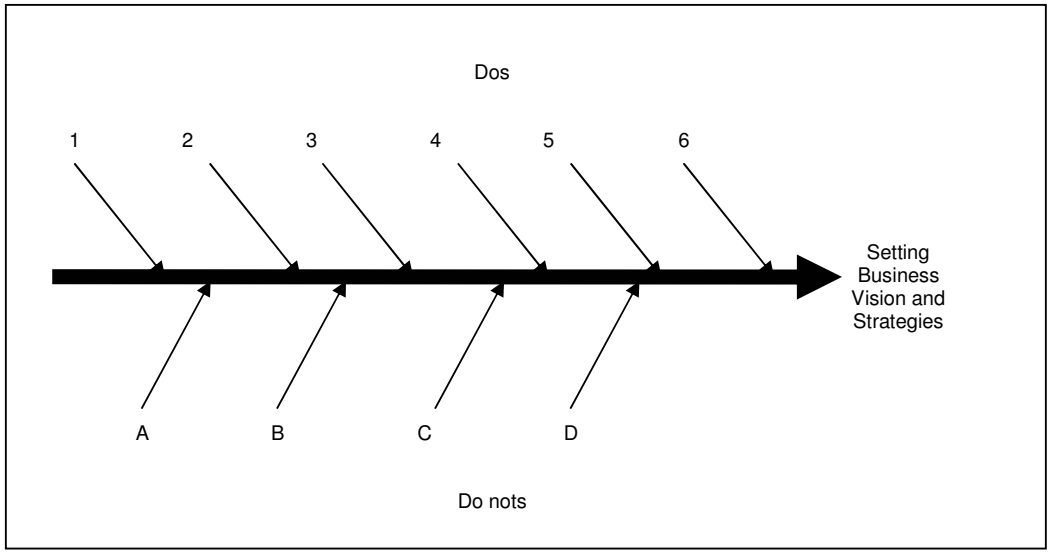

Figure 5.4. Fishbone Diagram for the First Phase of the ERP System Selection Process

5.2.1.1. Dos

1. Business Vision involves issues that are not even being thought about by those who use the software now. As Robinson (2002) points out, consider customers, markets, channels, e-commerce, etc while deciding the organizations business vision and strategies.

2. Know that, as Manoueuvre (2001) also indicates, company will be both restricted and enabled by the future direction defined for the product.

3. Take into account that once a company decides to adopt an ERP system, it will be more likely the last time that it will replace its major business systems. The basic platform and design will remain stable, even though future changes will be upgrades or enhancements to the chosen platform.

4. Be careful that the company's business vision comes before the other aspects such as functionality and the cost.

5. At this stage and so on, top management should show sound sponsorship and ownership of the whole project.

6. Expect some level of BPR as a future activity during or after the ERP System Selection Process.

5.2.1.2. Do nots

A. Do not just consult the CEO's vision of the business for 5 years out.

B. Do not misunderstand the true significance of what is taken on. It is the major mistake of the companies willing to install an ERP system. As it is mentioned in Chapter 3, investing in an ERP system is a major commitment because it means the partial delegation of a company's IT strategy to the software vendor.

C. Top management should not perceive them as IT initiatives and thus fail to have business support necessary to guarantee success. From the beginning, companies should understand that these are not IT/IS projects, but business projects.

D. Do not underestimate the scale and impact of the project and beware that ERP system will touch the corporate culture.

5.2.2. Formation of the Selection Team

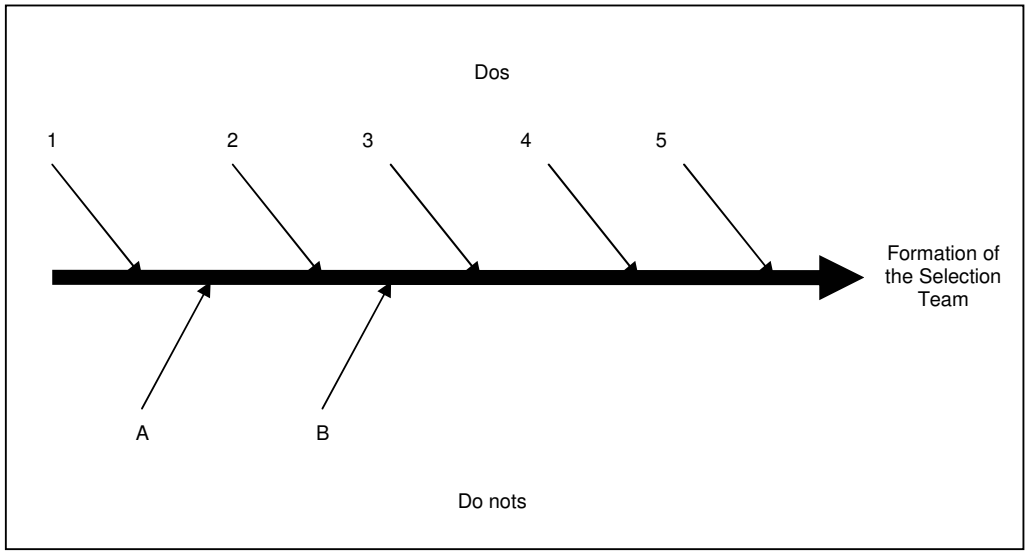

Figure 5.5. Fishbone Diagram for the Second Phase of the ERP System Selection Process

5.2.2.1. Dos

1. Find someone in each functional area with the best or adequate knowledge.

2. Empower them to make key business decisions.

3. Have faith in them to let them do their work without tight supervision.

4. Expect them hurt the organization in someway. If they do not hurt the organization, maybe they are the wrong people for the job.

5. Acknowledge the team members with the importance of their role and their future importance for the organization.

5.2.2.2. Do nots

A. Do not expect the selection team members to continue their normal roles within the organization. Being a selection team member is a full-time job. Allocate skilled personnel to back-fill their position.
B. Do not underestimate the importance of the selection team members for the future of the organization. During the course of the selection project the team members develop broad knowledge of many business processes, therefore, their value to the company enhances with their participation.

5.2.3. Business Requirements Analysis

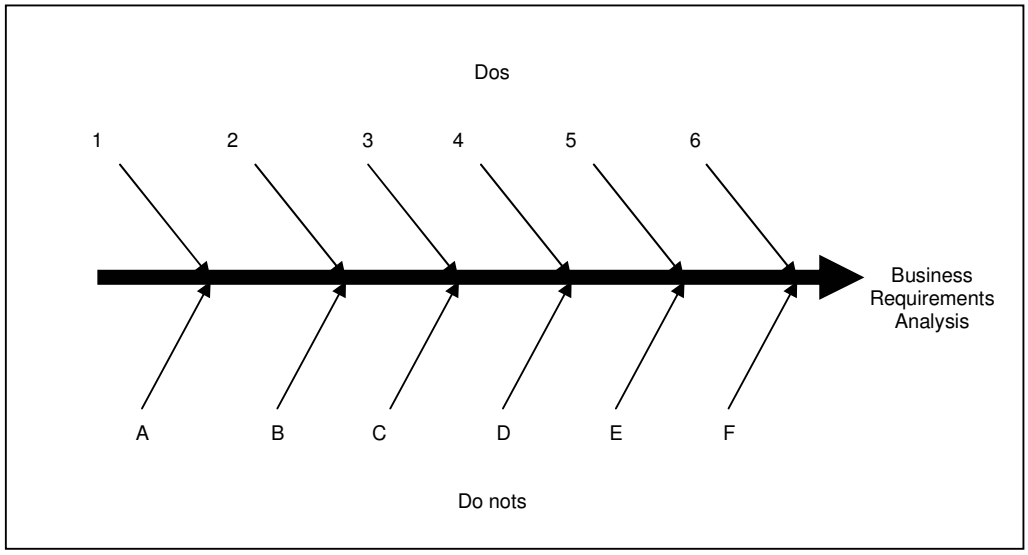

Figure 5.6. Fishbone Diagram for the Third Phase of the ERP System Selection Process

5.2.3.1. Dos

1. Present all functional areas of the company's business.

2. Do a real needs assessment using the in-house members of the organization, or ask for help of an independent consultant if it's necessary.

3. Analyze the current and future technical and procedural requirements.

4. Observe new and future trends (B2B, B2C, ERP II, etc.) in the market, and then come to a decision whether you want to involve with these trends or not.

5. Decide for whether BPR will be required, and if so when: before the selection of the ERP solution, or during the implementation of the ERP solution.

6. Keep in mind the organizational problems and future benefits over the organization while assessing the company's needs and the requirements for the ERP system.

5.2.3.2. Do nots

A. Do not wait for the Vendor to do the company's needs assessment. Vendor is biased on its own product.

B. Do not rely solely on the independent consultancy, not forgetting the fact "you get what you pay for".

C. Do not get caught up with technological motivations. They may cause overbuying.

D. Do not expect the ERP software to solve the organizational problems.

E. Do not ignore the participation of the middle management and operational staff during business requirements analysis. Their advice is necessary in order for the selection team to analyze business processes properly.

F. Do not mix-up what you need with what you want. Make sure the needs assessment reflects what is needed first, and then what is desired for the future. Therefore, prioritize the required futures from an ERP system.

5.2.4. First Evaluation

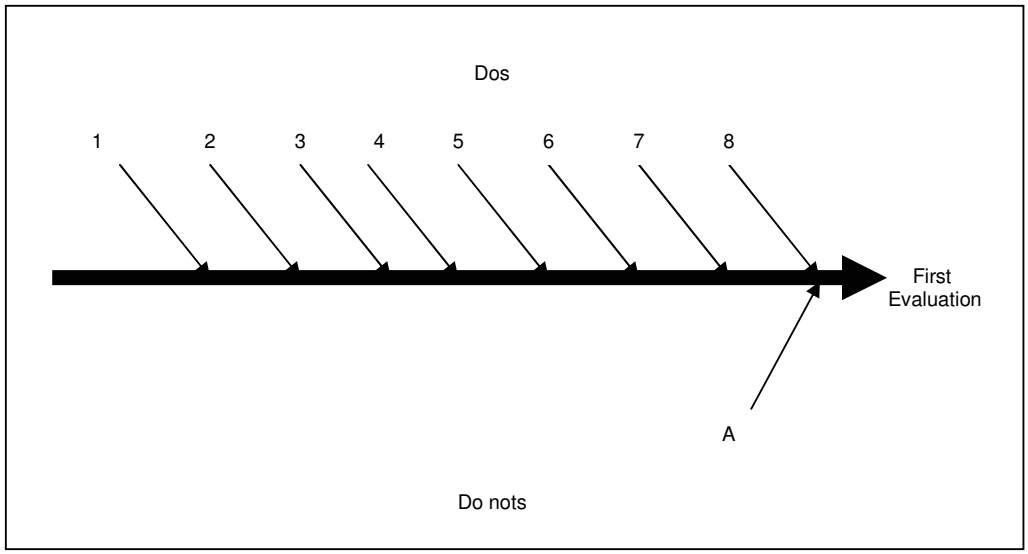

Figure 5.7. Fishbone Diagram for the Fourth Phase of the ERP System Selection Process

5.2.4.1. Dos

1. With respect to Business Requirements Analysis, gather some high-level criteria evaluating vendor profile, the qualities of the ERP system, and economical / financial risk that the company is willing to take.

2. Do a marketplace research and determine who the major players are in the market.

3. Seek the advice of industry, professional associations and find out what the competition uses.

4. Send out RFIs. This would help gathering more information about the vendors and the products. It also help to eliminate time spend for information search.

5. Search the internet for forums, case studies, independent user groups, and comments.

6. Attend independent seminars, vendor sponsored seminars and trade shows.

7. Determine the customer base, applications coverage and pricing of the ERP product.

8. Determine the support and services reputation of the vendors as well as their financial strength, and industry expertise.

5.2.4.2. Do nots

A. Do not wait for the vendor to come and advertise itself on their own ground. It would be biased its own profile, as well as the product. It may also have the slight tendency of not reflecting the real figures of its company. The customer company needs to dig it out itself through information search.

5.2.5. Creating Short List

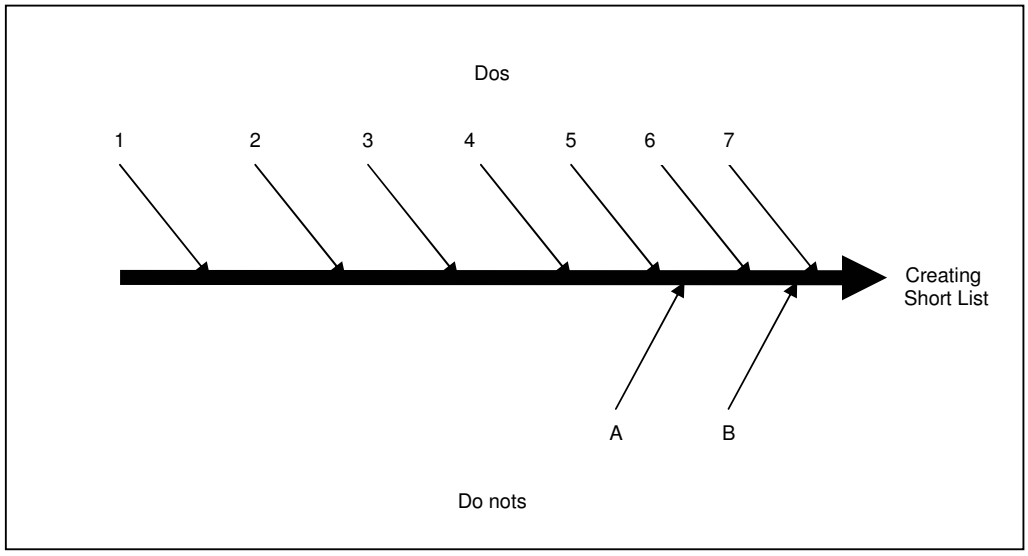

Figure 5.8. Fishbone Diagram for the Fifth Phase of the ERP System Selection Process

5.2.5.1. Dos

1. Create a short list of 4-5 candidate vendors as a result of the First Evaluation Phase.

2. Choose vendors who are familiar with the company's industry sector such as discreet, process, or services industry.

3. Choose companies with huge customer support network.

4. Choose companies with large customer base. Large customer base means that there thousands of people debugging the ERP system product to make it reach to perfection.

5. Choose companies with strong financial position. Otherwise, the user company may end up realizing that they struggled to install an ERP package or a system just to discover that its vendor has gone out of business.

6. Make sure that there are knowledgeable resellers behind the product. Not forgetting the fact that user companies should go for support-driven instead of sales driven vendors.

7. Ensure that the reseller or the vendor have a good training methodology which is presented in Chapter 4, since training is a heavy implementation cost.

5.2.5.2. Do nots

A. Do not choose vendors with small customer base. Small customer base may not provide enough revenue to support the longevity of the product.

B. Do not choose resellers or vendors who do not have a personality fit between the selection team and the primary interface person. Because, it is obvious that both side will not get along well and co-operate properly for the rest of the project.

5.2.6. Preparing Selection Criteria

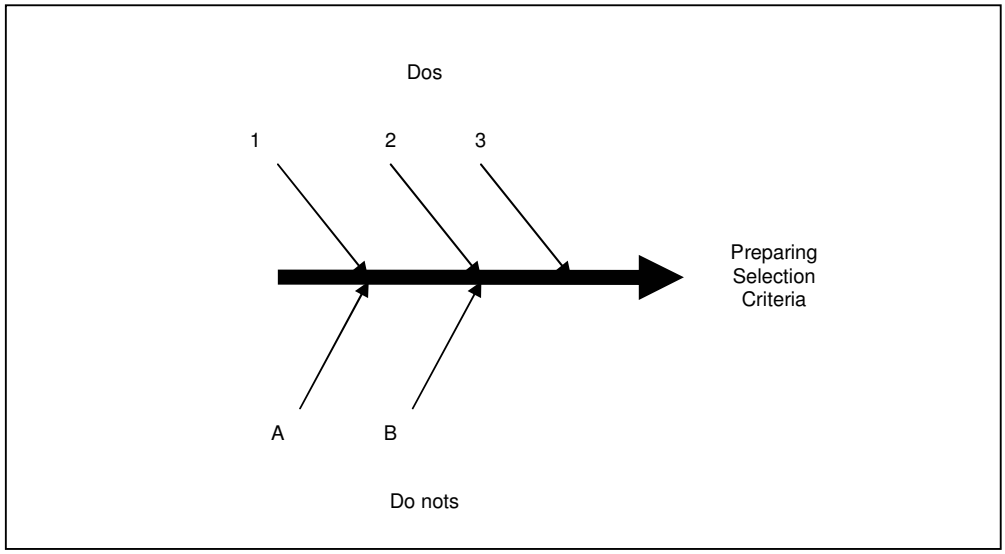

Figure 5.9. Fishbone Diagram for the Sixth Phase of the ERP System Selection Process

5.2.6.1. Dos

1. Form a complete set of ERP systems selection criteria reflecting the entire vendor, functional, and technical requirements prepared during Business Requirements Analysis Phase.

2. While preparing the selection criteria, the company may cover the issues listed in Table 3.4 and use the criteria listed in Table 1.1.

3. State every little detail about the company's processes, and technical requirements and generate detailed questions (maybe hundreds) to ask for response of the short listed vendors during the Second Evaluation Phase.

5.2.6.2. Do nots

A. Do not get overwhelmed with the short listed vendors' offers and do not let them interfere to your criteria.

B. Do not neglect the little details of the company's business requirements. They may be special features of some ERP system products that would suit the company better.

5.2.7. Second Evaluation

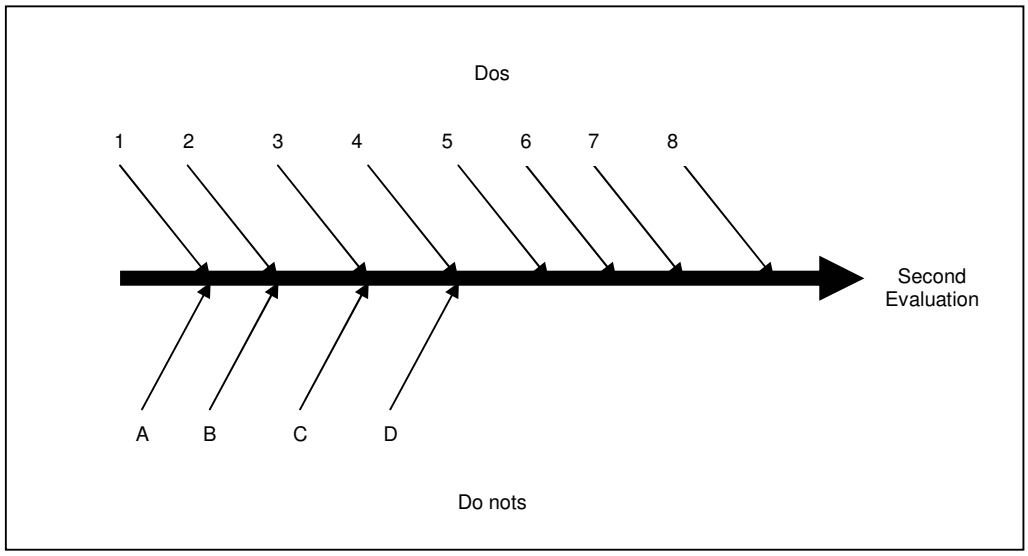

Figure 5.10. Fishbone Diagram for the Seventh Phase of the ERP System Selection Process

5.2.7.1. Dos

1. Stick to the ERP Systems Selection Criteria of the company.

2. Prioritize the ERP packages according to their necessity. First, go for packages that would be upgrades to the existing software. Then, go for the packages that can use the existing hardware. Next, go for the packages that the company's internal personnel have experience with. And last, consider packages used in the familiar companies, customers, suppliers, etc.

3. Send RFPs to short-listed vendors and ask them to respond to your questions generated, which will represent the company's selection criteria.

4. Prepare some procedural scripts that would help analyzing the transactional or functional fit of the dedicated ERP system.

5. Give these scripts to vendors to use them on their scripted-demonstrations and bombard them with tough questions during these demos; such as data conversion issues, or report writer functionality of the system.

6. Choose the vendor who puts the most into scripted demo, because it prequalifize itself as being someone desired to do business with.

7. Ask the vendors for 3-5 reference companies to interview.

8. Gather an evaluation copy of the product for the selection team to test it in their own time.

5.2.7.2. Do nots

A. Do not believe anything the salesman says until he proves it.

B. Do not go for products which offer more customization. Because, more customization means less fit of the dedicated ERP package, delays in the implementation, and also more financial costs.

C. Do not go for products which require source code changes. Changes make upgrades more difficult to achieve afterwards. And also the company will depend upon outside programmers.

D. Do not exercise too much mixing-matching ERP with 'best-of-breed' solutions (discussed in Chapter 3.3) can lead to trouble as well as getting overwhelmed by technology.

5.2.8. Site Visits

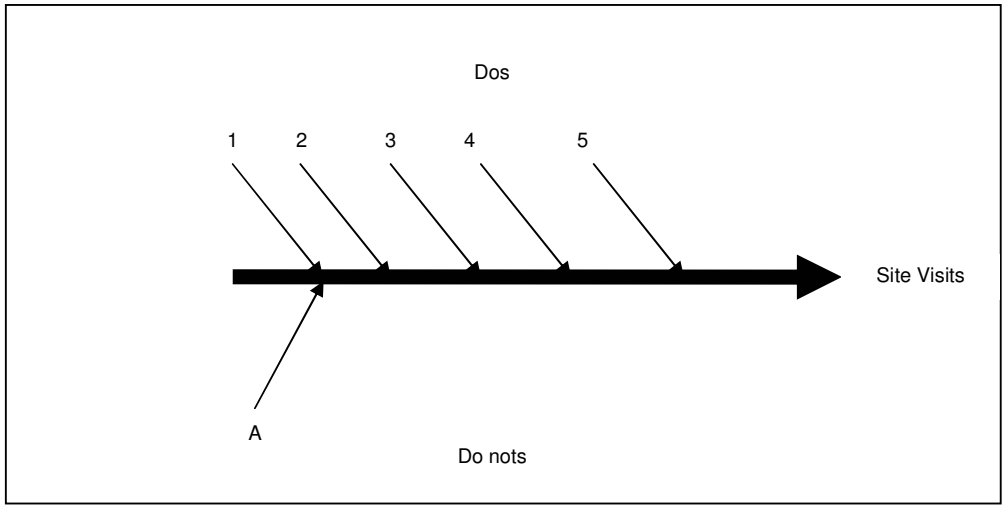

Figure 5.11. Fishbone Diagram for the Eight Phase of the ERP System Selection Process

5.2.8.1. Dos

1. Visit the reference companies of the short-listed vendors in an objective environment away from the product experts. They could be biased over the system.
2. Make sure the visited company has the same type of manufacture (make-to-order, make-to-stock, or engineer-to-order), and has the same type of industry (discreet, process, project-based), and is of a similar size.

3. Ask them about their processes, the ERP system product, any problems or the benefits of their system. Interview them with questions similar to the ones in Chapter 4.2. Even, the companies may ask them to demonstrate the product by having their hands on the keyboard.

4. Make sure that the release of the product that the user company will acquire is the same release as the reference company uses.

5. Just before leaving, ask the killer question, whether they had to do it again, would they use the same software.

5.2.8.2. Do nots

A. Do not buy the next (untested) release of the ERP product that the reference company uses. Because, vendors always have the tendency to sell the next release of the software to fix all the reference company's problems. However, this new version will be more likely full of bugs since it has not been widely used.

5.2.9. Justification

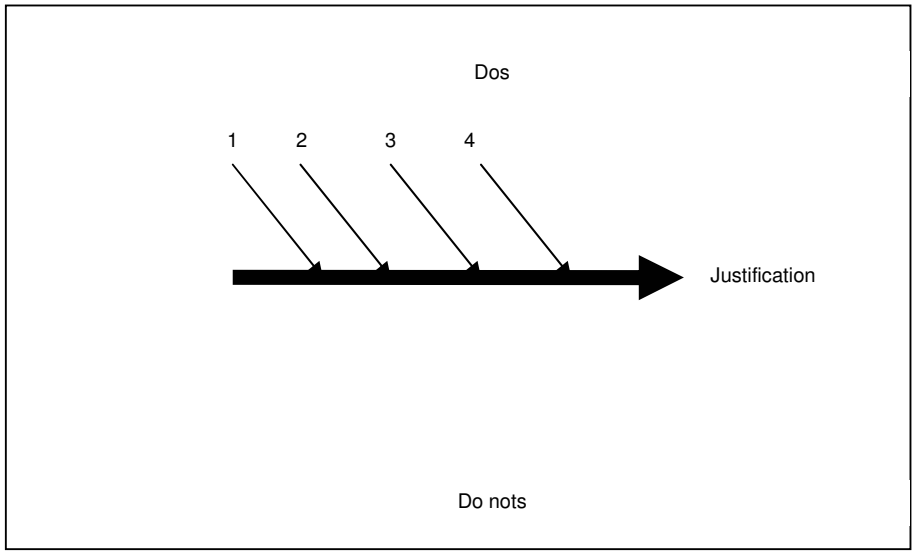

Figure 5.12. Fishbone Diagram for the Ninth Phase of the ERP System Selection Process

5.2.9.1. Dos

1. Justify the effectiveness of the proposed ERP system solution by determining the extent it contributes to business vision and strategies compromised from the start.

2. Identify non-tangible benefits such as reductions in transaction systems and technical support personnel.

3. For example, calculate savings from not upgrading legacy systems.

4. Make a final recommendation to the top management.

5.2.10. Business Negotiations

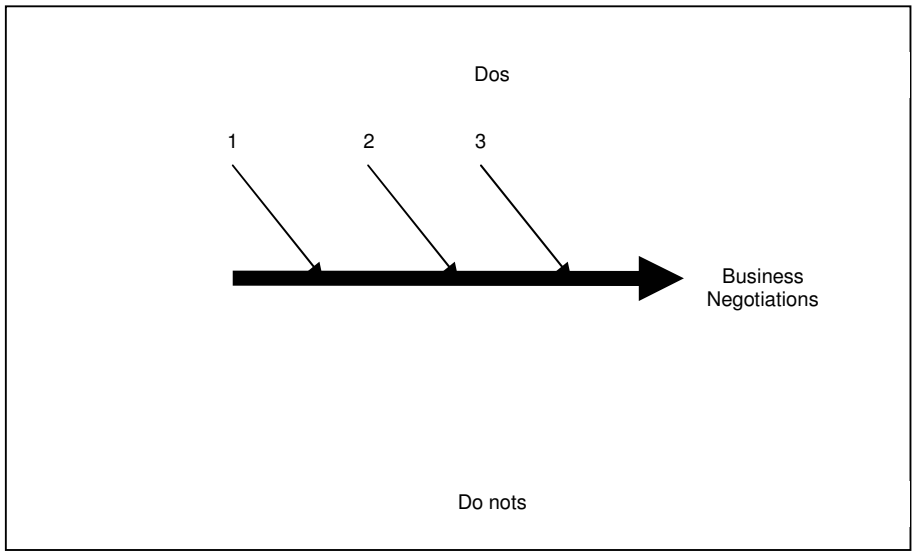

Figure 5.13. Fishbone Diagram for the Tenth Phase of the ERP System Selection Process

5.2.10.1. Dos

1. With the top management's approval of the ERP System solution, negotiate the estimated cost, the overall implementation plan, and the contingency plan.

2. Ask IT management and top management for their final approval and the signature of the contract with the vendor or the reseller.

3. After the agreements are reached, ensue legal negotiations and complete the sign off of the final contract.

5.3. Business Requirements Analysis

Business Requirements Analysis is the most important stage of the ERP System Selection Process. As Özdemir (2001) also highlights, some of the decisions made at this phase during ERP software selection can be irreversible, or very costly to change later. At this stage, the selection team must define and analyze their organization's existing technological environment, the functional departments, the technical requirements, the organizational (business, procedural, and policy) requirements, the different user areas and functions, existing processes that will be affected by the new software, and problems and opportunities that will come along as it is also emphasized in the MERPAP Model[9].

In course of Business Requirements Analysis Phase, the selection team should not ignore the middle management and the operational staff. As it is also discussed previously in Chapter 4, their advice is highly necessary for the selection team in order for understanding the business processes and related problems within these processes. Moreover, the active participation of the middle management and the staff will also motivate them to own the system further avoiding organizational resistance to change. At this very stage, a firm must decide whether it is wiling to initiate BPR before conducting business requirements analysis, or afterwards. And then it should apply Business Requirements Analysis accordingly.

If the company is willing to do BPR before, then it is best to conduct requirements analysis according to the expected results of BPR. Because, the requirements analysis will become useless and require changes if a company intends to initiate BPR later. If firms cannot rely on their organizational structure and processes, then it is best for them to accomplish BPR before getting involved with the selection activities. Because, as it is emphasized in Chapter 3, ERP systems are no superman. Companies should not expect these systems to solve their organizational problems

[9] See Chapter 3.3 for detail, or look for Verville and Haligten, 2003 from the references.

and to fix their business problems (CTS [2], 2003). ERP software is only as good as the organization behind it.

After having confidence in their organization, the companies have to specify their current and future business needs arising mainly from external competitive pressures. And companies also have to balance these needs against various technological, work and organizational constraints[10].

While defining business processes, the project team needs to represent all functional areas. It should not be forgotten that the project affects every part of a company's business and every person within the organization. In order to acquire the most benefit from the project everything in the organization should be scrutinized in detail.

In order to have sound information all the functional areas within the organization, the selection team should put together an organizational chart of the company and find someone in each functional area or division to get some feedback so they feel they made a contribution. In most cases, they make a positive contribution. Team members should poll these people on what their departmental problems are. As Navision (2002) suggests that some people will indicate that they do not need to be involved in the selection but others will want to be consulted.

Before starting for the software search through market place analysis during the first evaluation period, a firm is to do real needs assessment. Most companies wait until a prospective vendor or a reseller comes in before they really start evaluating their requirements. But this is a huge mistake. As it is discussed in Chapter 4, firms should avoid using product resellers to their needs assessment. First, this approach does not give a firm enough time to carefully consider its priorities and to work out compromises with staff on what must be done. Firms are more likely to eliminate their chance of learning and comparing when they use a vendor for needs

[10] See Chapter 3.3.2.2 for more detailed discussion of the constraints analysis

assessment. Second, it is obvious that the product resellers are more likely biased towards their own products. There are a few who are truly objective even when they sell a product but they are few and far between. Therefore, it is risky for firms since the "you get what you pay for" applies. According to a study conducted by Özdemir (2001) surveying five private enterprises, and one consultancy firm, and a none-profit public educational institution located in Ankara, Turkey, it can be concluded that most of firms directly initiated business requirements analysis by themselves. Some of them asked for independent consultancy advice along with their requirements analysis efforts. And some of the firms had already have business requirements analyzed since they have already been awarded by ISO 9000 certificate. These can be seen in Table-5.1.

Table 5.1. Formation of the group that analyzed business processes.

	Coşkunöz	SİFAŞ	BOSCH	KARSAN	METU	Durmazlar
In house members	•	•		•	•	
Consultancy Firm		•				
ISO 9000 certificate	•		•			•

Source: Özdemir, 2001.

A real needs assessment should involve some or all of the following: strategic plan, SWOT analysis, E-Commerce planning, E-Business planning, department by department assessment of current information requirements and opportunities for improvement, statement by key management of data requirements, needs of operational personnel in the areas of data entry, audit trails, operational reporting, current and anticipated financial reporting needs.

Evidently, during the course of the analysis the firm's key business drives should be considered. The selection team should assess how each software solution supports these drives such as the delivery speed, delivery reliability, price, quality, innovation,

flexibility, etc. It is also legitimate to issue a RFP for ERP product and services. The RFP ensures accumulation of comparable information to be gathered and also reduces the amount of time spent with suppliers.

The decision criteria should include software architecture, training and support, documentation and maintenance, computer hardware and communications. As it is mentioned previously by Homer (2002), decision criteria should be agreed earlier with top management and should include supplier and software developer viability, functional compliance, pricing issues. It is useful to create generic checklists to speed up the process.

Starting from the late 1990s, the innovations in IT stimulated new trends in the Enterprise Information Systems (EIS) such as SCM, CRM, DSS, and E-Business. Accepting the ERP systems as the information backbone over which these applications are laid, the organizations are started to transform themselves from vertically integrated, meaning focused on internal enterprise functions, to more flat organizations which are more focused on core-competency-based entities and positioned themselves within supply and value chain network to involve with Business to Business (B2B), Business to Consumer (B2C) E-Commerce activities (Gencel, 2003).

These trends of course influenced the architecture of leading ERP systems as Chan (2000) also highlighted. Hence in order to satisfy the new trends, capabilities of the ERP systems are enhanced to adopt E-Business platform bringing a new dimension to the way organizations manage their business.

This new technological paradigm is called as **Extended-ERP (ERP II)** focusing on industry domain expertise, and inter-enterprise business processes (Gencel, 2003). Figure-5.14 lists the comparable features of ERP and ERP II. Consequently, vendors innovated their vision and responded to this phenomenon by offering ERP II solutions under the name of Enterprise Application Suits (EAS). Evidently, these

trends in the new economy have caused changes in the business requirements of the firms that are willing to keep up with the competitive-edge and to take a stand in the New Economy.

Therefore from now on, ERP, inventory accuracy, or visibility of the information within the organization should not be a company's only requirements when considering ERP system products. They should set forth their vision towards whether in the future they will involve with SCM, CRM, or E-Business. And then, they should do their needs assessment and business requirements analysis according to that vision.

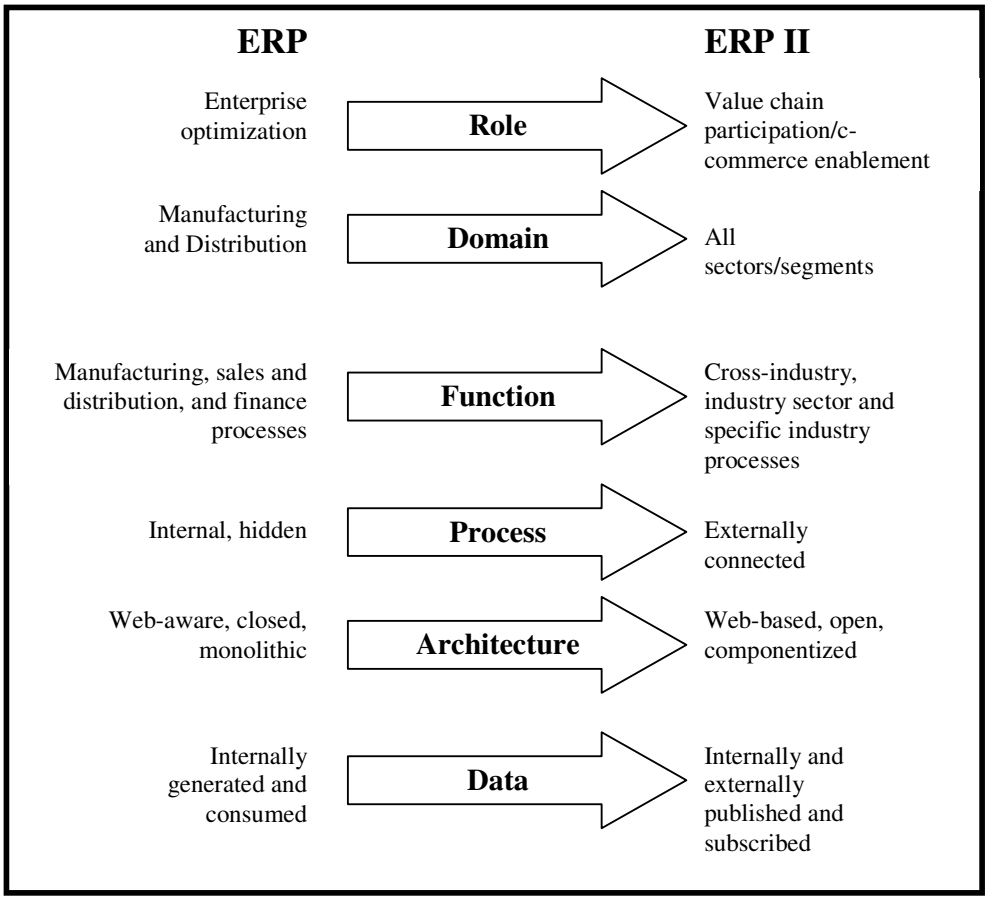

Figure 5.14. ERP-II Definition Framework
Source: Gencel, 2003.

However, the point that needs to be highlighted is that no matter how IT enhance and new technology trends become available, a firm's decision should be driven by business not technical motivations.

Otherwise, as Homer (2002) also emphasized, they get lost with humongous high-technological issues and probably may overpay for the technological junk. As it is discussed previously, Table-3.2 and Table-3.3 lists some sample technological requirements and a checklist for these requirements.

Hence, by being cautious not to confuse what is really needed and what is wanted companies should set their requirements specification covering their strategies for the

next 5 years, the decision criteria, objective scoring of functionality that is necessary taking into account the changing business trends in the New Economy and other aspects.

5.4. Conclusion

As it is discussed previously, there is no one generic ERP system solution that fits all organizations. Since all organizations, except for some work organizational or industrywise similarities, are unique in nature, then they come to face the situation where they have to choose an ERP system that is unique and provides the best organizational fit. In order to achieve this, organizations are due to initiate the same selection activities in which only the selection and evaluation criteria differ according to, for example, industry specific processes, manufacturing expertise, supply or value chain networks, technological requirements, etc.

Hence, at the very beginning of the selection process, organizations are to adopt functional, technical, and organizational requirements peculiar to them. In another words, as a result of the Business Requirements Analysis the companies come up with a set of ERP system selection criteria which happens to be as unique as the organization behind it.

Eventually, this grants vital importance to Business Requirements Analysis Phase and major responsibility to the selection team who are conducting it. As well as the current features and requirements of the enterprise, the future direction of the organization and changing trends in the market should also be taken into account during the course of the analysis. Once the Business Requirements Analysis Phase is complete, companies may proceed the rest of the ERP system selection path by paying attention to the dos and don'ts of each selection phase accordingly. As a consequence, they could obtain considerable savings in terms of cost, time and improvement in administrative procedures.

CHAPTER VI

CONCLUSION

The research was conducted through a series of investigations in both academic literature, IS conferences, and practitioner journals. The purpose of the thesis was to develop a comprehensive study on the ERP systems selection process by integrating the stream of research on all ERP systems selection related issues in order to provide a road-map to guide for better ERP systems selection and evaluation activities by considering future trends and importance of the phase of Business Requirements Analysis. The main objectives of this research were; to develop a comprehensive framework and a road-map for ERP systems selection process, to provide organizations with valuable knowledge that could stimulate them to make significant changes in the manner in which they proceed with the acquisition of an ERP system, which in turn could result in substantial savings in terms of cost, time and improved administrative procedures.

Therefore, the following research questions were addressed:

1. What are the factors affecting the decision to acquire an ERP system?
2. Why is the ERP selection process important?
3. How is ERP system selection process done?
4. What are the methods for a better ERP selection process?

First of all, the motivator factors for ERP systems selection were analyzed, and the significance and importance of the selection process for the ERP system implementation projects were discussed. Subsequently, according to ERP system selection and evaluation literature, a general framework for the selection process was established. Next, the problematic issues, as well as the methods and vital tasks within the process were presented as ERP systems selection tips providing guidelines for the better ERP system selection activities. Finally, a road-map for ERP System

Selection Process is presented as a result of mapping the ERP selection guidelines to ERP Systems Selection Framework.

This thesis depicts the principal processes pertaining to the acquisition of ERP systems. Also, it is to provide organizations with valuable knowledge and a road-map that could stimulate them to make significant changes in the manner in which they proceed with the acquisition of an ERP system, which in turn could result in substantial savings in terms of cost, time and improved administrative procedures.

As it is discussed in Chapter V, changing trends in the IT/IS World affects the way companies do their business. With the introduction of the internet and internet-enabled technologies, firms have the opportunity to expand their business over a new type of investment and to gain competitive edge by doing so. At first, ERP system investments` vision was centered on resource planning and inventory accuracy, as well as the control of the main parts of a company's business with the visibility of information throughout the enterprise. However, these systems have evolved from having mainframe-centric environments with centralized legacy systems, fragmented LANs, limited use of desktop computing, and data access, to network-centric environments which are built on WAN and client-server computing, data sharing, efficient use of work stations, interactive organization supported by networks, common database, etc.

As a consequence, in the late 20th century, changing trends in the market have stimulated organizations to start transforming themselves from the network-centric environment to internet-enabled environment which adopts the Internet and Web Technologies to accelerate the sharing and distribution of information within and outside of the enterprises boundaries. These new environmental features of ERP systems as known as ERP II, has enabled companies to position themselves within the supply and value chain network by engaging in B2B and B2C electronic commerce as it is indicated by Gencel (2003).

Subsequently, ERP systems' vision of business processes has evolved from intra-enterprise centric processes to inter-enterprise centric processes via additional applications such as SCM, CRM, and E-Business. Further, all these applications are integrated for good to construct EAS. EAS are the last trend within IT/IS phenomena that are offered by the major vendors of the EIS community. As far as the companies' motivation to adopt EAS systems is concerned, the companies should fill the gaps between architecture requirements and their current IT environment to develop implementation strategies. But first, they need to understand the significance of what they have taken on and decide on their business vision and strategies including their future tendency towards these new trends in business. And they are to reconsider their business processes and work organization according to their decision to change the way they do business. As the phases to follow during ERP System Selection Process remain unchanged, the business requirements analysis of the companies are due to change prior to their BPR initiatives, and their future technical requirements.

Although this study set a basis for the development of a formal policy for complex ERP selection process, it may provide some interesting issues for academic community for future research such as the possibility of a link between the selection process and the implementation process for ERP systems by taking focus on the "cause and effect" relationship that activities or results of the selection process have on the implementation process. On the other hand, another research may be possible to analyze whether an implementation is due to fail from the start by users simply because of choosing the wrong system for their organization by focusing on the correlation between final choice of ERP system and failure or success of its implementation.

Furthermore, this study might also serve as a basis for the formalization of the best ERP system selection path that organizations could adapt easily. As another possible research, it is legitimate to investigate each phase within the selection process in

depth to construct industry-specific (discreet, service, process, project industry. etc) procedures. Even ASP could be prompt to conduct such study.

Moreover, a common database of all business, technical, and functional requirements that organizations analyze during the acquisition of their ERP system might be developed to serve for the benefit of those who are in search for ERP systems. Likewise, another database containing all problems and their solutions that organizations cope with during their ERP system selection activities could be established. Further, these databases could be open for access of the all organizations and companies around the world for both accumulation and sharing of information.

Unfortunately as far as the time and scope limitations are concerned, it is not possible to cover one of those subjects within the scope of a master's thesis. However, this thesis might be extended, or it may serve as a basis for future research to cover one of these research subjects for further study.

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