DEVELOPMENT OF A BEST-FIT ERP IDENTIFIER MODEL FOR THE PUBLIC SECTOR IN THE UAE

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ABSTRACT

Efficient planning and utilization of organizational resources have always been top priority for executives worldwide and across industries. Private and public sectors are seeking efficient utilizations of their resources to realize cost savings, better quality and higher profits, or in the case of public sector, better services that cost less. Consequently, many organizations have focused on Enterprise Resource Planning systems (ERP).

ERP's immediate predecessors, Material Requirements Planning and Manufacturing Resource Planning, focus mainly on managing manufacturing and accounting resources. However, ERP systems have come to be known as a broad set of activities supported by a multi-module fully integrated application software solution that assists all departments within an enterprise in managing the important parts and resources of the organization. ERP systems integrate all business functions, including planning, inventory/materials management, engineering, order processing, manufacturing, purchasing, accounting and finance, human resources, interacting with suppliers, providing customer service, enterprise asset management, and more.

ERP systems promise to meet all the information needs of organizations, pushing worldwide annual expenditures on ERP implementation to a staggering $20 billion, and according to research, ERP will remain the biggest segment of large and mid-sized companies' IT budgets for the next two years. Nevertheless, there is already evidence of high failure risks in ERP implementation projects.

This research aimed to develop a strategic model for the United Arab Emirates' public sector that allows managers and decision makers to identify their best-fit ERP system. A systematic framework was developed to generate a measuring instrument of 37 characteristics including business processes, diffusion of innovation elements, and some of the critical success factors of ERP project implementations. This list has included for the first time the B-Web Typology business processes, and it was subjected to multiple rounds of validation by experts and academics to generate what is called the Best-Fit ERP System Model (BFERPSM).

Seven public sector organizations and five ERP systems were surveyed to test the BFERPSM. Using the Delphi technique, the graphical profiles for both organizations and ERP systems were relatively compared to identify each organization's best-fit ERP system. Furthermore, different management matching techniques—totality, optimistic, and pessimistic management styles—were used to examine the computed best-fit ERP system in order to allow managers to determine their best-fit ERP system.

It was found that the new business processes frame, developed from the B-Web Typology, strongly affects the selection of the best-fit ERP system. Although each organization has a distinct set of objectives for its ERP adoption, BFERPSM successfully detected the commonalities and the differences of UAE public sector organizations.

The research indicated that this BFERPSM is generic, allowing future researchers to use it on a wider scale, including for the private sector. Further, this study also suggests complexities that are worthy of further investigation. Conclusions are made about the framework, and future work is discussed.

CONTENTS

FIGURES

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ABBREVIATIONS

ADIA–Abu Dhabi Investment Authority

AED–Academy for Educational Development

AHP–Analytic Hierarchy Process

ANP–Analytic Network Process

APIS–Application Program Interfaces

BFERPSM–Best-Fit ERP System Model

CRM–Customer Relationship Management

CSF–Critical Success Factors

DC–Decision Criteria

DCA–Department of Civil Aviation

DIC–Dubai Internet City

DMC–Dubai Media City

DNRD–Dubai National Registration Department

DS–DataStream

EIUL–The Economic Intelligence United Limited

ERP–Enterprise Resource Planning

FD–Finance Department in Abu Dhabi

GITEX–Global Information Technology Exhibition

IDMS–Industrial Data Management System

IS–Information System

KIPS–Key Performance Indicators

MRP–Material Requirements Planning

MRP II–Manufacturing Resource Planning

MS–Microsoft

NGT–Nominal Group Technique

NPC–Need for Process Changes

NTC–Need for Technical Changes

OC–Organizational Contingencies

PCI–Perceived Characteristics of Innovation

PDSZ–Private Department of Sheikh Zayed

PM–Preventive Maintenance

SF–Success Factors

SME–Sheikh Mohammed Bin Rashid Establishment

STD–Sewage Treatment Department

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Thanks to all ERP vendors who contributed to this study. Thanks to my friends who helped considerably in administrating the surveys. And finally, appreciation goes to General Darwish Ahmed Al Zarounei, my director at work, and to my colleagues for their support.

DEDICATIONS

To the memory of my father Juma Al Dhaheri, to whom I owe all that I am, may Allah bless his soul.

To my Mother F. Al Dhaheri, who showed me true love and respect. Both taught me the value of life, family, and most importantly religion.

And to my lovely wife K. Al Neyadi, who gave me all the support I needed and put up with my long hours of writing.

CHAPTER 1

1. INTRODUCTION

"Man is the only being on Earth that can make the same mistake twice. And he does. Those who have gone through the implementation of an Enterprise Resource Planning (ERP) system know how complex, difficult, slow, and costly the process can be. While many companies are aware of this fact, they still go ahead with the effort and fail. For others who know the complications, they don't even try it. Who is making the correct decision? None! Then, what should organizations do?" Rafael Funes (2005, p.01)

1.1 Background

The United Arab Emirates was established as an independent state in 1971. Since then, the UAE has developed its own political and administrative structures that combine both modern and tradition systems. During his presidency (1971–2004), Sheikh Zayed Bin Sultan Al Nahyan chose to work towards a society that would offer the best of modern administration, while at the same time retaining the traditional forms of government (United Arab Emirates Yearbook, 2005). The UAE aims to maintain its independency, security, and stability after Sheikh Zayed's death. Sheikh Khalifa, who is Sheikh Zayed's oldest son, is currently the president of the UAE and has been highly influential in economic policymaking for several years (The Economist Intelligence Unit, 2005). The Economist Intelligence Unit (EIU) (2005) forecasted that the UAE's economic growth will have annual expansion rate of 6 percent. The EIU estimated that the total fiscal earnings reached Dhs. 92.7 billion (US$ 25.2 billion) in 2004, a year-on-year increase of 23 percent and an all-time high.

The Academy for Educational Development (AED) (2004) called the UAE "one of the world's wealthiest and most technologically modern countries and also the most wired state in the Arab world." And according to international statistics, the UAE enjoys one of the world's highest per capita income levels, higher than those of some Western industrialized societies (ECSSR, 1998). With its world-class services infrastructure, developing in the midst of a robust economic environment, the UAE has a noticeably similar trend to that of the global one in adopting new technologies (Anonymous, 1990; ECSSR, 1998; Masie,1998).

The public sector in the UAE has invested millions of dirham during the last decade in information systems and technology, such as e-government, to enhance its service, reduce processes time, and cut costs. Speaking at a conference organized by the Hay Group from October 7–8, 2004, the UAE minister of state for finance and industry Dr. Khirbash noted that the public sector must deliver the highest quality of services while ensuring that all stakeholders benefit. "The UAE's rapid IT growth has been fueled by the government that firmly committed to applying the benefits of technology to the lives of the people and to businesses. As a result, individual departments are constantly challenged to create solutions tailored towards greater efficiency and swiftness," said Colonel Bin Belailah, head of DNRD (*IT News*, 2003). Shalhoub and Al Qasimi (2003) noted that "In terms of movement towards an information/knowledge society, the UAE has emerged as the forerunner in the Arab region and is among the 30 top information technology users in the world, based on the classification issued in the United States' IDC Group."

The public sector in the UAE has been dominated by the vision of automating the business processes and services. In 2001, His Excellency Dr. Khirbash said that with the formulation of the electronic government vision, the UAE can now path its way to implement electronic solutions that will greatly benefit the government, employees of the government, businesses and the citizens of the UAE and e-government will be the catalyst to transform the government towards a "knowledge-based government" (Fairholm, 2001).

The proliferation of Enterprise Resource Planning (ERP) systems over the last few years has taken organizations worldwide by a storm, and is expected to gain more momentum in the coming years. This increase in popularity has been largely attributed to the fact that computers and information systems have demonstrated their ability to administer a profound impact upon organizational success by providing more efficient, effective, and accurate business processing. Rosemann (1999) defines an ERP system as a customizable, standard application software that includes integrated business solutions for the core processes (e.g., production planning and control, warehousing management) and the main administrative functions (e.g., accounting, human resource management) of an enterprise. Slightly differently, Gable (1998), however, defines it as a comprehensive package software solution to integrate the complete range of a business processes and functions in order to present a holistic

view of the business from a single information and IT architecture. Similarly, Kumar et al (2000, p. 26) define ERP systems as "configurable information systems packages that integrate information and information-based processes within and across functional areas in an organization." One of the ERP system's major features is integration between modules, data storing and retrieving processes, and management and analysis functionalities, combined with typical functionalities of stand-alone applications. It promises one database, one application, and a unified interface across the entire enterprise (Davenport, 1998a; Gable et al., 1998; Hoffman, 1998; Wortmann, 1998; Bingi et al., 1999; Rizzi and Zamboni, 1999; Daveport, 2000; Gupta, 2000; Markus and Tanis, 2000; O'Leary, 2000).

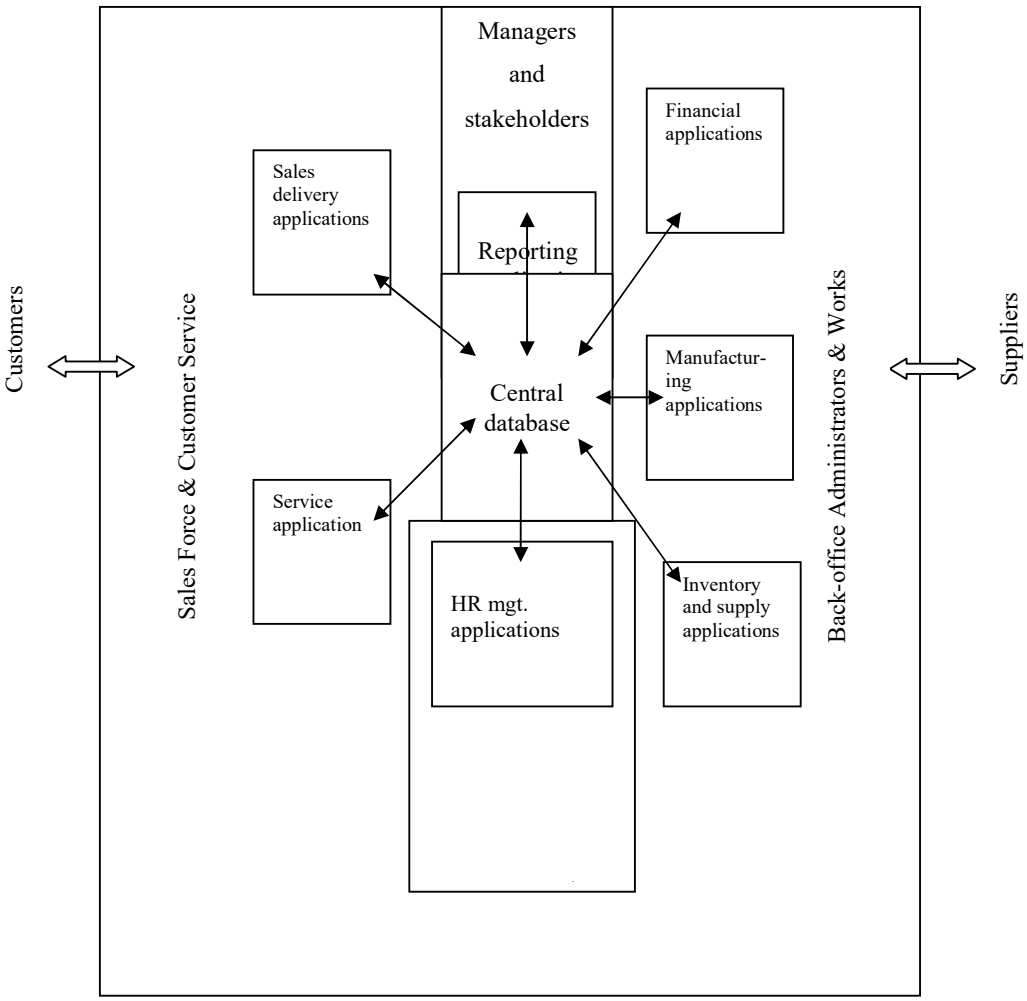

Figure 1.1: Anatomy of ERP System

Even though ERP systems implementations ranked eighth among the sample collected from worldwide companies in Figure 1.2, it still represents 25 percent of all systems implemented in the past six months when the survey was conducted. Figure 1.3 below shows how much of their budgets businesses worldwide are allocating for solutions and systems to be targeted for the year 2005. ERP systems implementations are one of the top priorities for managers around the globe.

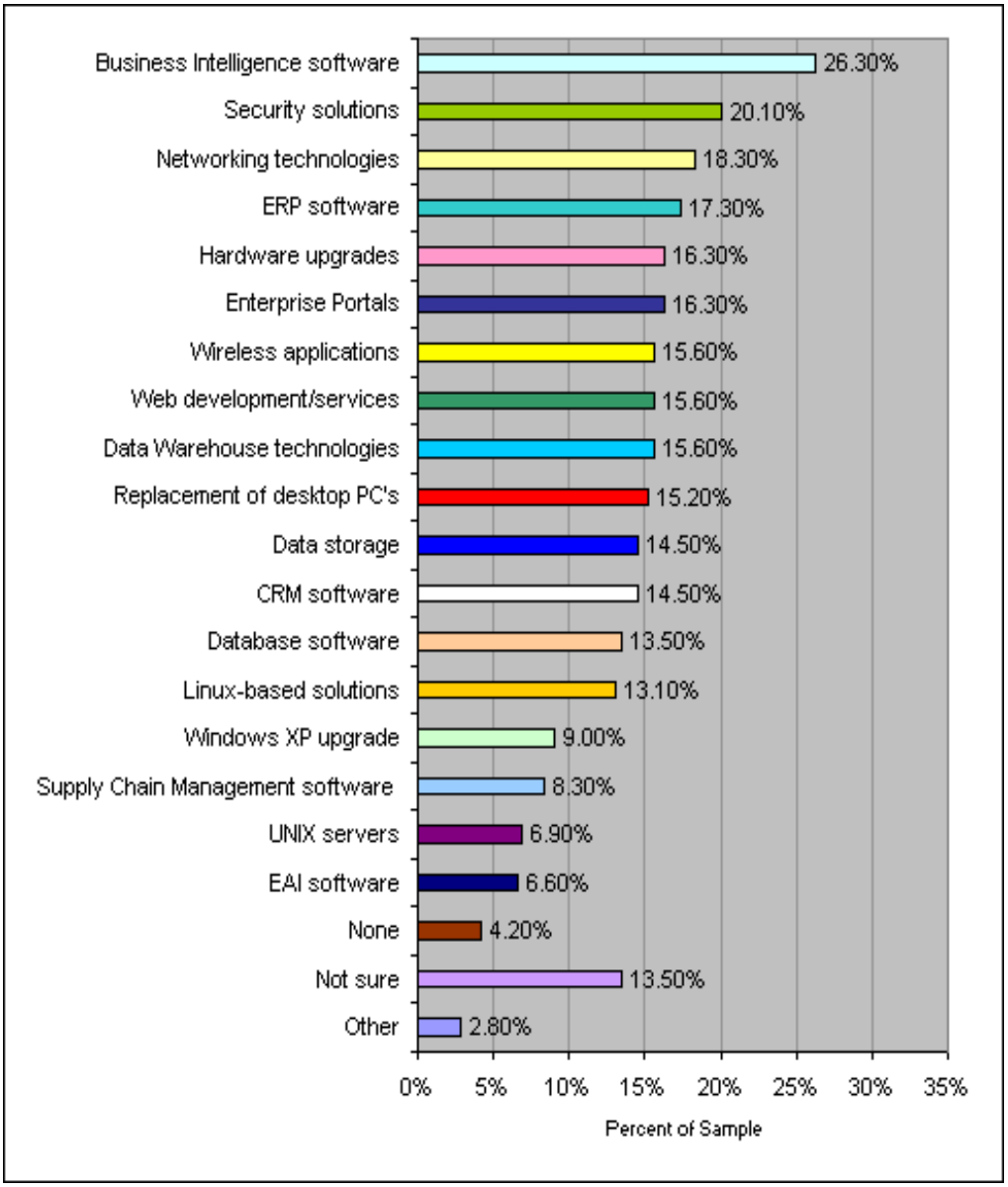

Figure 1.3: Sample Percentage of Anticipation of IT Budget Allocation for 2005

Source: IT toolbox 2004 Survey, ITtoolbox.com

According to AMR Research (1999), ERP solutions remain the biggest segment of large and mid-sized companies' IT applications budgets through and beyond 2004. A survey by Morgan Stanley of CIOs in different organizations showed that top spending priorities in IT are ERP and network security systems. *Information Week* (2004) stated that U.S. federal spending for ERP system implementations is to be increased by 40 percent in the next five years and is estimated to reach $7.7 billion in 2009. In 2004, *IT Toolbox* surveyed a sample of organizations worldwide to determine the current IT spending in the second half of 2004 (Figure 1.2) and the anticipation of IT budget allocation for 2005 (Figure 1.3).

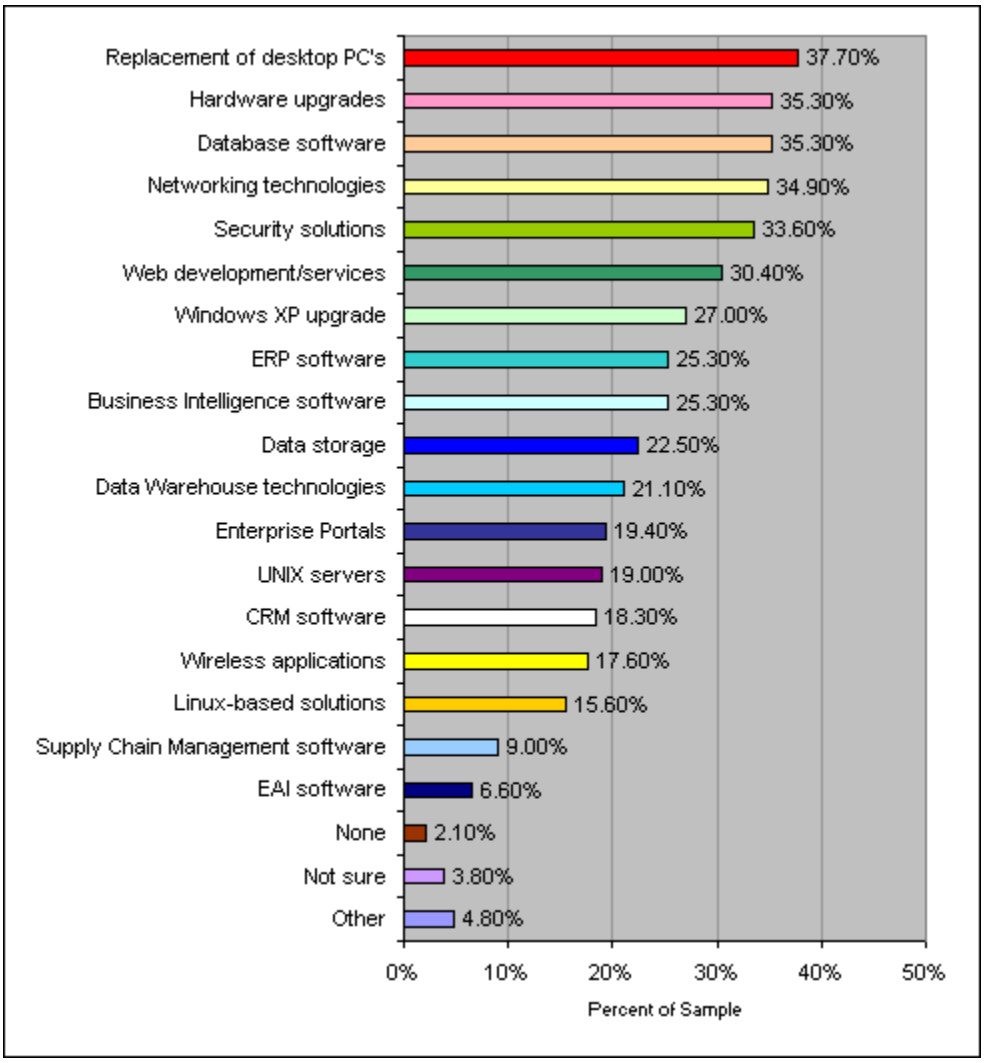

Figure 1.2: Sample Percentages of the Second Half of 2004 in Technology Implementations

Source: IT toolbox, 2004 survey, ITtoolbox.com

Public sector organizations in the UAE attempt to automate their business processes, to improve customer satisfaction, and to ensure quality services. Few of those organizations have adopted ERP solutions to promote business processes and to reduce costs but yet to exploit the full potential of ERP in their businesses (Al-Hosani, 2005). Kumar et al (2002) reported that ERP vendors are wagering that the coming years will see government agencies around the world making a big push to purchase ERP applications to amend or replace their aging legacy systems.

Farrar et al (2000) estimated that at least 90 percent of ERP implementations end up late or over-budget and almost half fail to achieve the desired results. This is why the subject of ERP is becoming popular from day to day and researchers are trying to specify the factors that have direct effect on the success of ERP projects.

The vast difference between ERP system implementation success rates in Western or Eastern countries and the UAE produces a need for research to examine the organizations' physical applications, business processes, and the specific factors that facilitate successful ERP implementation in UAE public sector organizations. Soh et al (2000) suggested that the organizational fit of ERP might be worse in Asia because the reference process model underlying most ERP systems is influenced by European or US industry/business practices, which are different from Asian business practices. It is important and rather critical for organizations aiming to implement an ERP system to figure out if their ways of doing business will fit within a standard ERP package. Those organizations are forced either to change the business processes to accommodate the software, which means deep changes in long-established ways of doing business, or to modify the software to fit the processes, which will slow down the project and introduce customization to the package. Customizing an ERP solution is a critical step organizations are trying to avoid because of its cost and update difficulties.

One critical challenge in ERP implementation has to do with first identifying gaps between specific organizational requirements and the ERP generic functionality, and then deciding how these gaps will be handled (Soh et al, 2000; Bancroft and Seip, 1998; Volkoff , 1999; Volkoff, 1999a). As mentioned earlier, implementation of an ERP software package involves a mix of business process change and software configuration to align software with business processes (Gibson et al 1999; Holland

and Light, 1999; Davenport 2000). It has, therefore, become increasingly clear that implementing an ERP system requires extensive efforts to transform the organization's business processes (Davenport, 1998a). Organizations are spending massive amount of time and effort in the planning and selection stage to determine the ERP solution best fitted to their business processes. Some organizations are seeking high-cost consultation services to reduce the risk of failure and to minimize the time for selection.

Kumar et al (2002) found that adoption initiation is strongly influenced by the expected benefits of ERP adoption in the organization. Different organizations may adopt an innovation for entirely different reasons, such recognition of a need or an opportunity. Bancroft et al (1998) suggested that ERP diffusion agencies, including ERP vendors and consulting firms, recommend strongly that ERP projects embody the universally applicable "best practice" and should be implemented without extensive of adaptation of the package's software.

Due to the high rate of failure in ERP system implementations, a proactive methodology is needed to assist an organization in selecting an ideal ERP system to suit its unique business processes. In this region, firms have been attracted to the concept of ERP and its potential benefits but still are resistant due to its high cost and failure rate. Swan et al (1999) argued that the root of such failure rate is the difference in interests between customer organizations who desire unique business solutions and ERP vendors who prefer generic solutions applicable to a broad market. Everdingen et al (2000) showed that an important criterion used in selecting an ERP system is the ERP fit with the current business processes.

This research is an exploratory study which will examine the strength of the BFERPSM and investigate the unique characteristics of the public organizations in the UAE. The outcome of this study will help practitioners better understand and accurately predict organizational behavior when a new ERP system is to be implemented.

1.2 Objectives

Two objectives motivated this study. First is the need for developing a strategic approach for matching ERP systems to UAE public sector organizations by introducing a best-fit profile tool, which consequently improves the selection of an ERP package, for the first time in the UAE. Second, the UAE is a developing nation

whose government is implementing large projects to automate many of its ministries' and department's work processes, in which an ERP solution is one main ingredient. However, the country's managers and decision makers lack the tool to help them predict their organization's behavior towards accepting and using a new ERP system.

CHAPTER 2

2. LITERATURE REVIEW

2.1 Historical Background

Highlighting the history and evolution of ERP is essential to understand its value to operations. Material Requirement Planning (MRP) and Manufacturing Resource Planning (MRP II) are ERP's business planning systems predecessors. In the 1970s, MRP represented a huge forward step in the materials planning process and especially in gross material requirements. Scheduling techniques for the factory floor and suppliers scheduling were incorporated in the MRP systems. When these occurred, users began to consider their system as a company-wide system. These developments resulted in the next evolutionary stage, which that became known as closed-loop MRP (Umble, 2003; Oden,1993).

In the 1980s, businesses began to look after the advantage of the available technology and were able to couple the movement of inventory with coincident financial activities. Manufacturing Resources Planning (MRP II) systems evolved to incorporate the financial management system along with manufacturing and materials management systems. This allowed companies to have a more integrated business system that derived the material and capacity requirements associated with a desired operation plan, allowed input of detailed activities, translated all this to a financial statement, and suggested a course of action to address those items that were not in balance with desired plan (Umble, 2003; Ptak, 2000).

By the early 1990s, continuing improvements in technology allowed MRP II to expand to incorporate all resource planning for the entire enterprise. Areas such as product design, information warehousing, materials planning, capacity planning, communication systems, human resources, finance, and project management could now be included in the plan. Hence, the term, ERP was coined. ERP can be used not only in the manufacturing companies, but in any company that wants to enhance competitiveness by most effectively using all its assets, including information (Ptak, 2000; Shankarnarayanan 2000).

2.1.1 MRP I and MRP II

ERP systems appeared first in the 1980s but their importance was realized after the 1990s and they replaced the legacy systems. The Granter Group is credited for coining the term "Enterprise Resource Planning" for the concept it developed in the 1990s for the next generation of MRP II systems (Dahlen and Elfsson, 1999; Keller 1999). Ptak and Schragenheim (2000) called ERP the next logical sophistication level in an evolutionary series of computer tools for operation.

Gunson (2002) stated that ERP solutions were known during 1990s as gradual evolution of their functional scope as shown in Figure 2.1 below.

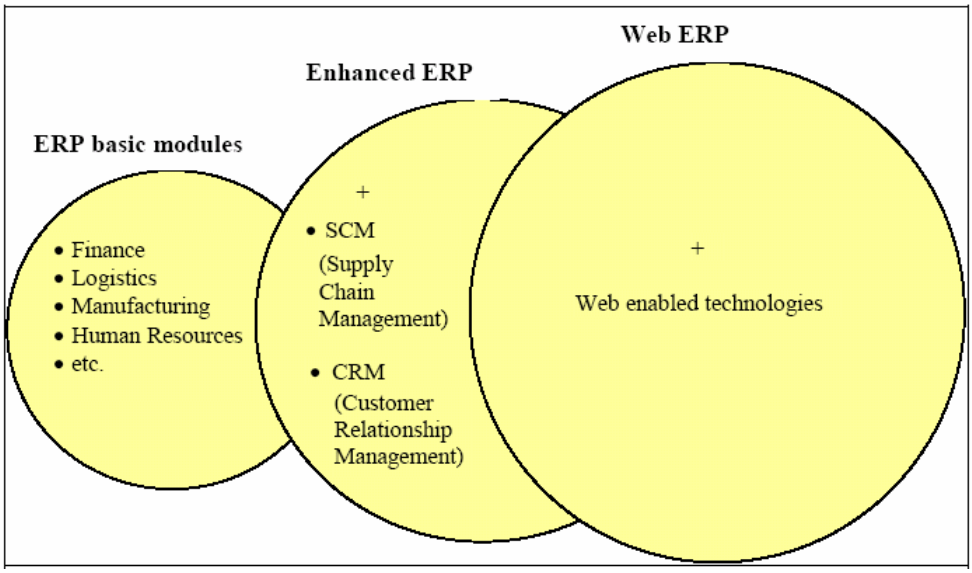

Figure 2.1: Integrated Modules in ERP Solution

Source: Gunson (2002)

Jean-Louis Lequeux (1999) gave a definition that distinguishes ERP from other types of software by suggesting that it must possess simultaneously at least the three following characteristics:

- the effective management of various company activities
- the existence of a common database
- the capability to react quickly to operating rules.

While companies experienced implementation problems with MRP and MRP II systems, it was expected that the implementation problems with ERP systems would be much worse because ERP systems are very complex and have a massive impact on the entire organization, and not just operations (Abdinnour-Helem, 2003).

2.1.2 Appearance of ERP Projects

Organizations worldwide have defined ERP implementation projects as high-risk and high-cost projects where 65 percent of executives believe that ERP systems have at least a moderate chance of hurting their businesses because of the potential for implementation problems (Aiken 2000).

Despite the widespread popularity of ERP, not all organizations are aggressively adopting ERP systems. Some have adopted certain stand-alone or partially integrated functional modules, while some organizations have even discontinued implementing ERP systems after adoption (Davenport, 1998; Bingi et al., 1999). User acceptance of technology, or just user acceptance, gathers its roots from the large and more famous research called Diffusion of Innovation.

One of the main reasons for failure of an ERP project that Davenport (1998) reported is that organizations tend to falter in the absence of the alignment between their human and business systems and the new technological system. Davis and Olson (1985) described package adaptation to the organization's needs and organizational adaptation to the package as two alternative approaches to the implementation of package software. Soh et al. (2000) suggests that ERP misfit stems from the firm- or country-specific requirements that do not match the capabilities of ERP systems.

Al-Mashari et al. (2003) categorized the success factors as correspondence success, process success, interaction success, and expectation success. Markus and Tanis (2000) highlighted that ERP adoption is a complex exercise in technology innovation and organizational change management. Kyung and Kim (2002) have examined organizational fit of ERP and its impact on ERP implementation where they showed that ERP implementation success significantly depends on organizational fit of ERP and certain implementation contingencies.

2.2 Recent Development in ERP Adaptation and Implementation

ERP adaptation increases the feature-function fit between ERP and the adopting organization, which is likely to result in lower resistance, reduced training needs, and less organizational adaptation (Bingi et al., 1999). Davenport (2000) describes two parts of a rational approach to implementing an ERP system: (1) preparing the people and (2) preparing the technical system. ERP implementation also

involves business process change (BPC) and ERP adaptation to align the software with the business processes (Holland and Light, 1999).

Several methods have been proposed for selecting a suitable ERP system or management information system (Teltumbde 2000, Ptack 2000, Chen and Gorla 1998, Santhanam and Kyparisis 1995, Santhanam and Kyparisis 1996, Lee and Kim 2001, Badri et al, 2001, and Lai et al, 1999). The scoring method is one of the most popular. Although it is intuitively simple, it does not ensure resource feasibility. Teltumbde (2000) suggested 10 criteria for evaluating ERP projects and constructed a framework based on the Nominal Group Technique (NGT) and the Analytic Hierarchy Process (AHP) to make a final choice. Santhanam and Kyparisis (1996) proposed a nonlinear programming model to optimize resource allocation and the interaction of factors; their model considered interdependencies of criteria in the information system selection process. They considered variables such as risk, cost, benefit, resource and contingency constrains. Their model represents a significant improvement over other project selection models especially in R&D and capital budgeting projects. Lee and Kim (2001) combined the analytic network process (ANP) and a (0-1) goal programming model to select an information system. In their paper, they did not consider more than three interdependence variable cases and their sensitivity analysis was not applicable to real-world project problem. These mathematical programming methods can not contain sufficient detailed attributes, above all, which are not easy to quantify, so that the attributes were restricted to some financial factors, such as costs and benefits. Furthermore, many of them involved only the consideration of internal managers, but do not offer a comprehensive process for combining evaluations of different business processes requirements within one organization to select an ERP system objectively.

2.2.1 ERP Adoption and Diffusion

Best practices in Canadian government organizations (Kumar et al., 2002) showed a significant result in adoption of the innovation process theory framework as well as the Marks and Tanis (2002) model as a basis to delineate the ERP adoption process. Krumbholz and Maiden (2001) provided evidence for an association between organizational culture and ERP implementation problems but no direct evidence for an association between national culture and implementation problems.

Typically, ERP vendors recommend process adaptation and discourage ERP adaptation for fear of potential performance and integrity degradation as well as maintenance and future upgrade difficulties. On the other hand, user departments of the customer organization would prefer ERP adaptation to process adaptation, which would necessitate significant changes in their work environment. It was found that organizational fit of ERP is indeed critical in explaining ERP implementation success. In addition, both ERP and process adaptations interact with organizational fit of ERP on ERP implementation success (Kyung and Kim 2002).

Originating from the study of the process of economic growth in anthropology diffusion research, Diffusion of Innovation defines the process by which new ideas, opinions, or products spread through society (Nabseth and Ray, 1974; Valente 1995). According to Rogers, "Diffusion is the process by which an innovation is communicated through certain channels over time among members of a social system" (1995, p. 5). The Diffusion of Innovation definition suggests that diffusion or adoption of innovation is primarily the outcome of a learning or communication process that entails risk and uncertainty (Brown, 1981; Leer, 1996; Valente, 1995). In general, successful innovations are accepted and used faster and over a wider area than their counterpart (Brown,1981). The decision to adopt an IT, or any technology for the matter, may affect the economic, political, and social structure of a nation (Hanson and Narula, 1990). And, for a technology to be adopted, its attitudes must be compatible with attributes of the receiving social system. Furthermore, there are often conflicting opinions, beliefs, and attitudes surrounding the nature of impact and amount of change technology may ultimately inflect on traditional society. In Hanson and Narula's opinion (1990), that may be part of the reason why third world countries, where tradition is strongly valued, wrestled with problem of technology transfer.

Recently, researchers in the field of information systems (IS) have begun to rely on the theories of innovation diffusion to study implementation problems. A major focus in these studies has been how potential users' perceptions of the information technology innovation influence its adaptation (Moore 2001). Moore focused in his research on the famous perceived characteristics literature of Rogers (1983), who surveyed thousands of innovation studies and identified five characteristics of innovation that affect the rate of diffusion of an innovation. These are relative advantage, compatibility, complexity, observability, and trialability. Two

further constructs were identified beyond Rogers' classification that were thought important in the decision to adopt an innovation. The first one was image; some researchers, including Rogers, included image as an aspect of relative advantages. The second one was voluntariness of use. Finally, Davis in 1986 developed a Technology Acceptance Model (TAM), which is quite similar to the Diffusion of Innovation model where he included two constructs, perceived usefulness and perceived ease of use (Al-Hosani 1998). In his study, Moore (2001) combined the above characteristics into one instrument to measure the adoption of an information technology innovation. He also proved that observability is tapping two distinctly different constructs, result demonstrability and visibility.

CHAPTER 3

3. MODEL DEVELOPMENT

3.1 Introduction

The most important step was to design a proper tool that interacts with the objectives of this research. This chapter presents the development and the design stages of the BFERPSM. It also shows the elements that were considered to be included as part of this model. Based on the knowledge of experts and academics in the field of the ERP technology, this model was tailored to fit the process of an ERP system evaluation and the diffusion of innovation within this country. Our framework was divided into three stages: characteristics development; the measuring instrument; and the data collection. The next chapter presents the procedure that was followed to examine this framework.

3.2 Developing the Model

The BFERPSM is unique because it combines different aspects within one systematic framework in order to identify the best-fit ERP system. The model consists of three frames: main business processes of the B-Web typology; DOI elements; and SF variables. While the literature is rich in its study of various aspects of ERP system implementation, none of these studies has focused on the actual process of matching an ERP system with the business processes of an organization. The second frame of the model includes different perceived characteristics of innovation (PCI) that reflects the process of ERP system technology diffusion within the public sector in the UAE (see Figure 3.2). The last frame includes success factors (SF) variables such as organizational structure, size, and technology.

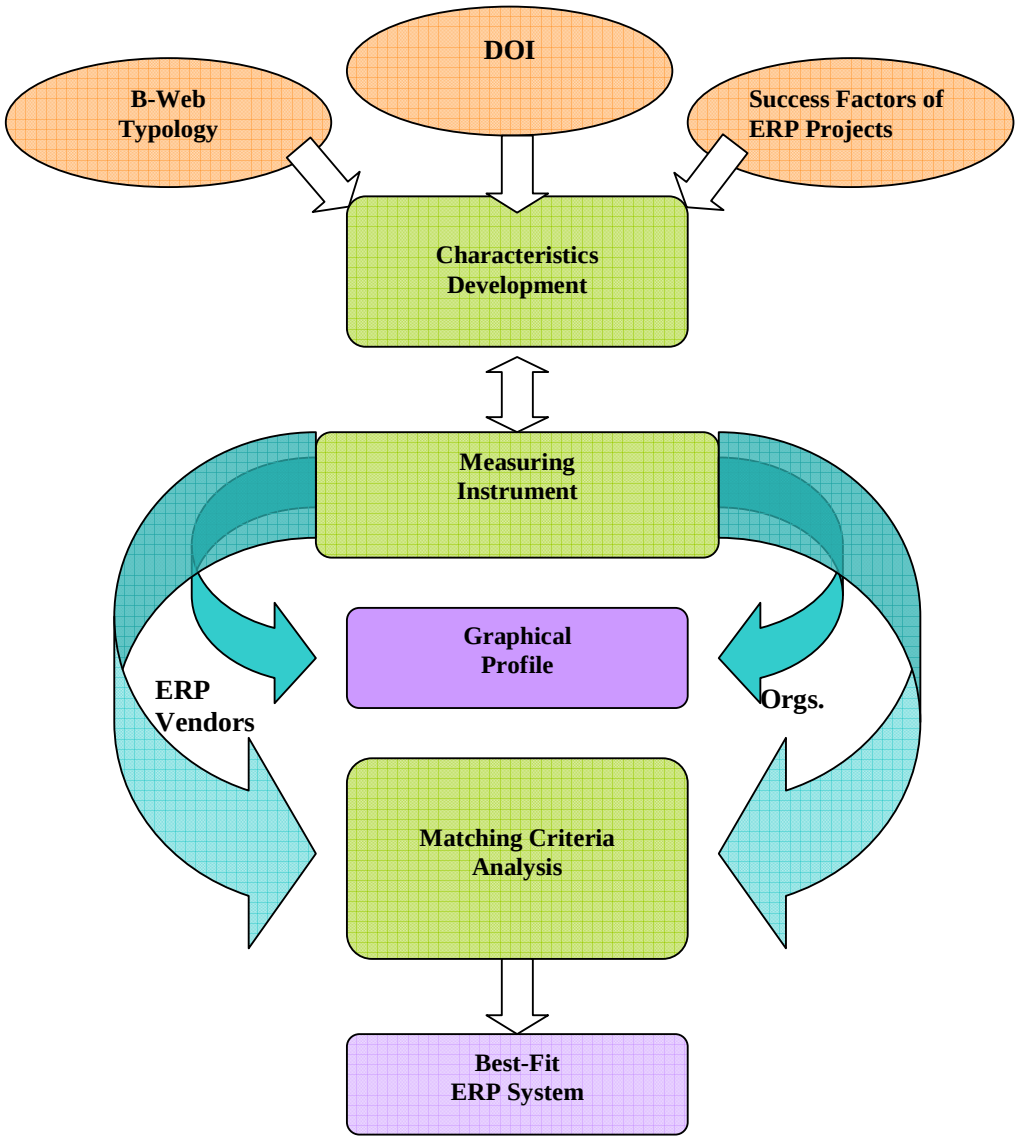

Figure 3.1: Best-fit ERP System Model (BFERPSM) Process

3.2.1 The B-Web Typology

Tapscott (2001) looked for a new typology to categorize organizations after investigating hundreds of them. He showed that this typology applies to the physical business world as well as to the digital applications. He called this a B-Web Typology as illustrated in Figure 3.2 with different themes and key features as shown in Table 3.1.

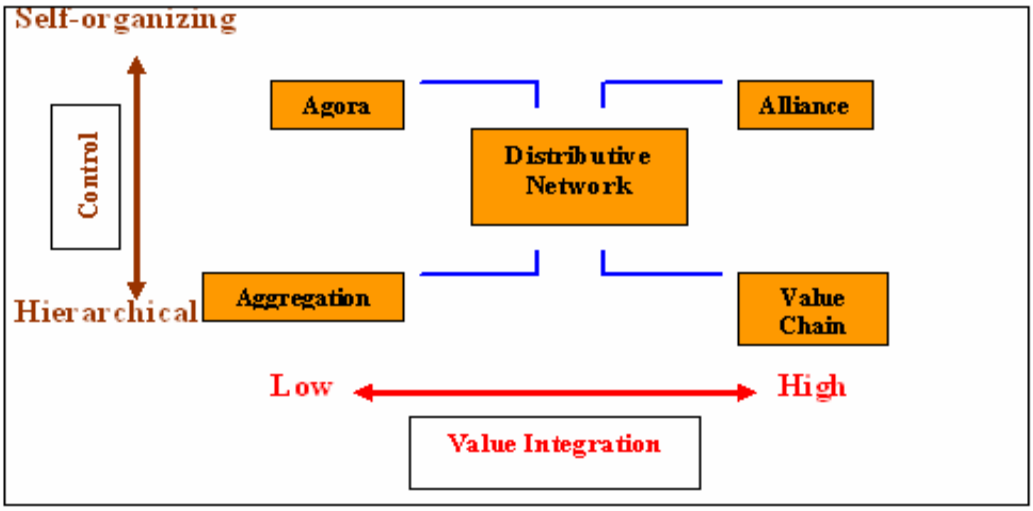

Figure 3.2: B-Web Typology (adopted from Tapscott, 2001)

Table 3.1

Key Features of B-Web Types (adopted from Tapscott, 2001)

	Agora	Aggregation	Value Chain	Alliance	Distributive Network
Main Theme	Dynamic pricing	Selection and convenience	Process integration	Creativity	Allocation distribution
Value Proposition	Liquidity: converting goods into a desirable price	Optimization of selection, organization, price, convenience, matching, and fulfillment	Design and delivery of an integrated product or service that meets a specific set of customer needs	Creative collaboration in aid of a goal shared across a community of contributors	Facilitate the exchange and delivery of information, goods, and services
Customer Role	Market player	Buyer	Value driver	Contributor	Sender/recipient
Knowledge Focus	-Timing -Market -Intelligence	-Market segmentation -Supplier offerings -Fulfillment	-Innovation -Supply chain management	-Community -Creativity -Standards and roles	-Network optimization -Visibility and transparency
Key Process	Price discovery	Needs matching	-Product design -Supply chain management	-Innovation	-Distribution
Examples	-Yahoo classifieds -eBay -Priceline -AdAuction -NASDAQ -MetalSite -FreeMarkets	-Amazon.com -Chemdex -HomeAdvisor -Webvan -E*Trade -Travelocity -WS Il	-Cisco Systems -Dell Computer -General Motors -Celestica -Bidcom	-America Online -NetNoir -Linux -MP3 -Wintel	-Enron -UPS -AT&T -Sells Fargo -Internet

Tapscott's B-Web Typology (2001) recognized five different types and their characteristics, which are described below:

- Agora: Originally from Greek, this term applies here to a market where buyers and sellers meet to freely negotiate and assign value to goods. Both buyers and sellers discover a price through on-the-spot negotiations. Tapscott categorizes it as the price discovery mechanism, which features one-to-one haggling, multiparty auctions, and exchanges as illustrated in Figure 3.3.

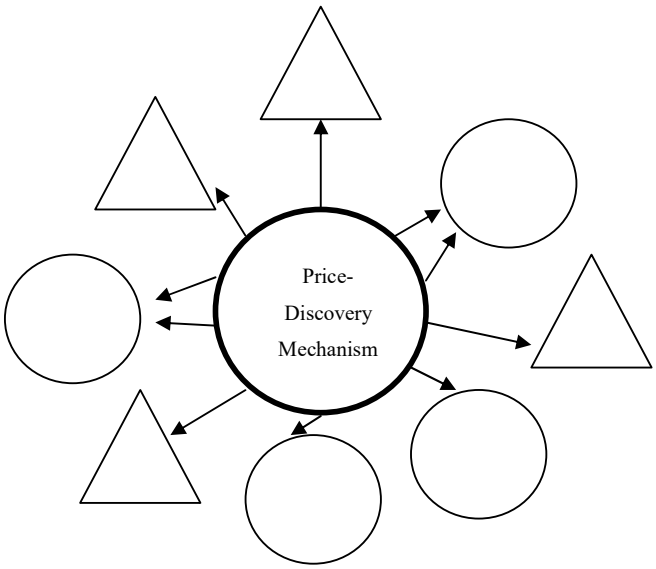

Figure 3.3: Agora Structure (adopted from Tapscott, 2001)

- Aggregation: This is an intermediate between the producers and customers as shown in Figure 3.4. The lead aggregator in a network takes responsibility for selecting products and services, targeting market segments, setting prices, and ensuring fulfillment. An aggregation offers a limitation of value integration and diversity of variety in products and services. Retailers and wholesaler are good example of aggregations.

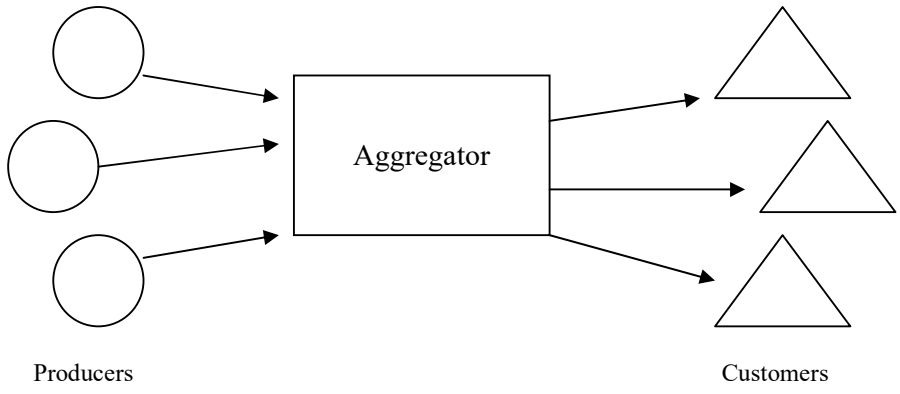

Figure 3.4: Aggregation Structure (adopted from Tapscott, 2001)

- Value Chain: This term is used to produce a highly integrated value proposition as shown in Figure 3.5. The output meets a customer order or

market opportunity. An example is Cisco Systems, which makes routers that shuffle data from one computer to another.

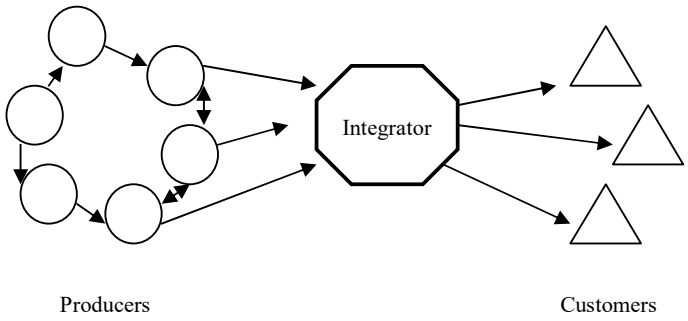

Figure 3.5: Value Chain Structure (adopted from Tapscott, 2001)

- Alliance: it is the most ethereal of b-web. It strives for high value integration without hierarchical control as shown in Figure 3.6 where both the producer and customer combined in one term as a prosumer. The goal of an alliance is to design goods or services, create knowledge, and produce dynamic or shared experiences. An example of this would be the MP3 phenomenon and technology where open source innovation is initiated.

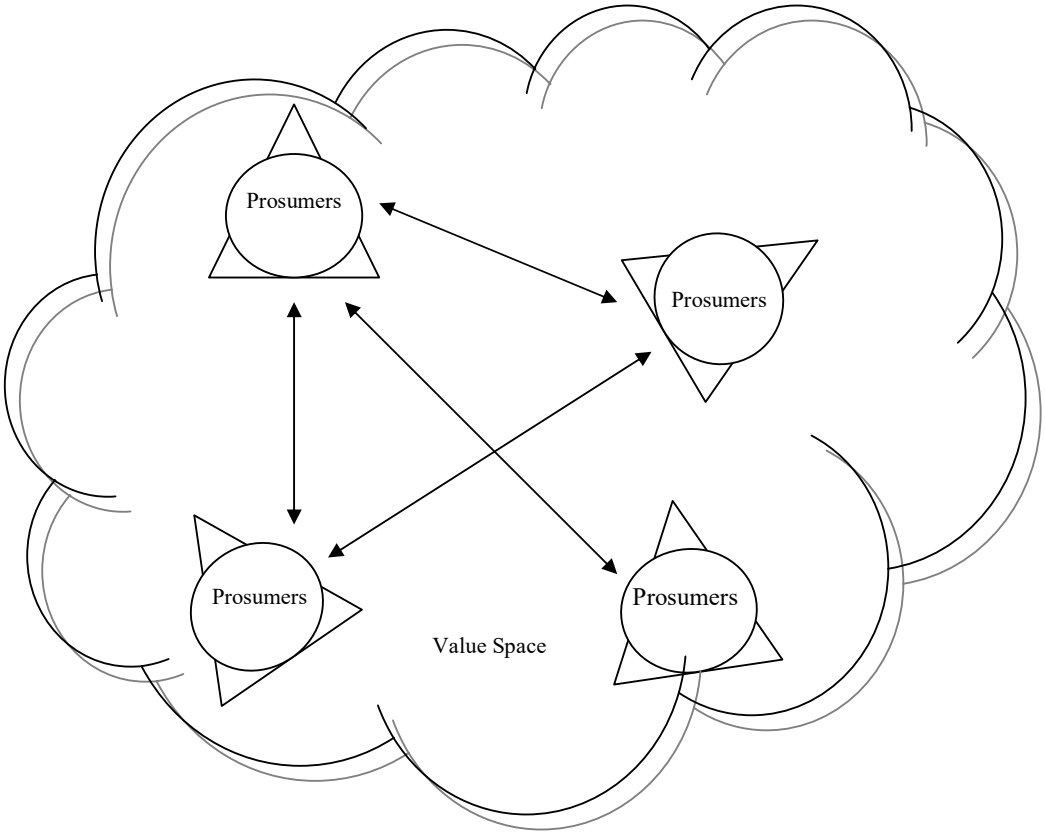

Figure 3.6: Alliance Structure (adopted from Tapscott, 2001)

- Distributive Network: This is the part of the b-web that keeps the economy alive and mobile. This can be any of network operators, which include logistic companies, banks, postal services, telephone companies, and the electrical power grid of the industrial economy. These neither create nor consume their essential cargo. As with alliances, the more customers who use a distributive network, the more value it provides to all its customers.

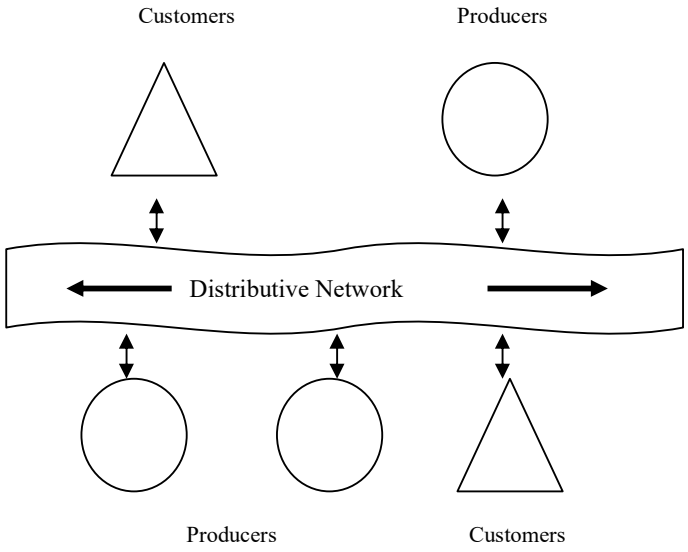

Figure 3.7: Distributive Network Structure (adopted from Tapscott, 2001)

Finally, Tapscott noted that there are key differences between the physical world organizations and the digital businesses, which are listed below:

- The basis of competition is often shifted as the organizations are moving toward the b-web, such as e-trade to an aggregation of advisory information and investment services.
- Business model innovation becomes the basis of competitive advantage, such as with as eBay, who developed new ways to create and deliver value.
- The alliance business model is rare in the physical world whereby in the b-webs, alliances are becoming highly visible and powerful, such as Linux and American Online.

3.2.2 Diffusion of Innovation (DOI)

As stated previously in the review of literature, the diffusion process (adaptation) is a critical factor in the ERP system implementation cycle. The following selected characteristics are the ones that have been identified and tested in Moore's (2001) instrument for IS diffusion:

- Relative advantages: the degree to which an innovation is perceived as being better than its precursor
- Compatibility: the degree to which an innovation is perceived as being consistent with the existing values, needs, and past experiences of potential adopters
- Complexity: the degree to which an innovation is perceived as being difficult to use
- Observability: the degree to which results of innovation are observable to others
- Trialability: the degree to which an innovation may be experimented with before adoption
- Image: the degree to which use of innovation is perceived to enhance one's image or status in one's social system
- Perceived Usefulness: the degree to which an individual believes that using a particular system would enhance his or her job performance
- Perceived Ease of Use: the degree to which an individual believes that using a particular system would be free of physical and mental effort
- Voluntariness of Use: the degree to which an innovation may be used voluntarily
- Result Demonstrability: the degree to which use of innovation is perceived to demonstrate result after adoption and implementation

3.2.3 Success Factors of ERP Implementation (SF)

ERP system implementations are one of the IT-driven initiatives that require change of the organization's socio-technical system, which intertwines technology, task, people, structure, and culture (David and Olson, 1985). Henderson and Venkatraman (1993) developed the "strategic alignment model" emphasizing the multivariate fit among business strategy, IT strategy, organizational infrastructure, and processes.

For the purpose of the model development, the above variables were also subject to validation by the experts and academics for the development of the final characteristics list.

3.2.4 Characteristics Development

One of the most important steps was the characteristics development, which was the heart of the overall model. The preliminary investigation of the public sector was designed to collect the most important measures applicable for the ERP solution. The pre-list of the characteristics (see Appendix I) was distributed to experts and academics to seek their opinions as to what they think is applicable to meet the project's objectives. The first attempt had the most changes and then the list stabilized with minimum changes to produce a final list of characteristics as shown in Table 3.2.

Table 3.2

The Final Characteristics

No.	Dimension	Element
1	Analytic	Strategic Management
		Detailed Operations Analysis
		Workforce Analysis
2	Financial	Financial Accounting
		Financial Supply Chain Management
		Balanced Score Cards
3	Human Capital Management	Detailed Employee Life-Cycle Management
		Individual Access
		Employee Service Request
		Workforce Deployment
4	Operations	Automating Procurement
		Automating Inventory and Warehousing
		Manufacturing Activities
		Vehicle/Fleet Management
		Sales Orders Management
		Product Life-Cycle Tracking
		Program and Project Management
		Quality Management
		Asset Management
		Customer Relationship Management
5	Corporative Services	Business Travel Management
		Environment, Health and Safety Management
		Real-Estate Management
		Incentives and Commissions Management
		Employee Interface (self-service)
6	Relative Advantages	
7	Ease of Use	
8	Enhancing Organizational Image	
9	Compatibility	
10	Results Demonstrability	
11	Support Voluntary Use	
12	Need for Technical Changes	
13	Need for Process Changes	
14	Fit Organizational Size	
15	Fit Organizational Structure	Flexibility
		Communication
		Type of Structure

3.2.5 The Measuring Instrument (Questionnaire)

The study constructs and variables were operationalized using a self-reporting self-administrated questionnaire. Based on the definition by Hu (1998, p. 58) and supported by Fowler (1993) and Gay and Diehl (1992): “The questionnaire survey is a quantitative research methodology that draws inferences based on statistics derived from a sample selected from a specific population.” Kleintop (1993) recommended the use of previously devised measuring instruments in the interest of literature comparisons. He argues that studies using similar measuring instruments can be compared more easily.

The scales used for this study are attitudes scales. They attempt to measure what an individual believes, perceives, or feels (Gay and Diehl 1992). A seven-point Likert scale (Likert 1932), one of the most common attitude scales in which individuals are asked to indicate their agreement with each statement using seven different levels, was used for all the items, except the items used to gather demographic data. See Appendix II for the survey questionnaires.

CHAPTER 4

4. METHODOLOGY

4.1 Introduction

An important criterion used in selecting an ERP system is that the ERP fit with current business processes (Everdingen et al., 2000). One challenging step of this research is to design and develop an approach that guides those organizations to select a matched ERP system to their business environment and processes. This research aims at developing a systematic methodology for matching ERP systems and the public sector of the UAE based on the same general principles.

4.2 Procedure

4.2.1 Preliminary Investigation of the Public Sector

Investigation of the public sector was performed to develop a list of organizations that fit the business processes based on B-Web Typology and its categories. Based on the approval of the organizations, a sample of each B-Web type was selected, surveyed, and further studied.

4.2.2 Model Development

From the preliminary investigation and the B-Web Typology shown in Chapter 3, a list of dimensions was developed to include the main quantifiable processes of each B-Web category as well as the ERP solution's modules that can be selected for the different business processes in the public sector. ERP systems packages were investigated to match the dimensions necessary for the business processes and to support each theme and key process of the B-Web types (see Table 3.2).

The selected Diffusion of Innovation characteristics and Success Factors variables were also included to the list for validation. Using the Delphi method, these characteristics were farther validated by expert opinions. A final list was then developed of the most influencing dimensions of the B-Web types, diffusion of innovation elements, and success factors of ERP implementation.

4.2.3 Survey Strategy

Survey questionnaires for the final list of each module and element were developed to be answered on Likert scale as the following:

Strongly Agree = 7

Agree = 6

Slightly Agree = 5

Neutral = 4

Slightly Disagree = 3

Disagree = 2

Strongly Disagree= 1

Demographic questionnaires were also included for further analyses.

4.2.4 Developing the Graphical Profile of the Public Sector Organizations

A similar approach was followed as Somnath and Deshmukh (2001), who used the Delphi method for experts' opinions to develop a quantitative approach for matching a given technology to a technology forecasting method. Their research resulted in developing a graphical profile for the technology as well as graphical profiles for all the forecasting methods. Then, they superimposed the graphical technology profile on the graphical profiles of the forecasting methods in order to choose the forecasting method that fits the technology the most.

Dimensions Force Ranking: For each organization a consensus was used to develop dimension relative ranking, where 1 is the most important and 15 is the least important.

Module/Element Ranking: Within one dimension, similarly a consensus was used to develop a relative ranking for each element of the business processes within one dimension.

Four individuals from each organization answered the survey questionnaires. A combined weightage (the product of the average of individuals' results and the multiplication of dimension ranking and module/element ranking) (Combined Weight= Average* Dimension Ranking* Element Ranking) was then computed. The result then was multiply by 10 to be plotted on an easier scale. The graphical profile of the combined weight for each dimension and element was then plotted.

4.2.5 Investigation of the Available ERP solutions

Careful investigation of the available ERP solutions was performed to determine the market's competitors. Experts' opinions were taken into account to ease and shorten the survey time. At the GITEX 2005 event, ERP vendors were met and experts were asked to answer the questionnaires.

A similar approach in step 4.2.4 was then followed in order to generate a graphical profile for each of the ERP systems available, with each vendor evaluating the others.

4.2.6 Selection of the Best-Fit ERP solution

Four different matching criteria were used in order to allow managers to select their best-fit ERP system based on their management style.

- Matching Criterion I: Graphical and Absolute Error Method

  Each organization's graphical profile was superimposed on all of the ERP solutions profiles generated in step 3.2.6. By observing the ERP solution profiles, the closest solution to the correspondent organization was then selected as a best-fit ERP solution for that organization. The same step was followed for all organizations in order to select their best-fit solution. For every ERP system, the error measured by the difference in combined weight between an organization and each ERP solution was computed. The sum of the absolute deviations (error) was then calculated. For each organization, the ERP solution with the least total absolute deviation was chosen and compared to the one selected earlier from the graphical method.

- Matching Criteria II: Totality Style

  By summing the errors for every ERP system measured by the difference in the combined weights, the ERP solution with greatest positive value was selected as the best system. This same step was repeated for every organization.

- Matching Criteria III: Optimist Management Style

By summing the positive errors only for every ERP system measured by the difference in the combined weights, the ERP solution with greatest positive value was selected as the best system. This same step was repeated for every organization.

- Matching Criteria IV: Pessimist Management Style

By summing the negative errors only for every ERP system measured by the difference in the combined weights, the ERP solution with the least negative value was selected as the best system. This same step was repeated for every organization.

4.2.7 Validation of BFERPSM

The model was divided into three main frames: business process (B-Web) dimensions, diffusion of innovation (DOI) elements, and success factors (SF). For every frame, the best-fit ERP system was computed based on the four matching criteria. The same step was repeated for every organization. A final comparison of the model behavior on the result of the best-fit ERP system using the three frames was developed.

4.2.8 Organization Commonality Analysis

This step was performed to determine the commonalities of the public sector organizations. Organizations that fall in one category of the B-Web were compared relatively to determine the commonalities or the differences of each type.

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CHAPTER 5

5. RESULTS AND DATA ANALYSIS

5.1 Introduction

In this chapter, results and analysis of the data collected from the surveys are presented. The first part of the analysis is a summary of the survey respondent's profiles while the second part presents the development of the graphical profiles for selected public organizations in the UAE as well as for selected ERP solutions based on the BFERPSM model discussed in Chapter 3.

5.2 Pre-investigation of the Public Sector in the UAE

The goal of this step is to determine which organizations in the public sector of the UAE will be included in the survey. A brief summary of the research objectives was presented to the managers of public sector organizations in order for them to decide whether to be a part of this study or not. Table 5.1 shows the organizations investigated and the final list of the organizations included.

Table 5.1

Pre-investigated Organizations

Organization	B-Web Type	Included/Eliminated	Reason
Signal Corps of the UAE Armed Forces	Distributive Network-Value Chain	Eliminated	Security and Confidentiality
Sewage Treatment Dept. (STD), Al Ain	Value Chain	Included	
Forestry Dept., Al Ain	Aggregator	Eliminated	Too many aggregators
Private Dept. of Sheikh Zayed (PDSZ), Abu Dhabi	Aggregator	Included	
Abu Dhabi Investment Authority (ADIA),Washington, D.C. Office	Aggregator	Included	
ADEWA	Value Chain-Aggregator	Eliminated	Too many aggregators
Finance Dept., Abu Dhabi	Aggregator	Included	
Dept. of Civil Aviation, Dubai (DCA)	Value Chain	Included	
Municipality of Al Ain	Aggregator	Eliminated	Confidentiality
Dubai Internet City (DIC)	Aggregator	Included	
SME	Alliance	Included	

5.3 Data Gathering

First, the organizations chosen to participate in the study were either public service or semi-governmental organizations. This was only done to categorize the organizations, keeping in mind the B-Web types where some categories do not fit the public sector organizations. Second, because the study was to be conducted on governmental organizations where some information may be classified, a champion individual within each organization was needed to aid in the process of distributing the data gathering instrument, the questionnaire, and collecting it back from the subjects. This ensures the proper culmination of the questionnaire to allow for the timely completion of the study, and to ensure the subjects of the legitimacy of the study and confidentiality of any organizational information.

Third, survey was given to managers at various levels of the chosen organizations. Spreading the coverage of the study across different organizational levels reduces the affect of the biases that may be caused by organizational characteristics or work environment particularities. With three guiding rules commanding the data gathering process, the study was first introduced to potential champions. A number of interviews were then conducted with potential champions and pre-investigation was done in February 2005 for several departments within various ministries and public sector organizations.

The results of the interviews and the pre-investigation survey helped eliminate some unsuitable organizations from participating in the study. Furthermore, even when the conditions were sound for the success of the study, some organizations were eliminated for security reasons. Champions in such organizations expressed their concerns for the security of the information and organizational work process, and asked not to be included.

5.4 Participating Organizations

The organizations were chosen according to their unique business processes and to the categories of the B-Web Typology, which was discussed earlier. The participating organizations were mostly public sector organizations. In this research, semi-government organizations were also included for the purpose of investigating most of the B-Web types. In summary, the selection criteria of the organizations included in this study was based on the following:

- Business processes of each organization.
- Matching one of the B-Web Typology categories.
- More than one organization within the investigated B-Web types.
- Organizations with an implemented ERP system.

5.4.1 Finance Department of Abu Dhabi

The Finance Department (FD) in Abu Dhabi finances all budget and financial requirements of government organizations in Abu Dhabi, Al Ain, and the Western region of Abu Dhabi Emirate. This organization is responsible for allocating budgets, auditing, and reporting to the Ministry of Finance. There are many organizations that are financed by the FD, such as municipalities, education departments, public health centers, etc. FD has a division structure and less than 500 employees. FD is a service

aggregator because it organizes all necessary budgets and it helps customers (other public sector businesses) match them to their requirements.

5.4.2 Abu Dhabi Investment Authority (ADIA) in Washington, D.C.

Abu Dhabi Investment Authority (ADIA) has regional offices in London and Washington, D.C. ADIA is in charge of all investments of the Abu Dhabi government locally and internationally. ADIA is investing in stocks, real estate, banks, and more. The Washington, D.C. office is responsible for all investment in North America. Furthermore, the office is responsible for 2,000 UAE students who go to schools and universities in the United States. The office has a functional structure with about 200 employees. ADIA is a service aggregator because it finances and organizes goods (properties) and help students to gain their degrees.

5.4.3 Private Department of Sheikh Zayed (PDSZ) in Abu Dhabi

The Private Department of Sheikh Zayed has three different branches: the main one in Abu Dhabi City, the Al Ain City branch, and the Western Region branch. PDSZ is responsible for all activities and projects that are servicing the governor of Abu Dhabi and the royal family. PDSZ takes care of all royal palaces, farms, and forests in the Emirate of Abu Dhabi. It also runs all necessary projects to fulfill any new requirements. PDSZ has a functional structure with about 2,500 employees. PDSZ is a customer-focused aggregator because it serves a special customer (the royal family) and fulfills all necessary requirements.

5.4.4 Sewage Treatment Department (STD) in Al Ain

The Sewage Treatment Department in Al Ain is one of the main branches of Al Ain Municipality. STD is responsible for planning and executing sewage activities and treatment plants, and coordinating road activities and housing in Al Ain City. The STD structure is designed as divisions with a functional structure and has 1,200 employees. STD has a division of projects and engineering processes where all projects are executed and all necessary engineering activities are planned. Furthermore, STD has privatized its maintenance and operational division to a private company to reduce overheads, minimize efforts, and focus on other processes. STD is a “product-centric” value chain because it designs and delivers products (roads and treatment plants) to meet a specific set of customer needs.

5.4.5 Department of Civil Aviation (DCA) in Dubai

The Department of Civil Aviation (DCA) in Dubai is among others that follow the Civil Aviation Authority in the UAE. DCA is in charge of all aviation activities in the Emirate of Dubai. It is located in Dubai International Airport and serves all airlines and companies that are using the airport. DCA has a functional structure based on divisions with about 3,000 employees. One of the main customers of DCA is Emirates Airlines, which is based in Dubai. DCA is "job-shop" value chain because it creates customized solutions (installation of the latest aviation equipment and building new airport buildings) where the end-customer (Dubai airport and airlines) initiate the value creating cycle.

5.4.6 Dubai Internet City (DIC)

Dubai Internet City (DIC) is a semi-government firm that acts as a service provider for Internet and other communication activities for companies and enterprises located in Dubai Media City (DMC). In the year 2000, DIC was responsible for delivering all infrastructures for the e-government project to Dubai public and government organizations. DIC has a matrix organizational structure with about 1,500 employees. Big companies such as Oracle, IBM, and Microsoft located in DMC are using the services provided by DIC to connect with their branches around the world. DIC is an aggregator type of organization because it provides and organizes all necessary telecom services for the companies in DMC to help them communicate with outside world.

5.4.7 Sheikh Mohammed Establishment for Young Leaders Support (SME)

Sheikh Mohammed Bin Rashid, UAE Vice President and Prime Minister and Ruler of Dubai Emirate, launched an establishment four years ago to support young business leaders to innovate and create new ideas and opportunities. SME is a semi-government organization and it is responsible for adopting the best ideas to support and finance them to be executed based on a proper business plan. SME also pays all governmental fees for its members in the emirate of Dubai. SME has divisional structure with less than 500 employees. SME is a social alliance because it creates a common goal (support young business leaders) to allow them to create wealth on their own and makes life worth living.

5.5 ERP Systems

Five major editors share the ERP market, with SAP by far the leader: SAP, Oracle Applications, PeopleSoft, JD Edwards, and BANN (Kumar and Van Hillegersberg, 2000). “When the definitive merger agreement between PeopleSoft and Oracle, the respective number two and three business applications providers in the market, was signed in December, the enterprise market shifted, if not rumbled”(Thompson and Jakovljevic, 2005). There are many ERP solutions that can be addressed for the purpose of this research but the migrations of some systems, such as Oracle with PeopleSoft and PeopleSoft with JD Edwards, required the focus to be on the market winners and the ones that can be reached and surveyed. Because of market security, many attempts were made to convince vendors of the need for this model and its contribution to this country. The following were included in this research:

5.5.1 Microsoft Business Solutions Axapta

Microsoft Business Solutions Axapta is a customizable, scalable, and global Enterprise Resource Planning (ERP) solution that supports connectivity with the business community and helps provide a fast and powerful way to gain competitive advantages especially for large enterprises. Axapta supports the entire business and allows the enterprise to choose from comprehensive functionality including manufacturing, distribution, supply chain management, project management, financial management, customer relationship management (CRM), human resource management, business analysis, enterprise portal, and commerce gateway (Microsoft Business Solutions, 2005).

5.5.2 Datastream 7i

Datastream 7i enables companies to proactively manage assets, asset information, and maintenance activities. It combines best-in-class asset management modules, unique features for improving operations and performance, and advanced modules to ensure the best possible fit for a customer’s asset performance management needs. Datastream 7i features include: application program interfaces (APIS), asset, asset hierarchy management, asset management services, audit trails, budget management, depreciation, inbox and scorecard, inspection management, key performance indicators (kpis), materials management, Messenger, Microsoft Project

2003, multi-organization support, preventive maintenance (PM) flexibility, project management and work management (Datastream, 2005).

5.5.3 Industrial Data Management System (IDMS)

Data Management Systems (DMS) is an Egyptian company that offers an ERP solution called IDMS. IDMS is a comprehensive ERP solution based on business process rather than departmental boundaries. It is based on an in-depth knowledge of the industrial processes that drive any business. IDMS aims to make the ERP solution an effective part of the customer's business life cycle by enabling business managers to find analysis and solve their most critical business challenges. IDMS modules include a distribution part (IDMS production quotation, customer order, distribution module); a procurement part (purchasing module); an inventory management, production and planning part (production setup, material and capacity planning, shop floor control, production quality, production costing, preventive maintenance); a financial management part (general ledger, account receivables, accounts payable, banking management, cashier, fixed assets); and a human resources management part (personnel module, payroll module, time attendance) (IDMS, 2005).

5.5.4 SAP

mySAP ERP is the world's most complete enterprise resource planning (ERP) solution, providing organizations with the strategic insight, ability to differentiate, increased productivity, and flexibility they need to succeed. With the mySAP ERP solution, SAP has evolved its vision of increasing efficiency within an organization to a next-generation ERP solution, automating end-to-end business processes and extending those processes beyond the enterprise to the entire business ecosystem by incorporating customers, partners, and suppliers. In addition, mySAP ERP helps drive innovation and supports future growth of an organization (mySAP ERP Solution Overview, 2005). Figure 5.1 from the brochure of mySAP and NetWeaver show the modules that can be delivered as an ERP solution:

Figure 5.1: SAP NetWeaver ERP Modules

Source: mySAP 2005 Brochure

5.5.5 Oracle

Oracle E-Business Suite is a fully integrated, comprehensive suite of business applications for enterprise. Whether one module is implemented at a time, multiple modules or the complete suite, Oracle E-Business Suite provides better business information for effective decision-making and enables an adaptive enterprise for optimal responsiveness (www.oracle.com). Oracle recently bought PeopleSoft and sold many of its products worldwide.

Table 5.2

Oracle E-Business Suite Families

Advanced Procurement	Interaction Center	Projects
Contracts	Learning Management	Sales
Corporate Performance Management	Logistics	Service
Customer Data Management	Maintenance	Supply Chain Execution
Customer Relationship Management	Manufacturing	Supply Chain Management
Financials	Marketing	Supply Chain Planning
Human Resources Management	Order Management	
Intelligence	Product Lifecycle Management	

5.6 Characteristics List

In Chapter 3, the process of characteristics development for the BFERPSM model was presented. Table 5.3 shows the final list of the characteristics for each of the main categories, namely B-Web type, diffusion of innovation, and success factors. The ranking columns shown are used to rank the importance of each characteristic relative to others. This ranking is used for the main categories (1 through 15) as well as for the subcategories shown in the third column (see Equation 5.1).

Table 5.3

Characteristics List

	Dimensions	r	Module/Element	r'
A	1. Analytic		1. Strategic Management	
			2. Detailed Operations. Analysis	
			3. Workforce Analysis	
	2. Financials		1. Financial Accounting	
			2. Financial. Supply Chain Management	
			3. Balanced Score Cards	
	3. Human Capital Mngt.		1. Detailed Employee Life-Cycle Management	
			2. Individual Access	
			3. Employee Services Requests	
			4. Workforce Deployment	
	4. Operations		1. Automating Procurement	
			2. Automating Inventory & Warehousing	
			3. Manufacturing Activities	
			4. Vehicle/Fleet Management	
			5. Sales Orders Management	
			6. Product Life-Cycle Tracking	
			7. Program & Project Management	
			8. Quality Management	
			9. Asset Management	
			10. Customer Relationship Management	
	5. Corporate Services		1. Business Travel Management	
			2. Environment, Health, & Safety Management	
			3. Real-Estate Management	
			4. Incentives & Commissions Management	
			5. Employee Interface (self-service)	
B	6. Relative Advantages			
	7. Ease of Use			
	8. Enhancing Organization Image			
	9. Compatibility			
	10. Results Demonstrability			
	11. Support Volunteerness of Use			
C	12. Need for Technical Changes			
	13. Need for Process Changes			
	14. Fit all Organizational Size			
	15. Fit all Organizational Structure		1. Flexible	
			2. Communication	
			3. Type of Structure	

5.7 Survey Questionnaire

The survey was divided into sections as shown in Table 5.4. The first section gathers information about the individuals who answered the survey in terms of gender, age, nationality, education level, primary field of study, current job level, and number of years with the organization. Summaries and distribution of respondent's profiles are presented in Section 5.5. The survey questionnaires for each section of Table 5.3 are included in Appendix II

Table 5.4

Structure of the Survey Questionnaire

Question	Subject
1-25	Business Process Frame (B-Web)
26-31	Diffusion of Innovation Frame
32-37	Success Factors Frame
I1-I9	Demographic

5.8 Survey Respondents' Profiles

5.8.1 Demographics

The demographic items, I.1 to I.9, were intended to gather general information about the subjects. These demographic variables (including the respondent's age, sex, education level, field of study, job level, department name, job title, and years in the job) were not hypothesized to have relationships with the variable survey. These variables were mainly gathered to support the validity of answers given for survey questions by the responding individuals. Table 5.5 summarizes the distribution for the demographic variables. The sample included eight females representing 29 percent of the total sample, which reflects the actual male-to-female employee composition of the public sector in the UAE. Sixty-eight percent of the respondents were UAE nationals while the other 32 percent were from the rest of the Arab world.

Table 5.5

Demographic Distribution of the Survey Respondents

Demographic Variable	Frequency	Percent
Gender		
Male	20	71%
Female	8	29%
Age Category		
17-22	0	0%
23-28	6	21%
29-34	9	32%
35-40	8	29%
41-47	4	14%
48-55	1	4%
Over 55	0	0%
UAE National		
Yes	19	68%
No	9	32%
Highest Level of Education		
No High School	1	4%
High School	4	14%
Some University	1	4%
University Graduate	18	64%
Some Graduate Work	2	7%
Received Graduate Degree	2	7%
Primary Field of Study		
General Science	1	3.6%
Liberal Arts	1	3.6%
Business/Management	12	42.8%
Engineering	7	25%
Computer Science/Information	3	10.7%
Technical Degree	1	3.6%
Other	3	10.7%
Current Job Level		
Upper Level Manager	9	32%
Middle Manager	10	36%
Technical Staff	4	14%
Administrative Staff	2	7%
Computer Staff	3	11%
Other	0	0%
Years at Current Organization		
1-5	9	32%
6-10	12	42.8%
11-15	3	10.7%
16-20	3	10.7%
Over 20	1	3.6%

The age distribution of the respondents shows that 82 percent of the subjects fall between the ages of 23 and 40 years, evenly distributed between the three middle categories (23-28, 29-34, 35-40), with 21 percent, 32 percent, 29 percent, respectively. Figure 5.2 shows the age distribution of the sample.

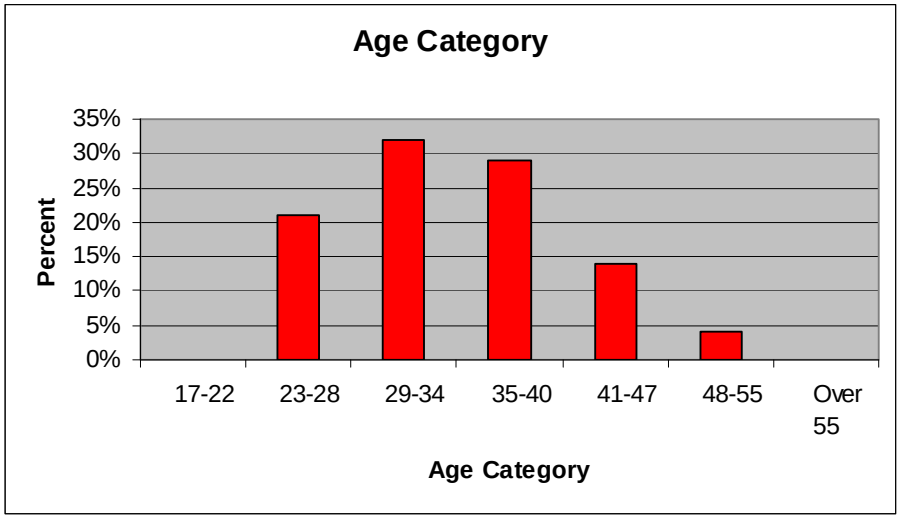

Figure 5.2: Survey Respondents' Age

Diversity in educational level was another variable recorded (see Figure 5.3). Seventy-eight percent of the respondents reported a high level of educational achievement, ranging from an undergraduate degree to a Ph.D. Sixty-four percent hold a college degree, seven percent did some graduate work, and seven percent also attained a graduate degree. Eighty-three of the respondents either hold a college degree or have some university-level education. Respondents whose educational level was up to or less than high school represented 18 percent of the entire sample.

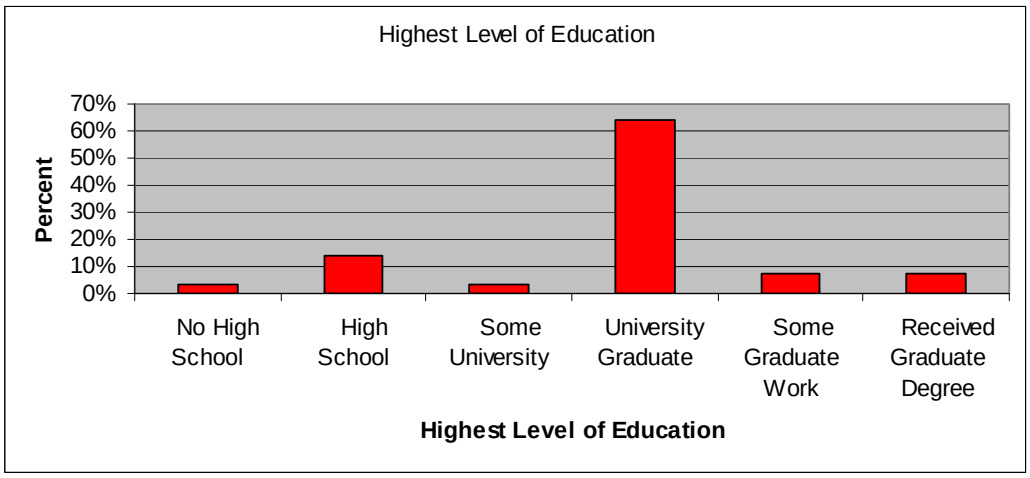

Figure 5.3: Survey Respondents' Education Level

The respondent's field of study was also recorded. This dimension of employee background also showed wide variability. Figure 5.4 shows the percentage distribution for the primary field of education. The most common field of study reported was business/management (43 percent). However, 11 percent of the respondents reported their primary field of the study as being outside of the choices given on the questionnaire. Other fields of study reported were mathematics, accounting, and law.

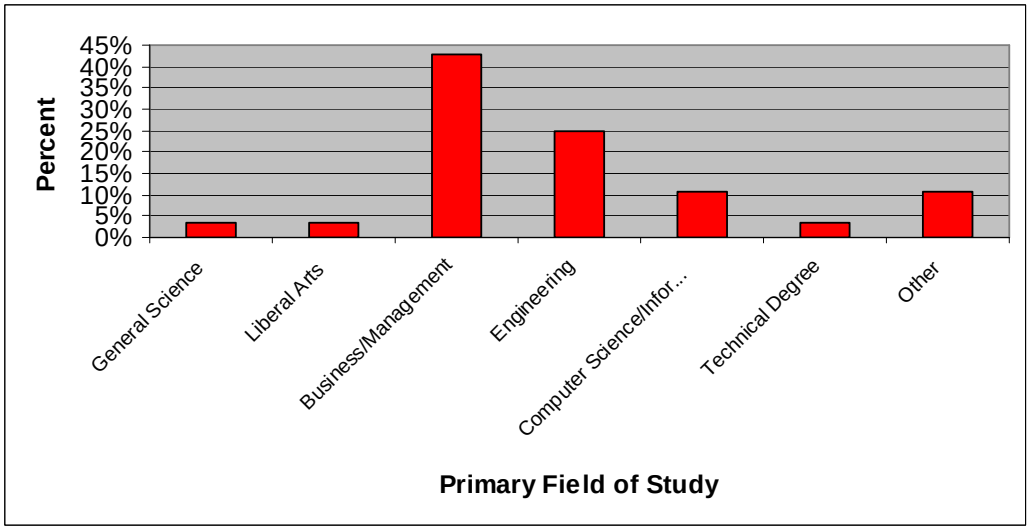

Figure 5.4: Survey Respondents' Primary Field of Study

The distribution of current job level shows that 36 percent classified themselves as middle managers, 32 percent classified themselves as upper level managers, while 14 percent classified themselves as technical staff. Computer staff represented 11 percent while administrative staff presented 7 percent. Middle managers are usually section or project managers, while upper managers are department managers, directors, and organizational heads. Figure 5.5 shows the percentage distribution of job level.

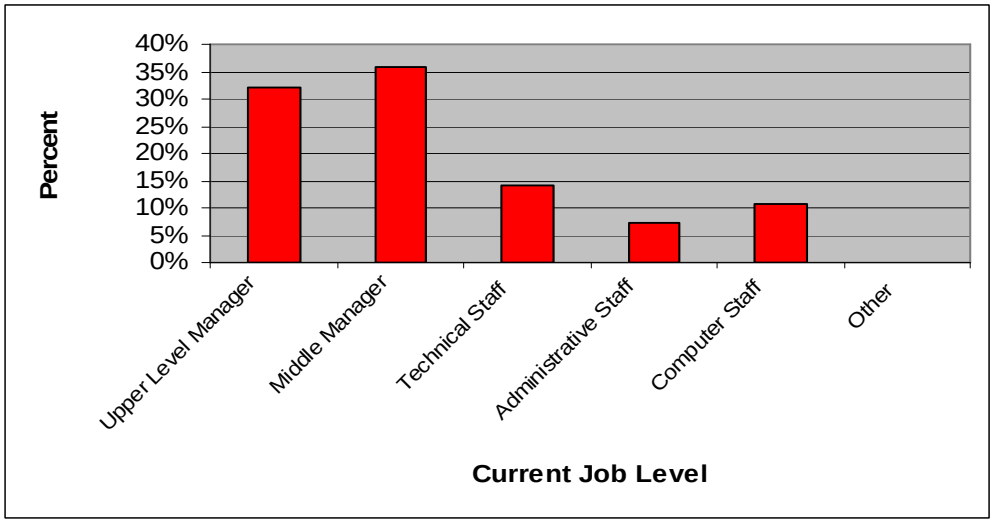

Figure 5.5: Survey Respondents' Current Job Level

Forty-three percent of respondents have been on their jobs between six and ten years, while 32 percent represented between one and five years. Eleven percent of respondents have been on their job between 11 and 15 years and the same percentage recorded between 16 and 20 years. Figure 5.6 shows the sample percentage distribution of number of years at current organization.

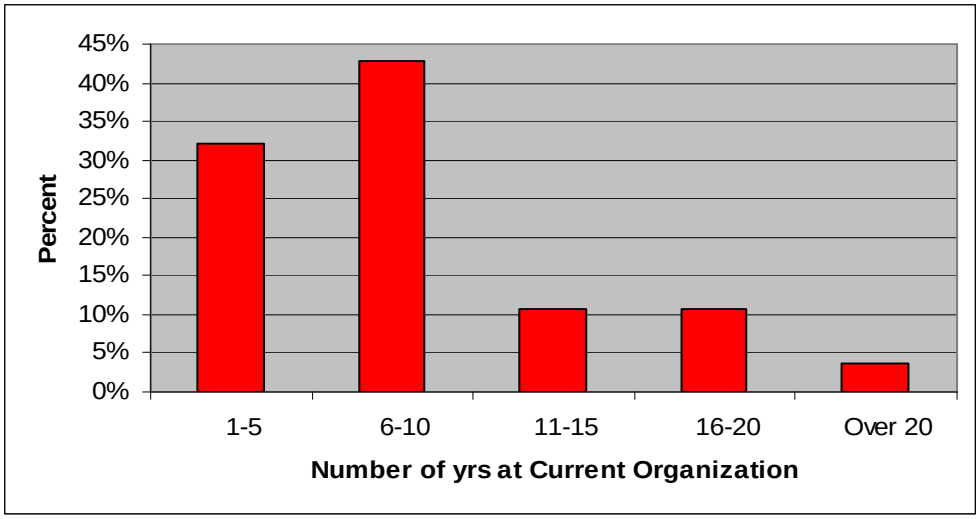

Figure 5.6: Survey Respondents' Number of Years at Current Organization

In summary, the majority of the respondents are male middle managers, 29-34 years of age, who are UAE nationals with business management degrees and who have been at their current organization for 6-10 years.

5.9 Organizations' Graphical Profiles

This section presents the graphical profiles of the investigated organizations. One example of an organization graphical profile is included here (see Appendix III for all organizations' graphical profiles). All results were computed according to the organization results based on the survey questionnaires. This is done by plotting the computed combined weightage of every element of the characteristics list on (1-70) scale. As stated in the previous chapter, Equation (1) represents the computed combined weightage, which is the product of multiplying the two ranking columns and the average of the individuals' results. From every organization, four individuals answered the survey questionnaires and a consensus was used to force rank the dimensions and the elements. The model consists of 15 dimensions; therefore the ranking range is from 1 to 15. A score of 1 indicates that the dimension is the most important for that organization while a score of 15 indicates that the dimension is the least important. Scores in between indicate varying degrees of importance. A similar approach was used for ranking the elements within one dimension where the number of elements in most of the dimension is different. For a better demonstration, the

result was then multiply by 10. A straight line connects every two results to generate the overall graphical profile.

$$\omega_{ik} = [r_d * r'_{dk} *(\sum_{m=1}^{4} (\text{respondent})_m / 4)] * 10 \quad (1)$$

Where

- ω_{ik} is the combined weightage of k element for i organization where $1 \leq k \leq 37$
- r_d is the rank of d dimension where $1 \leq r_d \leq 15$
- r'_{dk} is the rank of element k within d dimension and $1 \leq r'_{dk} \leq n$, where n is the number of elements in dimension

The following is an example of the calculated combined weightage:

- i is the PDSZ organization
- d is the analytic dimension, k is the workforce analysis element
- Analytic dimension ranked 10 among the 15 dimensions, r = [(15- 10) + 1 /15] = 6/15
- Workforce analysis ranked last among the three elements, r' = [(3-3)+1 /3] =1/3
- Average= (respondent1+ respondent2+ respondent3+ respondent4)/ 4 = (6+7+5+5) = 5.75
- $\omega_{PDSZ\ (workforce\ analysis)} = (6/15) * (1/3) * 5.75 = 0.8 * 10 = 8$

Figure 5.7 is an example of organization's graphical profile.

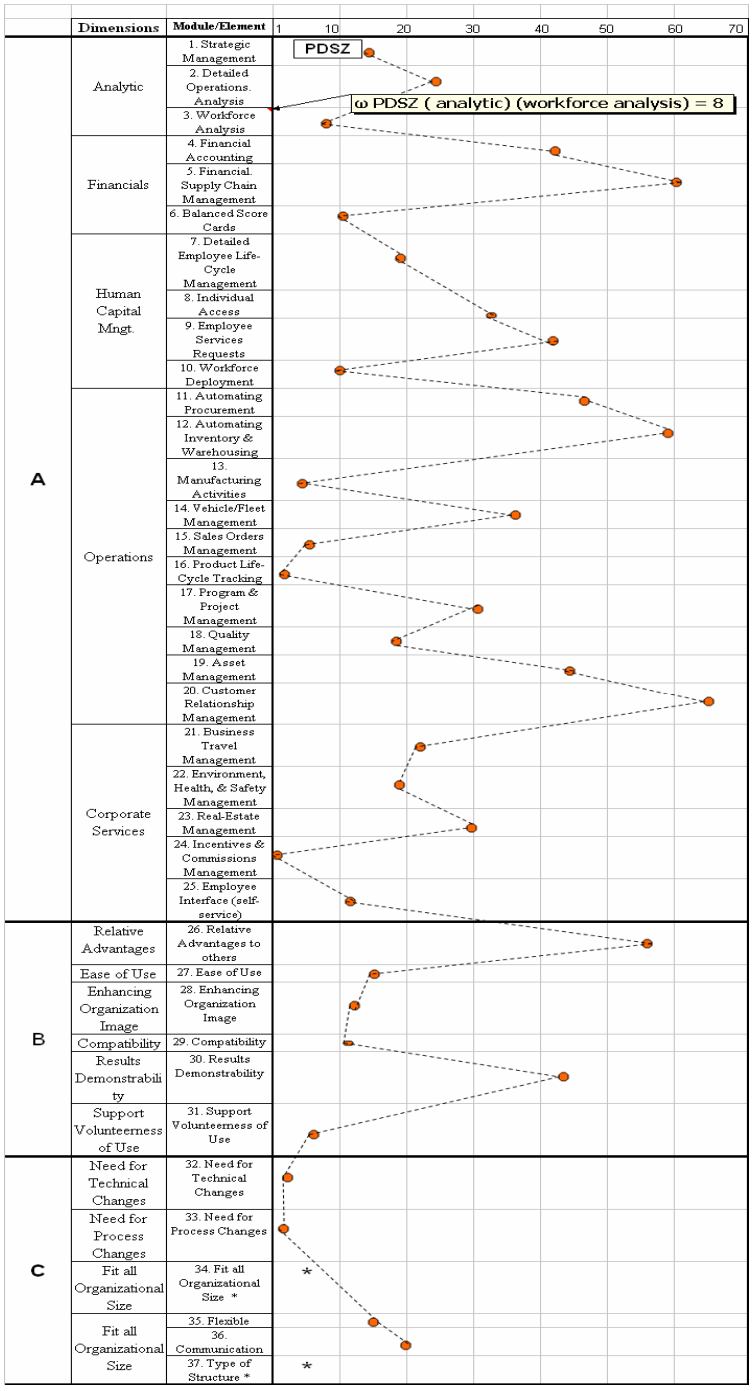

Figure 5.7: PDSZ Graphical Profile*

***** Both structure and size are organizational attributes and were not measured on this scale.

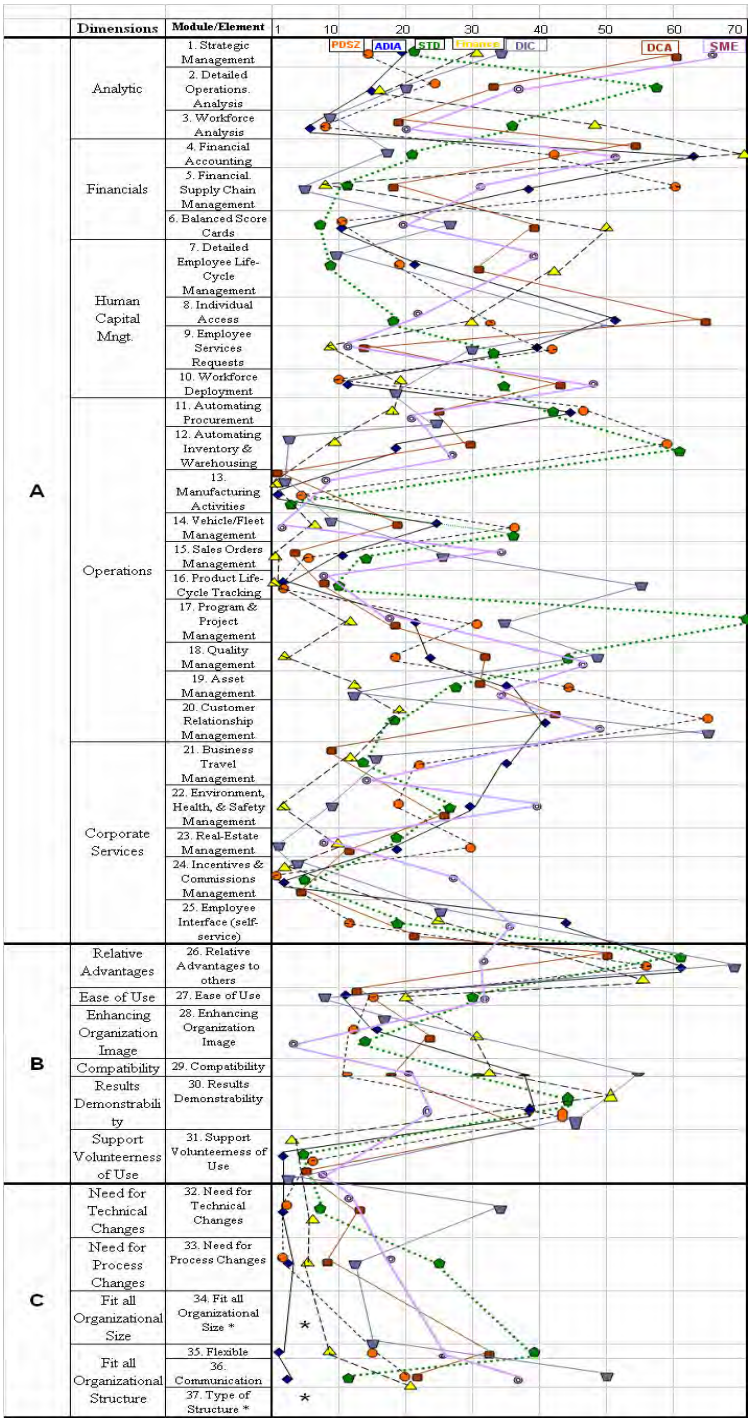

Figure 5.8: All Organizations' Graphical Profiles*

***** Both structure and size are organizational attributes and were not measured on this scale.

Figure 5.8 shows side-by-side the graphical profiles for all of the organizations investigated in this research.

5.10 ERP Solutions' Graphical Profiles

As stated in the previous chapter, a similar approach was used to develop the graphical profiles for each ERP system. The survey was answered by ERP vendors and experts. To keep the integrity of the evaluation, each ERP vendor did not evaluate his/her own system but did so for the others. The selected respondents of the ERP system survey questionnaires were exposed to different systems in the field of ERP technology in order to evaluate the included ERP systems in this research. For every ERP system, four different results were collected as a measure of each dimension and element of the model. Each ERP vendor measured his/her own relative importance of dimension ranking (r_d) and element ranking ($r'_{d\ k}$). Figure 5.9 is an example of Oracle's ERP system graphical profile.

$$\omega_{j\,k} = [r_{d} * r'_{d\,k} *(\sum_{m=1}^{4} (\text{vendor})_{4} / 4)] * 10 \qquad (2)$$

Where,

- $\omega_{j\,k}$ is the combined weightage of k element for j ERP system where $1 \leq k \leq 37$
- r_d is the rank of d dimension where $1 \leq r_d \leq 15$
- $r'_{d\,k}$ is the rank of element k within d dimension and $1 \leq r'_{d\,k} \leq n$, where n is the number of elements in d dimension

The following is an example of the calculated combined weightage for an ERP system:

- j is the Oracle ERP system (e-Business Suite)
- d is the analytic dimension; k is the workforce analysis element
- The financial dimension ranked third among the 15 dimensions, r = [(15- 3) + 1 /15] = 13/15
- The financial accounting element ranked first among the three elements, r' = [(3-1)+1 /3] =1
- Average = (vendor1+vendor2+vendor3+vendor3) / 4) =(7+7+7+7)=7
    - $\omega_{\text{Oracle (Financial Accounting)}}$ = (13/15) * (1) * 7 = 6.1 * 10 = 61

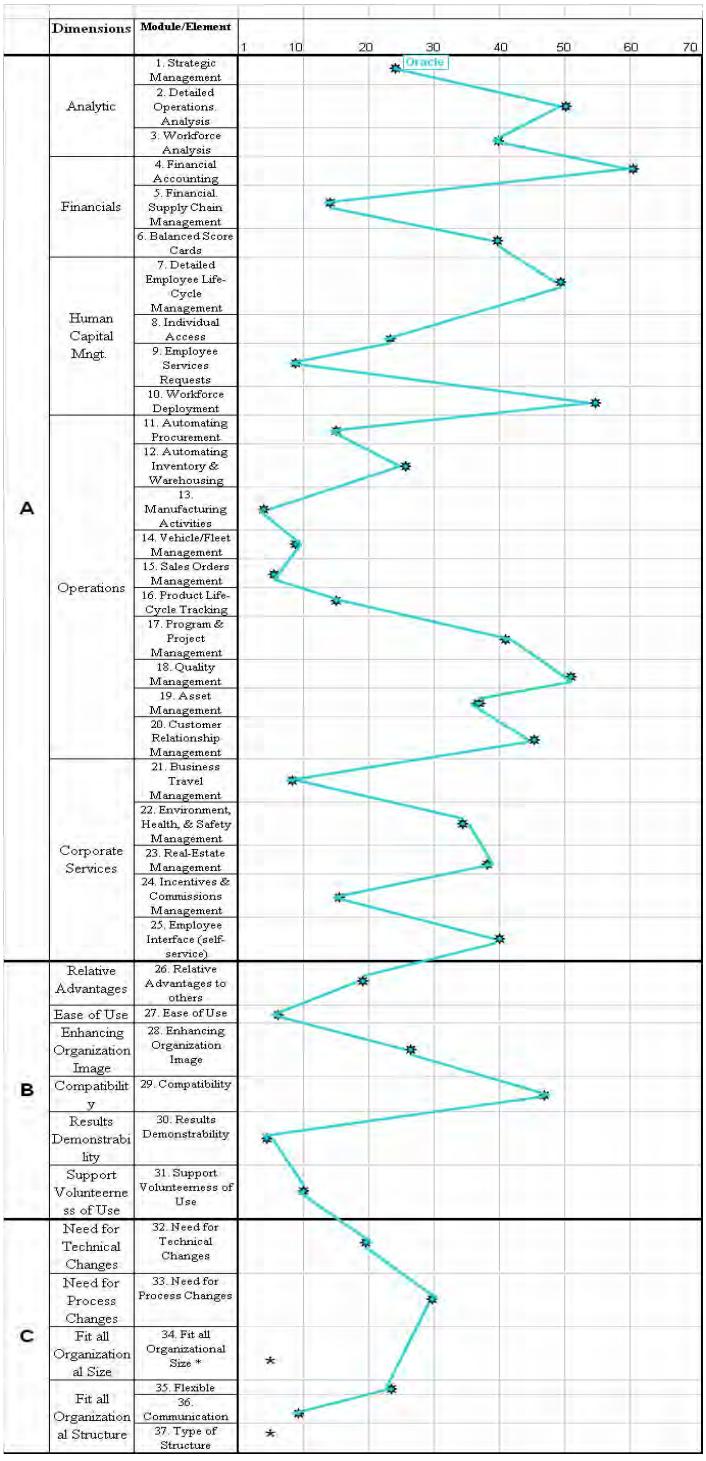

Figure 5.9: Oracle ERP System Graphical Profile*

***** Both matching organizational structure and size are attributes and were not measured on this scale.

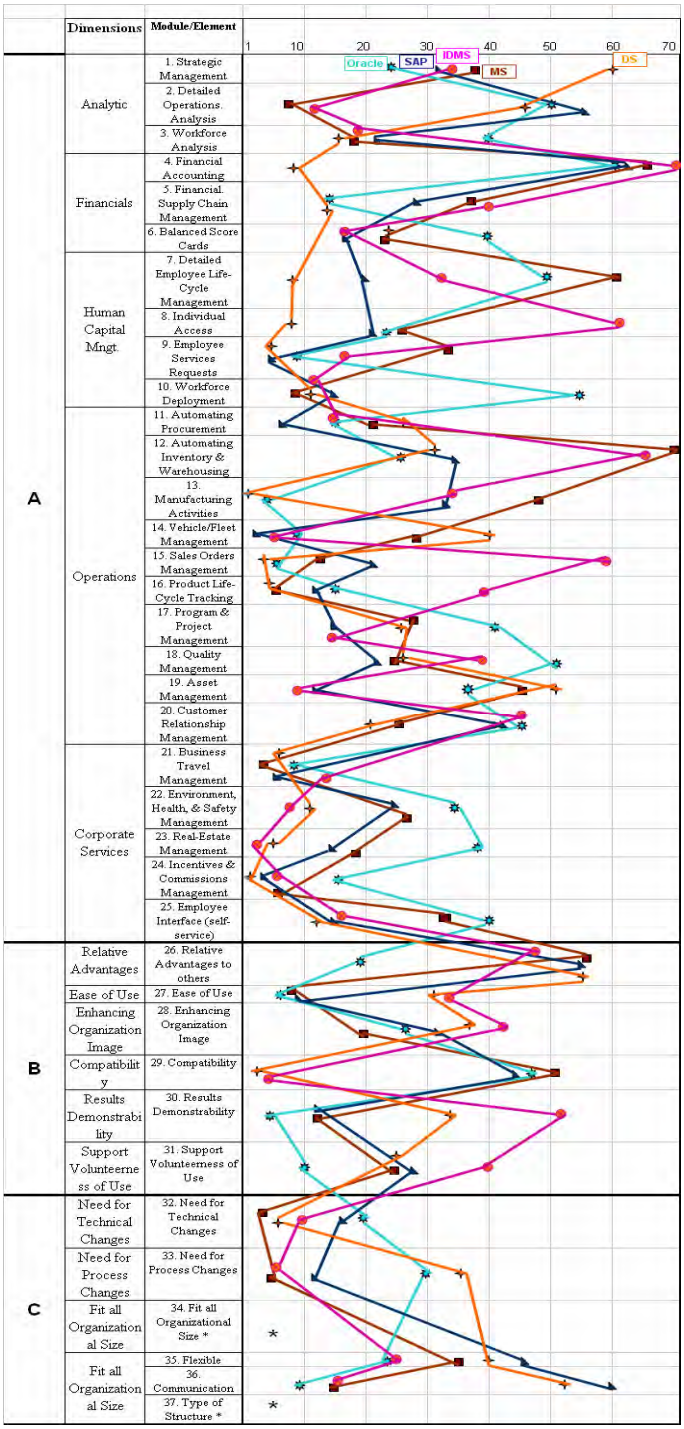

Figure 5.10: All ERP Systems' Graphical Profiles*

***** Both matching organizational structure and size are attributes and were not measured on this scale.

5.11 Decision Criteria for the Best Organizational-Fit ERP System

This section presents the matching decision criteria of the best-fit ERP system. The following methods allow managers in the public sector to choose their system based on their decision-making styles. The matching decision criteria are: the graphical method with the absolute error calculation; totality style, which looks at the overall deviation; optimistic style, which considers the highest negative performance measures; and pessimistic style, which considers the highest positive performance measures.

5.11.1 Matching Criteria I: The Graphical Method

For every organization, all ERP systems graphs were superimposed in order to select the closest best-fit ERP system. For example, Figure 5.11 shows the match between PDSZ and MS. The selected ERP system was confirmed by summing the absolute error (deviation) of each system using Equation (3). The ERP system with the least number was selected as the best-fit ERP system. Table 5.5 shows the calculation of the absolute error for PDSZ.

$$\delta_1(i, j) = \sum_{k=1}^{37} (\Delta\omega)_k \qquad (3)$$

Where,

- $\Delta\omega = \left| \omega_{ik} - \omega_{jk} \right|$
- δ_1 is the matching criterion 1 (sum of the absolute error)
- i is the organization, j is the ERP system and k is each element of the model
- ω_{ik} is the combined weight of i organization in k element
- ω_{jk} is the combined weight of j ERP system in k element

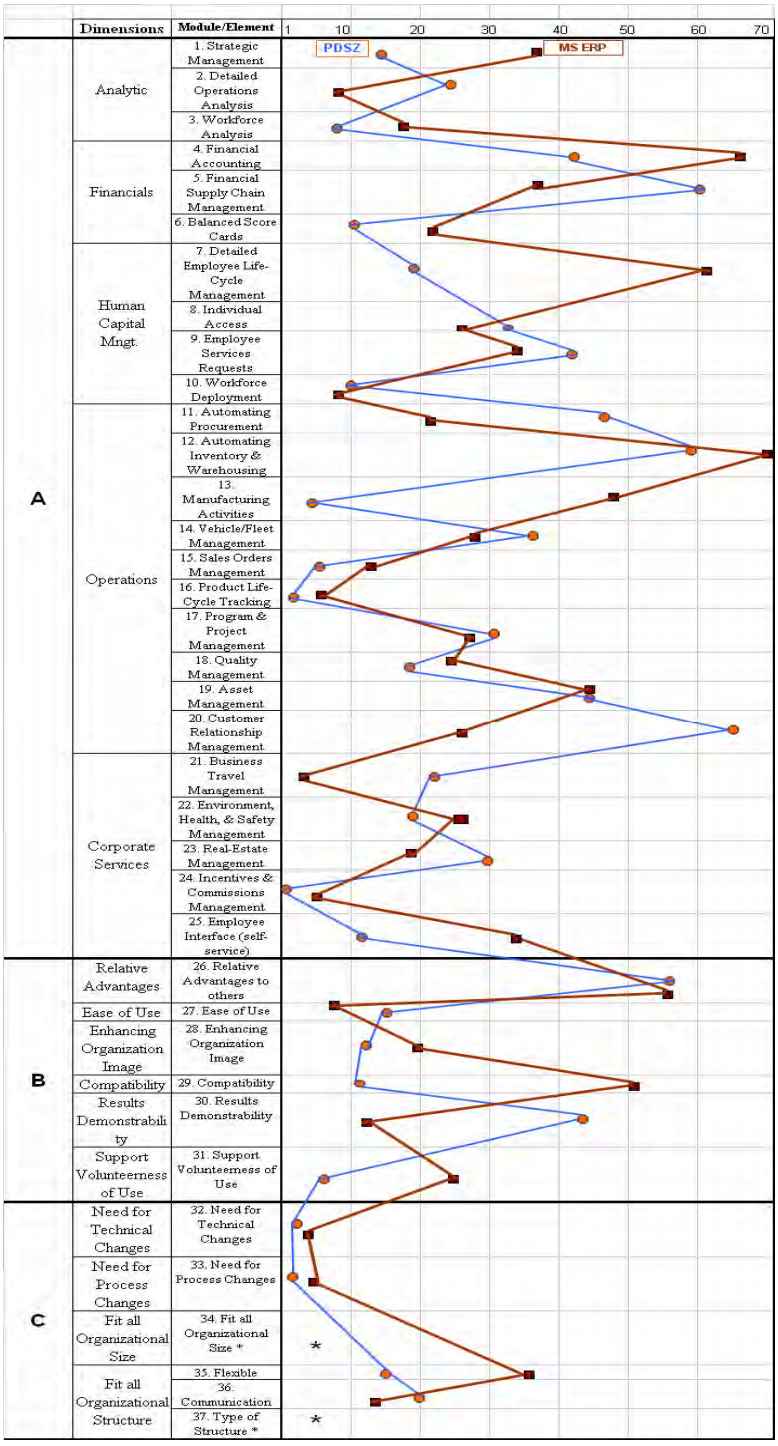

Figure 5.11: Graphical Profiles of PDSZ with MS ERP*

*Both matching organizational size and structure are attributes and were not measured on this scale.

Table 5.6

PDSZ Sum of Absolute Error (Deviation) Results

	ERP Systems				
ERPs	Oracle	MS	SAP	DS	IDMS
δ_1	739	514	654	573	631
Rank	5	1	4	2	3

MS ERP system has the least sum of absolute error among all ERP systems, which makes it the best-fit ERP system for PDSZ considering the first criterion.

5.11.2 Matching Criteria II

In this method, all ERP systems are relatively compared using the summation of the errors. Equation (4) shows the calculation formula. This technique is used by managers who look after the totality of the system. They consider a cross dimension deviation and basically count for every error, whether it positive or negative, to determine the overall performance of any system. Finally, these managers make their decisions based on the highest value of the sum of positive and negative errors. The ERP system with the highest value of negative errors is considered the best-fit ERP system. For PDSZ, Table 5.6 shows the results of this technique.

$$\delta_2(i, j) = \sum_{k=1}^{37} (\Delta\omega)_k \tag{4}$$

Where

- $\Delta\omega = \omega_{ik} - \omega_{jk}$
- δ_2 is the matching criterion with totality method
- i is the organization, j is the ERP system, and k is the element
- $\Delta\omega$ is the difference of the j ERP system combined weight to i organization combined weight
- ω_{ik} is the combined weight of i organization in k element
- ω_{jk} is the combined weight of j ERP system in k element

Table 5.7

Matching Criteria 2 Results for PDSZ

	ERP Systems				
	Oracle	MS	SAP	DS	IDMS
δ_2	103	92	10	-43	107
Rank	2	3	4	5	1

The IDMS system shows the best result with the highest value in sum of positive and negative deviations, which makes it the best-fit system for the totality management style.

5.11.3 Matching Criteria III

In this method, all ERP systems are relatively compared using the summation of the positive errors only. Equation (5) shows the calculation formula. This technique is used by managers who are optimistic and consider future expandability. Furthermore, they look for cross dimensions errors adding all negative errors and eliminating all positive deviations. These managers make their decisions based on the highest value of the sum of all positive errors. For PDSZ, Table 5.8 shows the results using this technique.

$$\delta_3(i, j) = \sum_{k=1}^{37} (\Delta\omega)_k \qquad (5)$$

Where

- $\Delta\omega = (\omega_{ik} - \omega_{jk}) > 0$
- δ_3 is the result of matching criterion III with optimistic management style
- i is the organization, j is the ERP system, and k is each element of the model
- $\Delta\omega$ is the difference of the i organization's combined weight to j ERP system's combined weight
- ω_{ik} is the combined weight of i organization in k element
- ω_{jk} is the combined weight of j ERP system in k element

Table 5.8

PDSZ Criteria 3 Results

	ERP Solution				
	Oracle	MS	SAP	DS	IDMS
δ_3	421	303	332	265	369
Rank	1	4	3	5	2

The Oracle system has the highest value in sum of the positive deviation, which makes it the best-fit system for the PDSZ in considering future functionalities and expansions.

5.11.4 Matching Criteria IV

In this method, all ERP systems are relatively compared using the summation of all positive errors. Equation (6) shows the calculation formula. This technique is used by managers who are pessimistic and do not consider any future benefits for their organizations. They look for cross dimensions errors, adding all positive errors and eliminating all negative deviations. These managers make their decisions based on the lowest value of sum of all positive errors. For PDSZ, Table 5.9 shows the results using this technique.

$$\delta_4(i, j) = \sum_{k=1}^{37} (\Delta\omega)_k \qquad (6)$$

Where,

- $\Delta\omega = (\omega_{ik} - \omega_{jk}) < 0$
- δ_4 is the result of matching criterion IV with pessimistic management style
- i is the organization, j is the ERP system, and k is each element of the model
- $\Delta\omega$ is the difference of the i organization's combined weight to j ERP system's combined weight
- ω_{ik} is the combined weight of i organization in k element
- ω_{jk} is the combined weight of j ERP system in k element

Table 5.9

PDSZ Criteria 4 Results

	ERP Solution				
	Oracle	MS	SAP	DS	IDMS
δ_4	-318	-211	-322	-308	-262
Rank	4	1	5	3	2

The MS system has the least value in sum of negative deviations, which makes it the best-fit system for the PDSZ considering no future expansion. In summary, the above matching criteria showed that the best-fit ERP system changes according to the criterion used. This allows different types of managers to make their choices and selections based on their managerial and decision-making styles. Table 5.10 shows the summary of the ranking results for the organizations included in this study using the above matching criteria.

Table 5.10

Summary of Organizations' Ranking Results

	Oracle	MS	SAP	DS	IDMS	
PDSZ	5	1	4	2	3	δ_1
	2	3	4	5	1	δ_2
	1	4	3	5	2	δ_3
	4	1	5	3	2	δ_4
ADIA	4	1	2	5	3	δ_1
	2	3	4	5	1	δ_2
	1	5	4	3	2	δ_3
	3	1	4	5	2	δ_4
FD	4	3	1	5	2	δ_1
	2	3	4	5	1	δ_2
	1	2	5	4	3	δ_3
	2	3	4	5	1	δ_4
DIC	2	3	4	5	1	δ_1
	2	3	4	5	1	δ_2
	2	1	5	4	3	δ_3
	3	4	2	5	1	δ_4
STD	3	2	4	1	5	δ_1
	2	3	4	5	1	δ_2
	2	3	4	5	1	δ_3
	1	2	4	3	5	δ_4
DCA	1	4	2	3	5	δ_1
	2	3	4	5	1	δ_2
	3	2	4	5	1	δ_3
	1	3	4	5	2	δ_4
SME	1	4	2	5	3	δ_1
	2	3	4	5	1	δ_2
	4	2	5	3	1	δ_3
	1	4	3	5	2	δ_4
	Oracle	MS	SAP	DS	IDMS	

Based on Table 5.10, and considering that both the first rank and the second are the top rankings for the best-fit ERP system for the investigated organizations, the findings are as follows:

1. IDMS is the first choice, with 20 occasions of being first or second.
2. Oracle is the second choice, with 19 occasions of being first or second.
3. MS is the third choice, with 10 occasions of being first or second.
4. SAP is the fourth choice, with 4 occasions of being first or second.
5. DS is the fifth choice, with only 2 occasions of being first or second.

Neglecting top vendors reputation, the BFERPSM identifies IDMS to be the first choice for the organizations investigated because it matched most of the organizations requirements. Furthermore, it has the highest scores in the dimensions and the elements such as Enhancing Organizational Image, Ease of Use, and Support Volunteerness of Use, Financial Accounting, Individual Access, Automating Inventory and Warehousing with MS, CRM with Oracle. All of these elements and dimensions were the top required characteristics and business processes of an ERP system by the organizations investigated. Figure 5.12 shows IDMS versus Oracle ERP system.

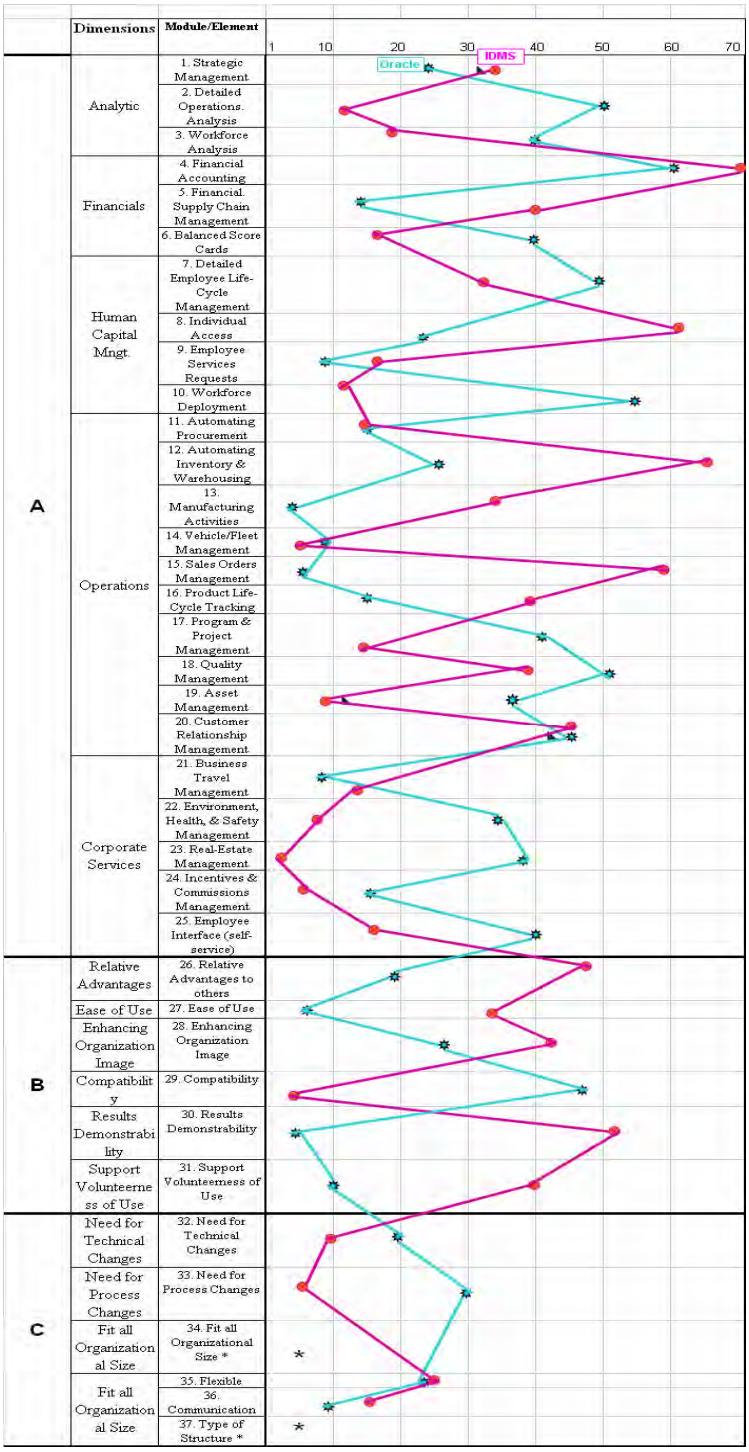

Figure 5.12: Graphical Profiles* of IDMS versus Oracle ERP system

*Fitting organizational size and structure are attributes and were not measured on this scale.

5.12 Model Validation

The purpose of this step is to examine the change in the result of the best-fit ERP system using BFERPSM. The model was divided into three main frames: business processes (B-Web), DOI, and SF dimensions. For each frame, all of the correspondent dimensions are measured and computed in order to select the best-fit system. The same decision criteria are used here to compute the results of the ERP systems. The second objective of this analysis is to identify a common ERP profile for the public sector organizations in each frame. For a better understanding of this analysis, we will start with DOI and SF frames and leave the process frame (B-Web) to the end.

a. DOI Frame

Only DOI dimensions are considered in this analysis to determine the results of the best-fit ERP system based on the different matching criteria. As an example, one organization's results are demonstrated in Table 5.11. (see Appendix III for the results of other organizations).

Table 5.11

DOI Frame Results for PDSZ

		ERP Solution				
		Oracle	MS	SAP	DS	IDMS
MC 1	δ_1	139	104	112	80	105
	Rank	5	2	4	1	3
MC 2	δ_2	-29	28	38	42	73
	Rank	5	4	3	2	1
MC 3	δ_3	55	66	75	61	89
	Rank	5	3	2	4	1
MC 4	δ_4	-84	-38	-37	-19	-16
	Rank	5	4	3	2	1

In summary, the DOI dimensions show different results for the best-fit ERP system in every matching criterion. DS has the least absolute error among all other systems, which makes it the first choice in the graphical technique. For PDSZ, the IDMS ERP system is the best solution for all other management styles. See Appendix III for the results of the other organizations.

b. SF Frame

Only the success factors (SF) dimensions are considered for this step to perform a similar approach as the DOI frame. Both organizational size and structure (k =34, 37) are attribute elements but were not considered to be measured on the scale of the model. An example of the SF frame results is shown in Table 5.12 (see Appendix III for the results of other organizations).

Table 5.12

SF Frame Results of PDSZ

		ERP Solution				
		Oracle	MS	SAP	DS	IDMS
MC 1	δ_1	65	30	96	94	24
	Rank	3	2	5	4	1
MC 2	δ_2	43	18	96	94	16
	Rank	3	4	1	2	5
MC 3	δ_3	54	24	96	94	20
	Rank	3	4	1	2	5
MC 4	δ_4	-11	-6	0	0	-4
	Rank	5	4	1	1	3

For PDSZ, the SAP system ranked first in all matching criteria, except the graphical technique where the IDMS ERP system has the least sum of absolute error. The DS system also ties for the first rank with SAP considering δ_4. See Appendix III for the results for all other organizations.

c. Business Process Frame (B-Web)

Only the business processes dimensions are considered for this analysis to perform a similar approach as the DOI and SF frames. An example of the process frame result is shown in Table 5.13 (see Appendix III for the results of the other organizations).

Table 5.13

Process Frame Results of PDSZ

		ERP Solution				
		Oracle	MS	SAP	DS	IDMS
MC 1	δ_1	535	380	446	399	502
	Rank	5	1	3	2	4
MC 2	δ_2	89	46	-124	-179	18
	Rank	1	2	4	5	3
MC 3	δ_3	312	213	161	110	260
	Rank	1	3	4	5	2
MC 4	δ_4	-223	-167	-285	-289	-242
	Rank	2	1	4	5	3

Table 5.13 shows that MS is the best-fit ERP system for PDSZ using the matching criteria δ_1 and δ_4 while Oracle is the first choice using δ_2 and δ_3. The results of the business frame differ from the results using the DOI and SF dimensions. This strongly suggests that the dimensions of the business process frame affect the results and lead to different ERP system.

5.12.1 Matching Criteria Results

The following section presents the results of the computed best-fit ERP system using the four matching criteria:

Table 5.14

Summary of Organization Ranking Results Using δ_1

	Oracle	MS	SAP	DS	IDMS	
PDSZ	5	1	3	2	4	Frame A
	5	2	4	1	3	Frame B
	3	2	5	4	1	Frame C
ADIA	4	1	2	5	3	Frame A
	3	1	2	4	5	Frame B
	3	2	4	5	1	Frame C
FD	2	4	1	5	3	Frame A
	5	4	1	1	3	Frame B
	3	2	4	5	1	Frame C
DIC	4	5	2	3	1	Frame A
	3	1	2	4	5	Frame B
	3	4	2	5	1	Frame C
STD	3	4	2	1	5	Frame A
	5	3	1	4	2	Frame B
	2	3	5	4	1	Frame C
DCA	1	4	2	3	4	Frame A
	5	2	2	1	4	Frame B
	3	2	4	5	1	Frame C
SME	3	1	2	4	5	Frame A
	2	3	5	1	4	Frame B
	2	3	4	5	1	Frame C
	Oracle	MS	SAP	DS	IDMS	

Table 5.14 shows the following findings:

I. The ranking result of the process frame (B-Web) is different from one organization to another. For the best-fit system, MS ERP is the number one choice for PDSZ, ADIA, and SME whereas SAP is the favorite pick for FD, IDMS for DIC, DS for STD, and finally Oracle is the choice for DCA.

II. For frame B (DOI), DS ERP ranked first in four of the seven occasions and SAP came either first or second in five occasions.

III. For frame C (SF), IDMS ranked first for all organizations with MS being second in four occasions. This indicates the commonality of the public sector organizations when considering only the SF dimensions.

IV. The process frame shows more strength in discriminating the best-fit ERP system for each organization. This is because of the differences in the business nature of those organizations and their processes. The DOI dimensions has less discriminating power in identifying the best system where 65 percent of the top-ranking choices are similar because the organizations basically represent the

public sector in the UAE and experience a similar environment and culture. Among all the frames, the SF frame has the least discriminating power in identifying the matched system where 95 percent of the choices are similar. The only difference is shown from the DIC where both “Need for Technical Change” and “Communication” dimensions are important factors is because of the business processes of this organization, which provides technology and technical solutions to other companies. All of the previous results support our framework of the model in including the B-Web dimensions in combination with DOI and SF frames because it effectively influences the identity of the best-matched ERP system.

V. As stated in Chapter 4, SME is a complex organization that is an alliance B-Web type, which is rare in the physical world of business. The choices of the full model and the process frame are only different for SME, which actually justifies the difficulty of this organization to be predicted and tested.

Table 5.15

Summary of Organization Ranking Results Using δ_2

	Oracle	MS	SAP	DS	IDMS	
PDSZ	1	2	4	5	3	Frame A
	5	4	3	2	1	Frame B
	3	4	1	2	5	Frame C
ADIA	1	2	4	5	3	Frame A
	5	4	3	2	1	Frame B
	3	4	2	1	5	Frame C
FD	1	2	4	5	3	Frame A
	5	4	3	2	1	Frame B
	3	4	2	1	5	Frame C
DIC	1	2	4	5	3	Frame A
	5	4	3	2	1	Frame B
	3	4	2	1	5	Frame C
STD	1	2	4	5	3	Frame A
	5	4	3	2	1	Frame B
	3	4	2	1	5	Frame C
DCA	1	2	4	5	3	Frame A
	5	4	3	2	1	Frame B
	3	4	2	1	5	Frame C
SME	1	2	4	5	3	Frame A
	5	4	3	2	1	Frame B
	3	4	2	1	5	Frame C
	Oracle	MS	SAP	DS	IDMS	

Table 5.15 shows the following findings:

I. The ranking results for each frame are identical in their order, except that the SAP and DS results are swapped in the frame C for PDSZ and ADIA. The reason for that is the process of summing the positive and the negative scores for each ERP system; therefore, the system with higher scores in positive deviation remains as the number one choice always.

II. Oracle is the best choice for the organization considering the process frame because it has the most positive deviations among others. IDMS is the best-fit system for the DOI frame, and DS is the best choice in six of the seven organizations for the SF frame.

III. Oracle scored higher among all others ERP systems in four of the corporate services elements, quality management, and workforce deployment elements. IDMS scored higher in four of the six DOI dimensions and therefore was the best choice in the DOI frame.

Table 5.16

Summary of Organization Ranking Results Using δ_3

	Oracle	MS	SAP	DS	IDMS	
PDSZ	1	3	4	5	2	Frame A
	5	3	2	4	1	Frame B
	3	4	1	2	5	Frame C
ADIA	1	3	5	4	2	Frame A
	5	4	3	2	1	Frame B
	3	4	2	1	5	Frame C
FD	2	1	5	4	3	Frame A
	5	2	4	2	1	Frame B
	3	4	2	1	5	Frame C
DIC	2	1	4	5	3	Frame A
	5	4	3	2	1	Frame B
	4	3	2	1	5	Frame C
STD	2	3	4	5	1	Frame A
	5	3	2	3	1	Frame B
	3	4	2	1	5	Frame C
DCA	3	1	4	5	2	Frame A
	5	3	2	3	1	Frame B
	3	4	2	1	5	Frame C
SME	3	1	5	4	2	Frame A
	5	3	2	4	1	Frame B
	4	3	2	1	5	Frame C
	Oracle	MS	SAP	DS	IDMS	

Table 5.16 shows the following findings:

I. In frame A, both MS and Oracle showed better performance measures with their ERP systems for optimist managers. MS ranked four times as first choice while Oracle is the best choice for both PDSZ and ADIA. On the other hand, optimist mangers in STD would pick IDMS for their first choice because it contains most of their needs in the operations elements.

II. FD, DIC, DCA, and SME weighted the analytic, financial, operations, and human capital management dimensions as the top four dimensions in the overall weight of the model. MS showed better performance in these dimensions than the other ERP systems, outscoring them in the “Detailed Employee Life Cycle Management” and “Employee Service Request” components of the human capital management dimension and in the “Automating Inventory and Warehousing” and “Manufacturing Activities” components of the operations dimension.

III. Similar to the DOI frame of the matching criteria 2 (δ_2), IDMS is the best choice for all of the seven organizations where it scored higher in four of the six dimensions of frame B.

IV. Similar to the SF frame of the matching criteria 2 (δ_2), DS is the best choice in six of the seven organizations.

Table 5.17

Summary of Organization Ranking Results Using δ_4

	Oracle	MS	SAP	DS	IDMS	
PDSZ	2	1	4	5	3	Frame A
	5	4	3	2	1	Frame B
	5	4	1	1	3	Frame C
ADIA	2	1	4	5	3	Frame A
	5	2	1	3	4	Frame B
	5	1	1	1	1	Frame C
FD	1	2	4	5	3	Frame A
	5	4	3	2	1	Frame B
	4	4	1	2	3	Frame C
DIC	2	3	4	5	1	Frame A
	5	1	2	4	3	Frame B
	3	5	1	2	4	Frame C
STD	1	2	4	3	5	Frame A
	5	4	3	2	1	Frame B
	3	4	2	1	5	Frame C
DCA	1	2	4	5	3	Frame A
	5	4	3	2	1	Frame B
	4	4	1	2	3	Frame C
SME	1	2	4	5	3	Frame A
	5	4	3	2	1	Frame B
	3	5	1	2	4	Frame C
	Oracle	MS	SAP	DS	IDMS	

Table 5.17 shows the following findings:

I. For the process frame, pessimist managers in FD, STD, DCA, and SME would have similar choices for their selections, with Oracle system as the best fit for them and MS as the second option. Both PDSZ and ADIA have the opposite results, with MS as the first choice and Oracle as the second.

II. Both Oracle and MS are less negatively deviated from those organizations, which make them better choices. In other words, they are the closest profiles among all other ERP systems profiles to the organizations considering only the negative deviations.

III. For the DOI frame and similar to the results of δ_2 and δ_3, five of the seven organizations have IDMS is the best choice.

IV. For the SF frame, pessimist mangers would prefer the SAP ERP system as the number one choice for all organizations because it has the least value of the negative deviations among all ERP systems.

In summary, it was found that matching criterion I (δ_1) (graphical profile with sum of absolute error) has better strength in discriminating the ranking choices of the best-fit ERP system for the organizations investigated. Furthermore, it is noticed that in all of the matching criteria used that the DOI and SF frames showed similarity in their results if they are to be considered independently. Because UAE public sector in UAE organizations experience similar factors such as culture and work environment both frames produced similar results. Finally, organizations with their own management style would choose different ERP systems if they only consider DOI or SF dimensions while excluding the process frame (B-Web).

5.12.2 Organization Commonalities Analysis

This section presents the commonalities of each of the B-Web types that are used in this research. The step will assist future researchers in predicting a similar profile for an organization attempting to evaluate the ERP system using BFERPSM. This section evaluates the aggregator and value chain types. With regard to the organizations investigated, four of them fall in the aggregator category and two are within the value chain type. One organization is categorized as an alliance, so it is not included in this analysis.

a. Aggregator Type

Since PDSZ, ADIA, FD, and DIC fall in the aggregator category as explained earlier, all are compared in this section to determine the commonalities and the differences in the our model.

I. Business Process Frame

Figure 5.13 shows the graphical profiles of all aggregators using the process dimensions only.

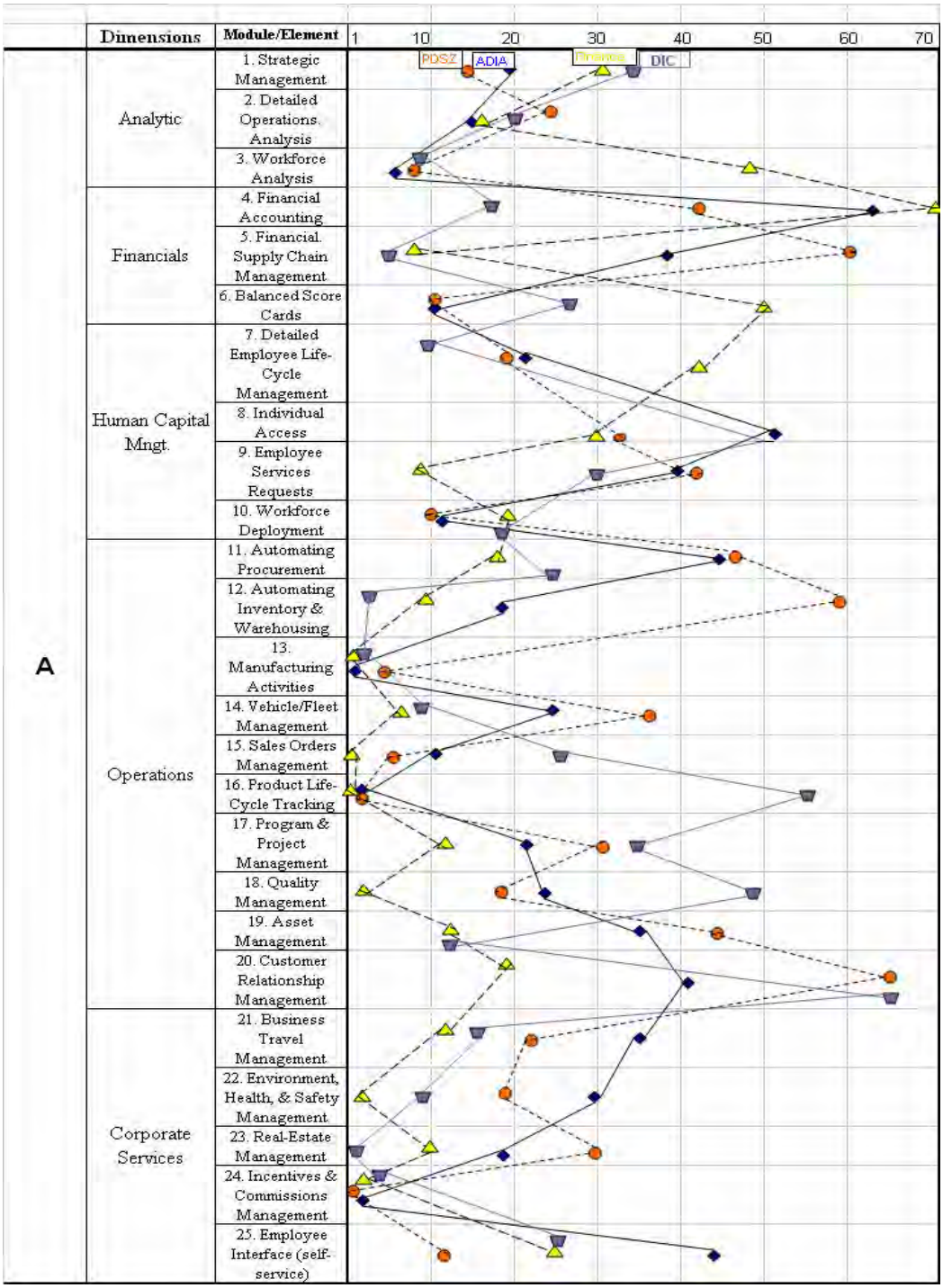

Figure 5.13: Graphical Profiles of the Aggregators using the Process Frame

Table 5.18 summarizes the ranking of the best-fit ERP system for every organization in the aggregator category.

Table 5.18

Summary of the Ranking Results for the Aggregators Using the Process Frame

	Oracle	MS	SAP	DS	IDMS	
PDSZ	5	1	3	2	4	δ_1
	1	2	4	5	3	δ_2
	1	3	4	5	2	δ_3
	2	1	4	5	3	δ_4
ADIA	4	1	2	5	3	δ_1
	1	2	4	5	3	δ_2
	1	3	5	4	2	δ_3
	2	1	4	5	3	δ_4
FD	2	4	1	5	3	δ_1
	1	2	4	5	3	δ_2
	2	1	5	4	3	δ_3
	1	2	4	5	3	δ_4
DIC	4	5	2	3	1	δ_1
	1	2	3	4	3	δ_2
	2	1	4	5	3	δ_3
	2	3	4	5	1	δ_4
	Oracle	MS	SAP	DS	IDMS	

Table 5.18 shows that all aggregators are similar in their selection of the best-fit ERP system using the process dimensions. That is because of their nature as services organizations. Most of the public sector organizations fall in this category. The Oracle system is the first choice for the above aggregators because it scored as first and second rank in 13 occasions using the four matching criteria while the MS system is the second choice with 11 occasions. IDMS is the third choice with four occasions only. This finding generalizes the commonalities of the aggregators considering only the process dimensions frame. Even though the nature business of the above aggregators differs from each other, the BFERPSM still guides us to a common profile once it comes to select the best-fit ERP system.

II. DOI Frame

All aggregators are graphically plotted in Figure 5.14 showing only the DOI dimensions results.

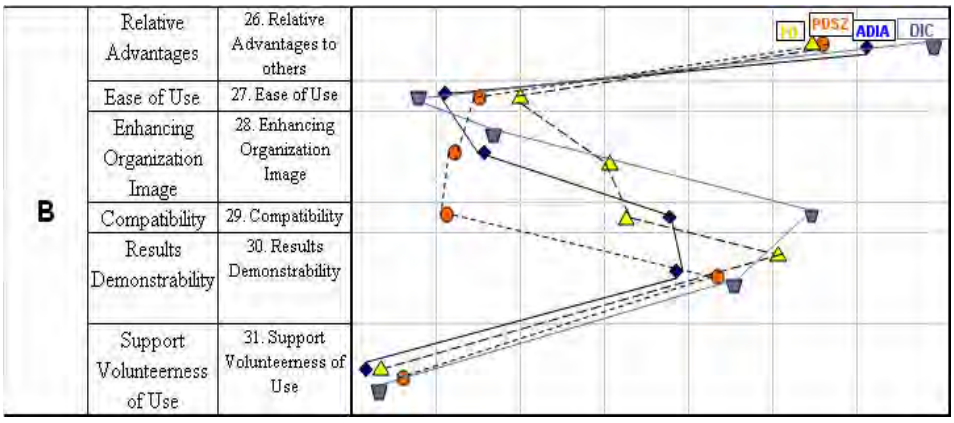

Figure 5.14: Graphical Profiles of the Aggregators using DOI Frame

The graphical profiles show that all aggregators have similar profiles for the DOI frame. DIC shows better likelihood of being compatible with the new ERP system, while it is less so at PDSZ.

A similar approach as the process frame is performed here to summarize the results of the best-fit ERP system for the aggregators.

Table 5.19

Summary of the Ranking Results for the Aggregators using DOI Frame

	Oracle	MS	SAP	DS	IDMS	
PDSZ	5	2	4	1	3	δ_1
	5	4	3	2	1	δ_2
	5	3	2	4	1	δ_3
	1	2	3	4	5	δ_4
ADIA	3	1	2	4	5	δ_1
	5	4	3	2	1	δ_2
	5	4	3	2	1	δ_3
	5	2	1	3	4	δ_4
FD	5	4	1	1	3	δ_1
	5	4	3	2	1	δ_2
	5	2	4	2	1	δ_3
	5	4	3	2	1	δ_4
DIC	3	1	2	4	5	δ_1
	5	2	3	3	1	δ_2
	4	5	3	2	1	δ_3
	5	1	2	4	3	δ_4
	Oracle	MS	SAP	DS	IDMS	

In general, Table 5.19 shows that the IDMS ERP system is the best fit with nine of occasions being in the first place, and the DS system is the second choice with two occasions of being first choice and seven times as the second choice. The above aggregators are also similar in their selection using the DOI frame, which strongly supports the commonalities of the organizations' culture and norms in this country.

III. Success Factors Frame

Using only the dimensions of the SF frame, a similar approach was followed to demonstrate the results for the aggregators.

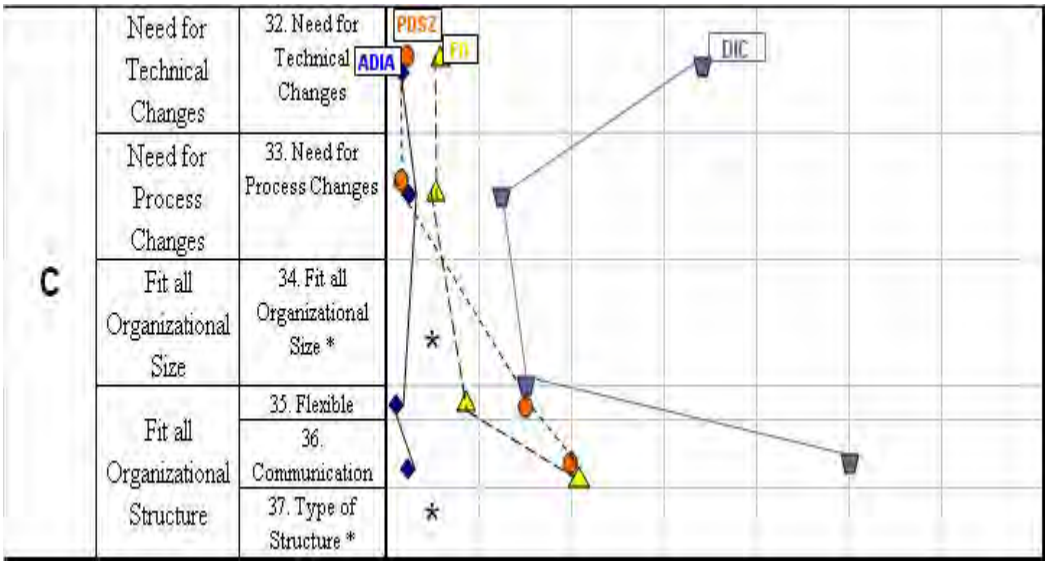

Figure 5.15: Graphical Profiles for the Aggregators using the SF Frame*

* k = 34, 37 are attributes and were not considered for this step.

Figure 5.15 shows that the aggregators are somewhat similar in their profiles using the SF dimensions. The only exception is DIC where "Need for Technical Changes" and "Communication" measures are different because of the nature of the technical business processes that are handled in this organization.

Table 5.20

Summary of the Ranking Results for the Aggregators Using SF Frame

	Oracle	MS	SAP	DS	IDMS	
PDSZ	3	2	4	1	5	δ_1
	3	4	1	2	5	δ_2
	3	4	1	2	5	δ_3
	5	4	1	1	3	δ_4
ADIA	3	2	4	5	1	δ_1
	3	4	2	1	5	δ_2
	3	4	2	1	5	δ_3
	5	1	1	1	1	δ_4
FD	3	2	4	5	1	δ_1
	3	4	2	1	5	δ_2
	3	4	2	1	5	δ_3
	4	4	1	2	3	δ_4
DIC	3	4	2	5	1	δ_1
	3	4	2	1	5	δ_2
	4	3	2	1	5	δ_3
	3	5	1	2	4	δ_4
	Oracle	MS	SAP	DS	IDMS	

Table 5.20 shows that DS is the first selection for the aggregators, considering only the SF frame, with 13 occasions of being either first rank or second rank. The SAP system is the second choice with 12 occasions.

b. Value Chain Type

The organizations that fall in this category are STD and DCA. As stated previously, value chain organizations can be divided to “product-centric” (STD), routine production, and “shop-production” (DCA).

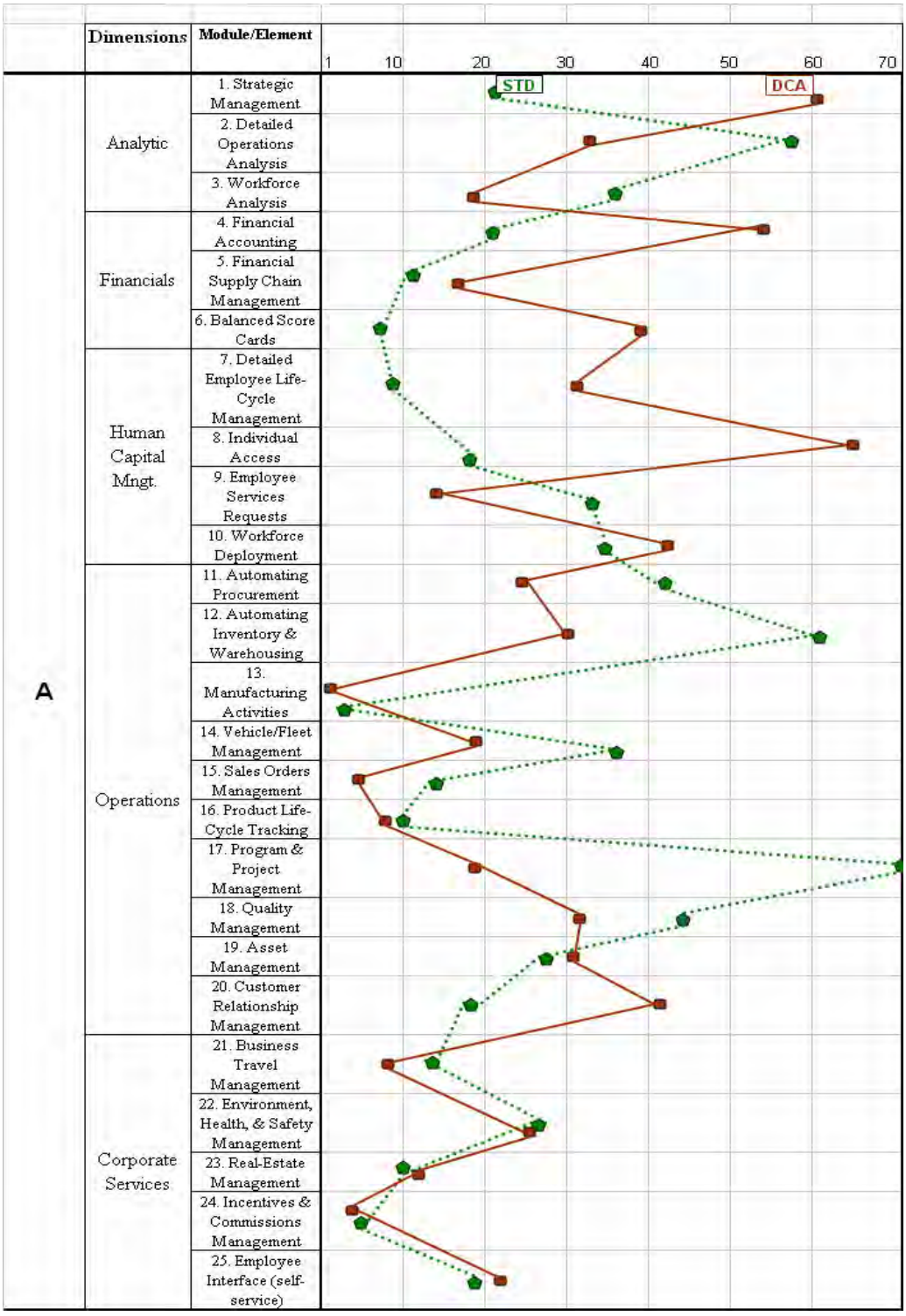

Figure 5.16: Graphical Profiles of the Value Chain Organizations

I. Process Frame

Figure 5.15 shows clearly the commonalities and the differences of the two types of value chains within the business processes frame. STD, a product-centric value chain, is focusing on the routine processes such as detailed operation analysis, and automating inventory and warehousing. Furthermore, STD is attracted to the projects and program management module because of its value on the yearly awarded projects. On the other hand, DCA, a shop production value chain considers human capital management as a critical dimension. Meanwhile, DCA is trying to make Dubai International Airport the number one airport in the world. So, knowledge and experience of their human resources are becoming structural capital. In fact, DCA has contracted with a specialized British company to manage the projects within the airport more efficiently and to train their employees professionally. Both organizations, STD and DCA, have similar profile in the corporate services dimensions.

Table 5.21

Summary of the Ranking Results for Value Chain Organizations Using Process Frame

	Oracle	MS	SAP	DS	IDMS	
STD	3	4	2	1	5	δ_1
	1	2	4	5	3	δ_2
	2	3	4	5	1	δ_3
	1	2	4	3	5	δ_4
DCA	1	4	2	3	4	δ_1
	1	2	4	5	3	δ_2
	3	1	4	5	2	δ_3
	1	2	4	5	3	δ_4
	Oracle	MS	SAP	DS	IDMS	

Table 5.21 shows Oracle at first rank five times and once at second rank, which makes it a better ERP system for both value chain organizations. The reason that Oracle is considered to be the first choice even though both organizations are different in their nature of business processes is because they are very similar in the corporate services dimension as well as some of the operation elements such as manufacturing activities and product life-cycle tracking. Oracle showed close results in these elements for both organizations. On the other hand, both organizations show different results in the optimistic management style, which supports the intension of these value chain organizations if considering future functionalities.

II. DOI Frame

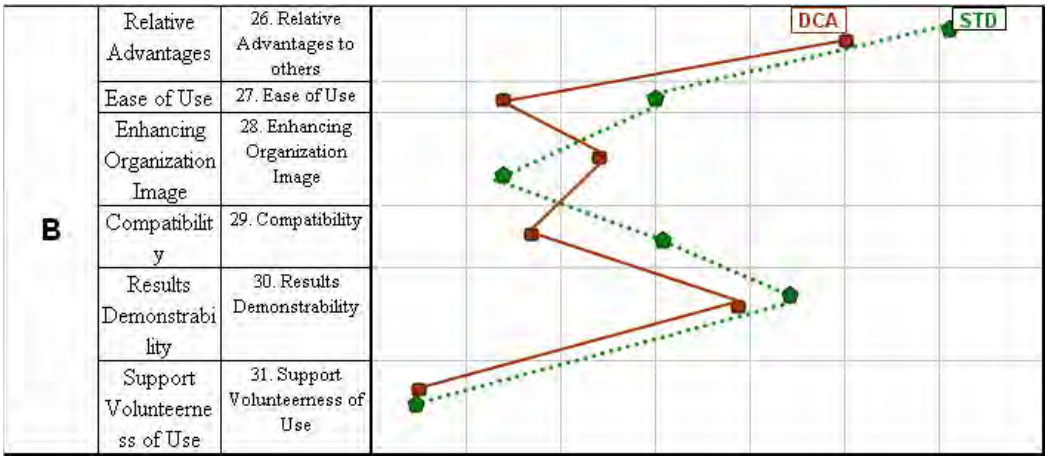

Figure 5.17: Graphical Profile of Value Chain using the DOI Frame

Figure 5.17 shows that both organizations indicated similar graphical profiles when considering only the DOI dimensions.

Table 5.22

Summary of the Ranking Results for Value Chain Organizations Using DOI Frame

	Oracle	MS	SAP	DS	IDMS	
STD	5	3	1	4	2	δ_1
	5	4	3	2	1	δ_2
	5	3	3	4	1	δ_3
	5	4	3	2	1	δ_4
DCA	5	2	2	1	4	δ_1
	5	4	3	2	1	δ_2
	5	3	2	3	1	δ_3
	5	4	3	2	1	δ_4
	Oracle	MS	SAP	DS	IDMS	

Table 5.22 shows that both value chain organizations are indicating similar results in their selection of the best-fit ERP system. IDMS is the first choice while DS is the second option when only the DOI dimensions are considered.

III. SF Frame

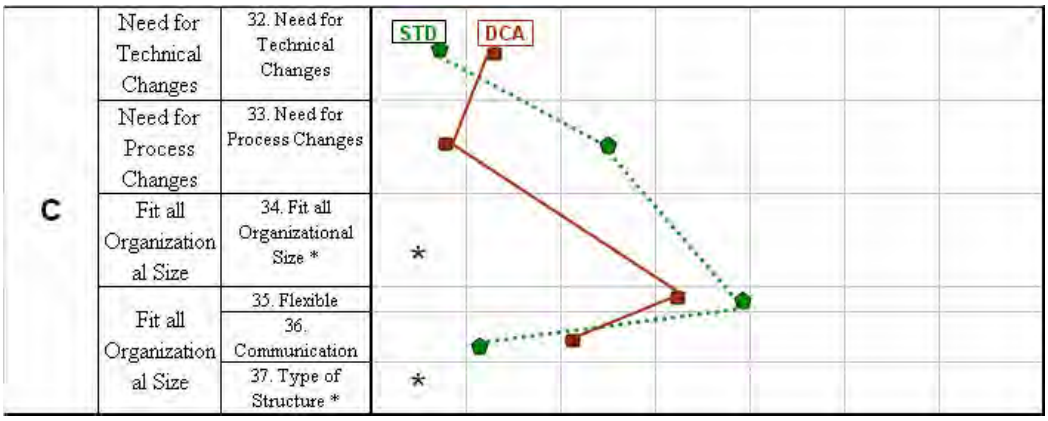

Figure 5.18: Graphical Profiles of Value Chain Organizations the using the SF Frame

* k = 34, 37 are attributes and were not considered for this step.

Figure 5.18 supports the difference in the two types of value chain organizations, which was explained earlier. STD, which is a product-centric value chain, requires more process changes than the technical modification, while DCA, a shop production value chain, needs more technical changes than process changes.

Table 5.23

Summary of the Ranking Results for Value Chain Organizations using SF Frame

	Oracle	MS	SAP	DS	IDMS	
STD	2	3	5	4	1	δ_1
	3	4	2	1	5	δ_2
	3	4	2	1	5	δ_3
	3	4	2	1	5	δ_4
DCA	3	2	4	5	1	δ_1
	3	4	2	1	5	δ_2
	3	4	2	1	5	δ_3
	4	4	1	2	3	δ_4
	Oracle	MS	SAP	DS	IDMS	

Both organizations are similar in their first choice of ERP system, with the DS system being the best-fit system. SAP is the second choice for the value chain organizations when considering only the SF frame.

Table 5.24

Best-Fit ERP System Results of the B-Web Types

	Process Frame	DOI Frame	SF Frame
Aggregators	Oracle	IDMS	DS
Value Chain	Oracle	IDMS	DS
Alliance	MS	IDMS	DS

In summary, the three B-Web types showed commonalities in the selection of the best-fit ERP system using the DOI and the SF frames where IDMS and DS are the best-fit ERP systems respectively. The reason that aggregator and value chain organizations identified oracle as their best-fit ERP system using the process frame is because most of the public organizations are service providers and they fall somewhat in the aggregator category and more distinguished value chain organization should differ from the aggregator selection. SME who is an alliance organization showed different result which strongly support the B-Web Typology used in this model of identifying different best-fit ERP system for each type. Finally, organizations would have chosen different ERP system if they only consider either DOI or SF dimensions.

CHAPTER 6

6. DISCUSSION AND CONCLUSION

6.1 Introduction

This chapter discusses the results and findings of the study. The chapter will interpret the results obtained from the various assessments presented in the previous chapter. The findings will be summarized and the strength of the model BFERPSM will be assessed. This chapter will also discuss the limitations in the current study that may have caused distortion to the inferences made from the results. Implications for particular use of the current research as well as recommendations for future studies are also discussed. The conclusions of this study are presented at the end.

6.2 Validity of BFERPSM

The research attempted to investigate two important concepts concerning public sector organizations' requirements and their best-fit ERP solution. The study postulated that any public sector organization can be categorized with regards to its business processes under one of the B-Web types. Secondly, drawing the findings from the organizations' business processes and the B-Web Typology's key processes, this study also postulated, using the graphical method, that almost each B-Web type matches a particular ERP solution. Accordingly, a correlation between the B-Web Typology and the best-fit ERP solution was postulated. Finally, a list of characteristics of the model—including SF variables, size, structure, need for technical change, need for process change, and most importantly diffusion of innovation elements—was validated to account for the development of the model. This resulted in the generation of the BFERPSM for public sector organizations in the UAE.

6.2.1 B-Web Typology Types

One of the objectives of this study was to develop a strategic approach to enable public sector organizations in the UAE to identify their best-fit ERP solution. As seen in the analysis, the significant positive association between the public sector organizations' business processes and the different B-Web Typology types provided

evidence for the validity of our BFERPSM. The computed results for the best-fit ERP system showed that the process frame, which includes the B-Web scheme, has a direct influence on the selected ERP system. Consistent with the finding of Tapscott (2001), business processes, diffusion of innovation, and success factors of ERP system implementations dimensions proved to have significant positive association with the different types of the B-Web Typology. Most commonalities were found to be in the characteristics of diffusion of innovation and SF variables for the organizations in the public sector.

Previous research has definitely proven that a failed ERP system implementation is linked to a mismatch between country-specific requirements and ERP system capabilities. Furthermore, ERP success factors can be attributed to correspondence success, process success, and interaction success. (Soh et al., 2000; Al-Mashari and Al-Mudimigh, 2003). This research used a first-time approach using the business process frame to develop a model for the public sector organizations in order to select their best-fit ERP solution. Therefore, the linkage between the perception components of the model and the organizations' needs and requirements will enhance the selection and surely shorten the product evaluation period of an ERP solution lifecycle.

6.2.2 Best-Fit ERP Solution

Although not originally hypothesized, demographic variables supported the data collected from the organization to ensure a healthy measure for the organization's requirements and needs. On the other hand, it was originally hypothesized that each ERP solution has its own characteristics. This hypothesis was strongly supported by the various graphs drawn for all ERP solutions included in this study. The analysis showed a significant association between the key business processes of the studied organizations and the ERP solutions under focus. One explanation to this finding is that some ERP solutions were found to be much further ahead than others in some business functions, such as operations and financial, which allows them to be a better fit for some organizations.

Three assessment methods were also developed to match all kind of managers' perspectives when it comes to selecting a new technology. The methods that were considered are future functionalities of an ERP system, more of an end-user service delivery package, and fewer mismatches of organizations' requirements. The analysis

for all the methods mentioned above showed that about 70 percent of the correspondents indicated similar results, ranked first or second, in all of the methods, which supports the validity of the data gathered.

6.3 Research Limitations

Every research has some limitations, and this one is no exception. The following are the limitations of this research:

a. The most pertinent limitation has to do with measurement tool utilized for this study. The instrument used to measure the constructs of this study is heavily based on experts' feedback and opinion of what that model should include. These opinions are based on previous expertise and knowledge of similar approaches. A consensus from the participated experts was used to achieve the final characteristics list as part of this model. The participated experts were from different parts of the world and may have not been aware of the UAE work environment and its culture.
b. The next limitation was the sample size. Only four individuals' measures were recorded for each of the organizations investigated. The overall graphical profiles were drawn based on the average of these measures. Even though individuals were carefully selected from each organization, their results may be subjective and may not reflect 100 percent of the organizations' requirements and needs. The selection criteria of those individuals were based on their qualifications, backgrounds, and their current job level.
c. Because ERP technology is new to the UAE, it was hard to find experts who could assist in answering the questionnaires for the ERP systems.

6.4 Implications

Adopting an ERP solution in an organization has indeed proven to add value. However, as the results of this research point out, thorough and careful planning should be placed in the evaluation effort. The associative link found between the organizations in the UAE, B-Web Typology, and the ERP systems naturally proposes implications to public sector organizations, ERP researchers, vendors, and developers. Some of these implications are presented here:

6.4.1 Practical Implications

- Public Sector Organizations

Knowing that business processes of the organizations have a positive effect on the selection of the ERP solution, it is worth to suggest that organizations, including vendors and ERP experts, should adopt the trial period method to enhance the organization's selection of the new ERP solution before implementing it on a full scale. The trial period reduces the overwhelming effect of the new technology that the organization might experience and increases the user's exposure to the technology, consequently improving acceptance (Al-Hosani, 1999).

Perhaps the most important implication for the findings presented in this research is the importance of BFERPSM as predictive tool for managers and directors in the public sector in the UAE. As mentioned earlier in this report, the UAE government has invested millions of dirhams to refine and modernize the business processes of the public sector, in which IT, including the ERP system, is a catalyst. Accordingly, one of the objectives set out for this research was to devise an organization prediction model to ensure the selection of the ERP system in the UAE public sector. BFERPSM presents a valuable tool to predict and improve organization selection of a new ERP system. Prior to making any financial commitments, managers can utilize BFERPSM to assess their organization's selection of an ERP system. Managers may decide, using BFERPSM, from what perspective he or she considers the selection of an ERP system whereby user involvement should be considered to improve the perception and consequently maximize the acceptance. This can be increased through exposure and training, and through providing information from magazines, bulletins, articles, conferences, seminars and other media.

- ERP Systems Vendors

Vendors should seek the outcome of this study to concentrate on the business processes dimensions to be part of their future agenda for further development, especially those with great interest to the public sector. Vendors should participate in workshops and training for the benefit of public sector organizations to introduce their products and to allow current and future users to be exposed to the ERP technology.

6.4.2 Theoretical Implications

This study found a strong positive association between the B-Web types and the best-fit ERP solution. This relationship suggests that the original ERP system evaluation period is missing an important link that ties key business processes to the perception of organizational requirements. Therefore, future studies should not look at the ERP vendors' reputation as an essential and integral part of a successful ERP system selection.

As shown from the results of this study found by previous researchers, the effect of selection a best-fit ERP solution holds even in a culturally-biased society, the UAE, where cultural, social, religious and other factors may exert influences on the process of IT diffusion (Rose and Straub, 1997). Therefore, BFERPSM provides a theoretical framework for predicting a successful ERP system implementation in general and a best-fit ERP solution in particular. BFERPSM can be a starting point for ERP technology diffusion in the UAE.

The importance of an ERP adoption in facilitating innovation process was highlighted in many previous studies including the Marks and Tanis model (2002). This study, however, empirically extended the previous work by adding the effect of organizational business processes to the selection criteria of an ERP technology.

The strong association found between the B-Web Typology and BFERPSM provides strong evidence to the importance of organizational needs as a perception component of an ERP technology implementation.

6.5 Recommendations for Future Research

The result of this study and its limitations unfold several recommendations for future research. Following are few of these recommendations:

- As it was explained earlier, the instrument used in this study was heavily based on expertise and previously similar questionnaires. The measurement tool utilized here should only be the basis for constructing new tools specifically designed for the public sector organization and more of the Middle East that take into consideration the possible effects of culturally dependent biases and group norms. New measurement tools need to be tested for reliability and validity in different settings utilizing previous models and research of an ERP system implementation.

- The research considered a small sample size for the development of the current approach; future researchers are encouraged to collect more data from each organization to attain more accurate results. Both number of experts in the field of IT project implementation and number of individuals in each organization can be increased to attain more precise outcome of the BFERPSM.
- This research is one of very few conducted in the UAE and the Middle East investigating ERP systems evaluation. Therefore, it is imperative that future studies replicate the work done here. Research needs to be carried out with a wider span of public sector organizations and ERP vendors with different settings to confirm and refine the finding of this study. It is desired, however, that future studies be conducted with longitudinal methodology, where the measurements are taken before and after the treatment, with the treatment in this context being ERP system implementation. A longitudinal study will provide more accurate measure of ERP system evaluation, selection, and diffusion, and consequently will provide experimental proof for the findings in this study.
- The study in hand did not measure actual organizational size and type of structure. Instead, as stated previously, these attributes were not measured on our scale. Therefore, it is important that future studies consider how organizational size and structure can accurately represent an actual measure of organizational requirements.
- Future research can utilize the process of the graphical approach in this model to develop customized software that can graph all kind of organizations' and ERP system's profiles.
- The result of this study showed that BFERPSM is generic. Therefore, future researchers are encouraged to implement this model in the private sector to confirm the results of this approach and to utilize the model for their benefit.

6.6 Conclusion

This study was intended to develop a tool to identify the best-fit ERP system for the public sector organizations in the UAE. The B-Web Typology developed by Tapscott (2001) for digital applications was used as a basis for the framework of this study. A unique combination of B-Web key processes, ERP system modules, diffusion of innovation elements, and some of the success factors of ERP systems implementations variables were used to develop the characteristics of the BFERPSM. Fundamentally, the B-Web Typology postulates that physical world organizations are different that the digital applications to be categorized as B-Web types. This research extends the B-Web Typology to include the public sector organizations and their key processes to help identify the best ERP system for their requirements. The study especially aimed at drawing the associative chain linkage between the organization's type, postulated to be an important factor influencing the prediction of an ERP system, and the determination of the best-fit ERP system. As a result, a new model was developed (BFERPSM) and tested in the public sector in the UAE to validate its exactitude and at the same time validate the B-Web Typology as it applies to the physical organizations in the UAE.

The results of the data analyses indicated strong support for BFERPSM. Organizations business processes, diffusion of innovation elements, and success factors of ERP systems implementations proved to affect the prediction of the best-fit ERP system. Although the graphical method showed significant results for each of the organizations in determining the best ERP solution, the analyses of the three methods (totality, optimistic and pessimistic management styles) proved another valuable prediction of ERP systems to be used by the mangers and decision makers in order to select the best ERP solution.

Beside the identification of the best-fit ERP system, the study showed the commonalities among public sector organizations and consequently suggests the strongest influences of ERP system evaluation and selection. This will also lead to predict technology diffusion key factors when planned to be implemented in the public sector.

It was found that organizational fit to ERP is indeed critical in explaining ERP implementation success (Hong and Kim, 2002). The research suggests the type of organization supports the prediction of the best-fit ERP solution. We also found that

both user resistance and ERP systems complexity are key factors of ERP system diffusion.

This study provides preliminary evidence supporting the importance of assessing the perception of organizational needs as a key factor in determining the best-fit ERP system. However, due to the small sample size in the survey, there are limitations in the generalization of the research to a large population. Meanwhile, BFERPSM is a generic tool that may be used in any organization intending to implement an ERP system.

Finally, the study objectives were achieved by introducing the graphical profile of the best-fit ERP system for each of the organizations investigated as an outcome of the developed methodology. Furthermore, the BFERPSM showed strong and positive results in improving the selection of an ERP package. Having introduced the management style assessment, public sector managers and decision makers may use the BFERPSM as tool to evaluate the alternative ERP systems in order to predict their organization's behavior towards accepting and using a new ERP system.

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APPENDIX A

CHARACTERISTICS DEVELOPMENT POOL

Organizations' Measuring Instrument

SECTION I: GENERAL BACKGROUND

[*Check* or *circle* your answer.]

Organization Name:_____

I.1. Gender:

☐ Male ☐ Female

I.2 How old are you?

☐ 17-22 ☐ 23-28 ☐ 29-34 ☐ 35-40 ☐ 41-47 ☐ 48-55 ☐ Over 55

I.3 Are you a UAE national?

☐ Yes ☐ No

I.4 What is the highest level of education you have attained?

1. Less than high school
2. Completed high school
3. Some university level
4. Received a diploma degree
5. Received a B.S. degree
6. Received a graduate degree
7. Other (Specify)_____

I.5 What was the primary field of study of your highest level of education?

1. General Science (e.g. physics, chemistry, etc.)
2. Liberal Arts (e.g., History, Geography, etc.)
3. Business/Management
4. Engineering
5. Computer Science/Information
6. Technical Training
7. Other (Specify)_____

I.6 Classify your current job level:

1. Upper–level Manager
2. Middle Manager
3. Technical Staff
4. Administrative Staff
5. Computer Staff
6. Other (Specify) _____

I.7 What is your job title? _____

I.8 What is your department name? _____

I.9 How many years have you worked in this organization? _____

Section II: Organizational Structure

[*Check* or *circle* your answer.]

II.1. What is the size of your organization? (Number of employees)

☐	☐	☐	☐	☐	☐	☐
Less than 500	500-1500	1500-2500	2500-3500	3500-4500	4500-5500	More than 5500

II.2. Classify your organizational structure:

1. The Bureaucracy Structure (a structure with highly routine operating tasks achieved through specialization, very formalized rules and regulations, centralized authority, narrow spans of control, and decision making follows the chain of command)
2. The Simple Structure (a structure characterized by a low degree of departmentalization, wide spans of control, authority centralized in a single person, and little formalization)
3. The Matrix Structure (a structure that creates dual lines of authority and combines functional and product departmentalization)
4. The Virtual Structure (a small, core organization that outsource major business functions)
5. The Team Structure (a structure that uses a team as central device to coordinate work activities)
6. The Boundary-less Structure (an organization that seeks to eliminate the chain of command, have limitless span of control, and replace departments with empowered teams)
7. Other (Specify) _____

II.3. My organization is a highly formalized structure (formalization is the degree to which the organization has rules and regulations to direct employees and managers).

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

II.4. I believe my organization is hard to change or modify its structure and design to adapt new technology.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

Section III: Organizational Individuals

[*Check* or *circle* your answer.]

III.1. I consider my organization to be a highly skilled organization:

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

III.2. Biographical characteristics do NOT matter in my organization (biographical characteristics are employee's age, gender, marital status, and length of service).

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

III.3 At my organization, the ability-job fit is highly practiced (ability-job fit is the degree of matching the employee's skills with the assigned job).

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

III.4 I believe that tasks are voluntarily performed rather than reinforced.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

III.5. I believe that my organization rewards seniority rather than performance:

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

III.6 At my organization, job involvement is highly practiced. (Job involvement is the degree to which a person identifies with his or her job, actively participates in it, and considers his or her performance importance to self-worth.)

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

III.7 My work environment is stressful.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

III.8 I am currently not satisfied with my job. And how would you rate your overall job satisfaction? (1-7 score, where 7 max and 1 min)

☐	☐	
Yes	No,	I rate it as _____

III. 9 I believe that most of the employees in my organization are satisfied with their jobs.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

III.10. Employees in my organization are aggressive. (Aggressiveness is the degree to which people are competitive rather than easygoing.)

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

Section IV: Organizational Dynamic

[*Check* or *circle* your answer.]

IV.1. I believe that the communication methods used in my organization are effective.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

IV.2. Formal communication channels are extensively used in my organization.
(Formal communication channels are written communication and computer-aided communication.)

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

IV.3 Informal communication channels are extensively used in my organization.
(Informal communication channels are rumors and friends talking.)

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

IV.4 Employees in my organization are highly empowered to make decisions.
(Empowerment is the process by which managers help others to acquire and use the power needed to make decisions affecting themselves and their work.)

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

IV.5. Decision making in my organization is highly centralized.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

Section V: Organizational Culture

[*Check* or *circle* your answer.]

V.1. My organization has a strong culture. (Strong culture is a culture in which the core values are intensely held, widely shared and used.)

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

V.2. My organizational culture supports innovation and risk taking (the degree to which employees are encouraged to be innovative, create new ideas, and take risks).

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

V.3. Our organizational culture is accepting new changes.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

V.4 Our organizational culture is team-oriented. (Team orientation is the degree to which work activities are organized around teams rather than individuals.)

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

V.5 Our organizational culture is always stable. (Stability is the degree to which organizational activities emphasize maintaining the status quo in contrast to growth.)

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

Section VI: Diffusion of Innovation

[*Check* or *circle* your answer.]

(Please use the scale where 7 is maximum and 1 is minimum.)

VI.1 I expect that new technology should always improve the current system.

☐	☐	☐	☐	☐	☐	☐
7	6	5	4	3	2	1

VI.2 I expect that new technology should be easy to use.

☐	☐	☐	☐	☐	☐	☐
7	6	5	4	3	2	1

VI.3 How important is a new adapted technology to your organization's image?

☐	☐	☐	☐	☐	☐	☐
7	6	5	4	3	2	1

VI.4 How important is it to you that new technology should be compatible with exiting values, needs, and past experiences?

☐	☐	☐	☐	☐	☐	☐
7	6	5	4	3	2	1

VI.5 I expect that new technology should produce quick, tangible results.

☐	☐	☐	☐	☐	☐	☐
7	6	5	4	3	2	1

Section VII: Questionnaire Evaluation

Table A.1

Pre-Characteristics Evaluation Sheet for Organizations

Dimension	Question	Character	Weight 1-10 scale (10 is most important and 1 is less important)
Organizational Structure	II.1	Size	
	II.2	Org. Structure	
	II.3	Formalization	
	II.4	Modification of Structure	
Organizational Individuals	III.1	Org. Skills	
	III.2	Biographical Characteristics	
	III.3	Ability-Job Fit	
	III.4	Reinforcement	
	III.5	Rewards	
	III.6	Job Involvement	
	III.7	Stress	
	III.8, III.9	Job Satisfaction	
	III.10	Aggressiveness	
Organizational Dynamic	IV.1	Effective Communication	
	IV.2	Formal Communication Channels	
	IV.3	Informal Communication Channels	

(table continues)

Dimension	Question	Character	Weight 1-10 scale (10 is most important and 1 is less important)
	IV.4	Employee's Empowerment	
	IV.5	Centralization	
Organizational Culture	V.1	Weak-Strong Culture	
	V.2	Innovation	
	V.3	Accepting Changes	
	V.4	Team-Oriented Culture	
	V.5	Stable Culture	
Diffusion of Innovation	VI.1	Relative Advantage	
	VI.2	Ease of Use	
	VI.3	Image	
	VI.4	Compatible	
	VI.5	Tangible Results	

ERP Solutions' Measuring Instrument

SECTION I: GENERAL BACKGROUND

Company Name:_____

I.1. For how long you have worked for this company?_____

I.2. What is your job title?_____

I.3. How long is your experience with the ERP system?_____

I.4 Please choose below the critical success factors that you think are related to your product implementation:

- Sustained Management Support
- Effective Organizational Change Management
- Good Project Scope Management
- Adequate Project Team Composition
- Comprehensive Business Process Reengineering
- Adequate Project Champion Role
- User Involvement and Participation
- Trust Between Partners
- Adequate ERP Implementation Strategy
- Avoid Customization
- Adequate ERP Version
- Dedicated Staff and Consultants
- Strong Communication Inwards and Outwards
- Formalized Project Plan/Schedule
- Adequate Training program
- Reduced Troubleshooting
- Appropriate Usage of Consultants
- Empowered Decision-Makers
- Adequate Software Configuration
- Legacy Systems

SECTION II: Matching Organizational Structure

[*Check* or *circle* your answer.]

II.1. What is the best organization size you recommend for your product?

☐	☐	☐	☐	☐	☐	☐
Less than 500	500-1500	1500-2500	2500-3500	3500-4500	4500-5500	More than 5500

II.2 Please classify what type of organization you highly recommend for your product? (You may choose more than one answer.)

1. The Bureaucracy Structure (a structure with highly routine operating tasks achieved through specialization, very formalized rules and regulations, centralized authority, narrow spans of control, and decision making follows the chain of command).
2. The Simple Structure (a structure characterized by a low degree of departmentalization, wide spans of control, authority centralized in a single person, and little formalization).
3. The Matrix Structure (a structure that creates dual lines of authority and combines functional and product departmentalization).
4. The Virtual Structure (a small, core organization that outsources major business functions).
5. The Team Structure (a structure that uses a team as central device to coordinate work activities).
6. The Boundary-less Structure (an organization that seeks to eliminate the chain of command, have limitless span of control, and replace departments with empowered teams).
7. Other (Specify) _____

II.3 Your product will definitely match a formalized structure of an organization. (Formalization is the degree where organization has rules and regulations to direct employees and managers.)

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

II.4 For a successful implementation of our product, we expect that a public sector organization should easily change or modify its structure.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

SECTION III: Matching Organization's Individuals

[*Check* or *circle* your answer.]

III.1 We expect a highly skilled organization to be able to operate the system.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

III.2 Biographical characteristics do NOT matter for the implementation of our product. (Biographical characteristics are an employee's age, gender, marital status, and length of service.)

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

III.3 We highly require that ability-job fit is practiced at the customer organization. (Ability-job fit is the degree of matching the employee's skills with the assigned job.)

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

III.4 For a successful implementation, tasks within the scope should be performed voluntarily rather than reinforced.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

III.5 Rewarding seniority rather than performance can be a cause for implementation failure.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

III.6 Job involvement is always required from the customer. (Job involvement is the degree to which a person identifies with his or her job, actively participates in it, and considers his or her performance importance to self-worth.)

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

III.7 A stressful work environment will NOT cause the implementation to fail.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

III.8 Job satisfaction for individuals is a key factor for a successful implementation.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

III.9 We always prefer our customers to have aggressive employees. (Aggressiveness is the degree to which people are competitive rather than easygoing.)

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

Section IV: Matching Organizational Dynamic

[*Check* or *circle* your answer.]

IV.1. We highly require the organization to have an effective communication method to be able to reach a successful system implementation.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

IV.2. We always prefer to use formal communication channels (e.g., written communication and computer-aided communication) to communicate the system implementation.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

IV.3. Informal communication channels (e.g., rumors and friends talking) will not influence the system implementation.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

IV.4. Regardless of their positions, employees should always be empowered to make decisions. (Empowerment is the process by which managers help others to acquire and use the power needed to make decisions affecting themselves and their work.)

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

IV.5. Centralization of decision making will not affect our product implementation.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

Section V: Matching Organizational Culture

[*Check* or *circle* your answer.]

V.1 Our system fits either weak or strong organizational culture.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

V.2 Our system will only fit an organizational culture that supports innovation and risk taking.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

V.3 Organizational culture should accept any changes for our system implementation.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

V.4 Team-oriented culture is a key factor of system implementation. (Team orientation is the degree to which work activities are organized around teams rather than individuals.)

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

V.5 Our system can only fit stable culture. (Stability is the degree to which organizational activities emphasizes maintaining the status quo in contrast to growth)

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

Section VI: Diffusion of Innovation

[*Check* or *circle* your answer.]

(Please use the scale where 7 is maximum and 1 is minimum.)

VI.1 Regardless of CSFs, our product will definitely improve the current organization system.

☐	☐	☐	☐	☐	☐	☐
7	6	5	4	3	2	1

VI.2 Comparing to others, our product is the easiest to use.

☐	☐	☐	☐	☐	☐	☐
7	6	5	4	3	2	1

VI.3 How important is a successful system implantation in the public sector to your company's image?

☐	☐	☐	☐	☐	☐	☐
7	6	5	4	3	2	1

VI.4 Comparing to others, our product is the most compatible with exiting values, needs, and past experiences of an organization in the public sector.

☐	☐	☐	☐	☐	☐	☐
7	6	5	4	3	2	1

VI.5 Our product will produce quick, tangible results.

☐	☐	☐	☐	☐	☐	☐
7	6	5	4	3	2	1

Section VII: Questionnaire Evaluation

Table A.2

Pre-Characteristics Evaluation Sheet for ERP Vendors

Dimension	Question	Character	Weight: 1-10 scale (10 is most important and 1 is least important)
Organizational Structure	II.1	Size	
	II.2	Org. Structure	
	II.3	Formalization	
	II.4	Modification of Structure	
Organizational Individuals	III.1	Org. Skills	
	III.2	Biographical Characteristics	
	III.3	Ability-Job Fit	
	III.4	Reinforcement	
	III.5	Rewards	
	III.6	Job Involvement	
	III.7	Stress	
	III.8,III.9	Job Satisfaction	
	III.10	Aggressiveness	
Organizational Dynamic	IV.1	Effective Communication	
	IV.2	Formal Communication Channels	
	IV.3	Informal Communication Channels	

(table continues)

Dimension	Question	Character	Weight: 1-10 scale (10 is most important and 1 is least important)
Organizational Dynamic	IV.4	Employee's Empowerment	
	IV.5	Centralization	
Organizational Culture	V.1	Weak-Strong Culture	
	V.2	Innovation	
	V.3	Accepting Changes	
	V.4	Team-Oriented Culture	
	V.5	Stable Culture	
Diffusion of Innovation	VI.1	Relative Advantage	
	VI.2	Ease of Use	
	VI.3	Image	
	VI.4	Compatible	
	VI.5	Tangible Results	

Public sector characteristics include structure, dynamic, behavior, and culture.

1. Organization complexity
2. Degree of independently
3. Degree of bureaucracy
4. Degree of innovations
5. Processes cycle
6. Diffusion of innovations
7. Use of IT infrastructure
8. Degree of delegation
9. Multicultural
10. Data accuracy
11. Impact of any change
12. Flexibility to any change
13. Teamwork
14. Uniqueness

15. Ease of implementation
16. Performance evaluation
17. Supportability
18. Integration and automation
19. Monitoring and control
20. R&D
21. Coaching & training
22. Cost-effective
23. e-government
24. Conservative
25. Risk averse
26. Privatization
27. Service-oriented

- What do you think you can add from this list? Or, what do you think is very important in the government or public sector of the UAE?
- What do you think are the critical and key factors of the public sector?
- How would you draw "a picture" or describe the public sector in the UAE? Or, what is unique about the public sector in the UAE? Please forward this to any of your friends if you can.

Factors of organization that are related to ERP project implementation

(1)

Table A.3

Factors of ERP Project Implementation

No.	Factor Name	Factor Description
1	Strategy	the ability of having a clear, communicated business strategy and an aligned IS/IT strategy
2	Leadership	strong and committed leadership and the ability to motivate employees to change
3	Support	the degree to which top management support a dedicated project team
4	Competence	the degree of having dedicated individuals with broad competence in ERP, BPR, or other IT-related projects involved in the entire project
5	Team	the degree of having an implementation project team that is comprised of individuals representing different views
6	Management	the degree of having excellent project management for the implementation
7	Plan	the degree of having a previously defined and well communicated project methodology that envelops both documentation procedures and clear performance measurements with routines for progress monitoring
8	External	the ability to manage the influence of external "consultants" in the implementation stage and the ability to optimally transfer the knowledge from the "consultants" to the organization
9	Culture	the degree of having a business culture that highlights the importance of learning, knowledge, past experience and change
10	Change	the degree of having fundamental willingness and readiness for change as well as an explicit change management strategy

(table continues)

No.	Factor Name	Factor Description
11	Process	the degree of having a high level of process maturity and explicit guidelines for process management
12	Communication	the degree of having a detailed communication plan and strategy that ensures the successful communication of the project plan and progress to all relevant stakeholders
13	Technology	the degree of having a clear understanding of the existing legacy environment and the technological aspects involved in the implementation of the ERP system
14	Training	the degree of having a clear educational strategy concerning the ERP implementation that involves routines for early hands-on training for the employees
15	User	the degree of having an implementation process that strives for a high level of users' acceptance early on through the use of constant presumptive end-user consultations
16	Empowerment	the degree of having a high level of implementation process transparency and a staff policy that empowers team members, end-users, and management

APPENDIX B

STUDY QUESTIONNAIRE

STUDY QUESTIONNAIRE

Organization Name: _____

1. To cope with our strategic vision, it is important that my organization applies strategic management.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

2. My organization employs detailed analysis about the daily operations.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

3. It is important that my organization monitors and tracks the workforce (Who?/Where?/When?).

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

4. It is important that my organization considers financial accounting to improve the decision-making process.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

5. It is important that my organization applies financial supply chain management to expand the control of the financial activities.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

6. In addition to financial processes, it is important that my organization focuses on human capital, resources, and other processes (the need for balanced score cards).

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

7. It is important that my organization focuses on managing the entire life cycle of all employees (employee's payment, education, benefits, insurance, career planning, etc.).

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

8. It is important that my organization allows and encourages employees to freely access their records.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

9. My organization needs to monitor and track internal service requests by the employees.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

10. It is important that my organization plans and tracks the new deployment of employees into the organization.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

11. It is important that my organization automates its procurement process.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

12. It is important that my organization automates its inventory and warehousing functions.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

13. Manufacturing activities are a core business function within my organization.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

14. Managing vehicle/fleet activities is important to my organization.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

15. It is important that my organization manages sales orders.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

16. Managing products life-cycle is crucial to my organization.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

17. It is important that my organization applies program and project management.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

18. Quality management is a heavily practiced principle in my organization.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

19. Asset management is important to my organization.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

20. For better customer service, it is important that my organization applies customer relationship management.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

21. It is important that my organization manages business travels.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

22. Environment, health, and safety are important to my organization.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

23. Facilities management is important to my organization (real estate management).

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

24. It is important that my organization properly manages employee incentives and sales commissions.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

25. Employee self-service is important to my organization (such as vacations, benefits, training, etc.).

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

26. I believe that implementing an ERP system to automate my organization processes will improve overall productivity and efficiency.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

27. I believe that an ERP system will be easy to use.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

28. I believe that implementing an ERP system will improve the overall organizational image.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

29. The last few IT systems that have been implemented were consistent with our needs and values.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

30. It is crucial that the automated processes (ERP system) should produce quick, tangible results (within six months).

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

31. I believe that employees within my organization do/will voluntarily use new systems "technology."

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

32. My organization can/will easily adapt to requested technical changes (technology related) needed to implement a new system.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

33. My organization can/will easily adapt to requested process changes needed to implement a new system.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

34. What is the size of your organization?

☐	☐	☐	☐	☐	☐	☐
Less than 500	500-1500	1500-2500	2500-3500	3500-4500	4500-5500	More than 5500

35. My organizational structure is flexible (not rigid*)* to accept new changes.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

36. My organization has an excellent communication system.

☐	☐	☐	☐	☐	☐	☐
Strongly Agree	Agree	Slightly Agree	Neutral	Slightly Disagree	Disagree	Strongly Disagree

37. My organizational structure can be defined as: [circle your answer]

a. Functional
b. Demographic
c. Divisional
d. Matrix
e. Team-oriented
f. Boundary-less

Other (Specify): _____

I.1 Gender:

☐ ☐

Male Female

I.2 How old are you?

☐ ☐ ☐ ☐ ☐ ☐ ☐

17-22 23-28 29-34 35-40 41-47 48-55 Over 55

I.3 Are you a UAE national:

☐ ☐

Yes No

I.4 What is the highest level of education you have attained?

1. Less than high school
2. Completed high school
3. Some university level
4. Received a Diploma degree
5. Received a B.S degree
6. Received a graduate degree
7. Other (Specify)_____

I.5 What was the primary field of study of your highest level of education?

1. General Science (e.g. physics, chemistry, etc.)
2. Liberal Arts (e.g. History, Geography, etc.)
3. Business/Management
4. Engineering
5. Computer Science/Information
6. Technical Training
7. Other (Specify)_____

I.6 Classify your current job level:

1. Upper –level Manager
2. Middle Manager
3. Technical Staff
4. Administrative Staff
5. Computer Staff
6. Other (Specify) _____

I.7 What is your job title: _____

I.8 What is your department name: _____

I.9 How many years have you worked in this organization: _____

Table B.1
ERP Solution Measuring Instrument

Dimensions	Rank, R	Module/Element	Element Rank	"X" ERP
1. Analytic		1. Strategic Management		
		2. Detailed Operations. Analysis		
		3. Workforce Analysis		
2. Financials		1. Financial Accounting		
		2. Financial. Supply Chain Management		
		3. Balanced Score Cards		
3. Human Capital Mngt.		1. Detailed Employee Life-Cycle Management		
		2. Individual Access		
		3. Employee Services Requests		
		4. Workforce Deployment		
4. Operations		1. Automating Procurement		
		2. Automating Inventory & Warehousing		
		3. Manufacturing Activities		
		4. Vehicle/Fleet Management		
		5. Sales Orders Management		
		6. Product Life-Cycle Tracking		
		7. Program & Project Management		
		8. Quality Management		
		9. Asset Management		
		10. Customer Relationship Management		
5. Corporate Services		1. Business Travel Management 2. Environment, Health, & Safety Management		
		3. Real-Estate Management		
		4. Incentives & Commissions Management		
		5. Employee Interface (self-service)		
6. Relative Advantages				
7. Ease of Use				
8. Enhancing Organization Image				
9. Compatibility				
10. Results Demonstrability				
11. Support Volunteerness of Use				
12. Need for Technical Changes				
13. Need for Process Changes				
14. Fit all Organizational Size				
15. Fit all Organizational Structure		1. Flexible		
		2. Communication		
		3. Type of Structure		

Please do the following:

Step 1: Rank 1-15 for the Dimensions, where 1 is the most important & 15 is the least for your product implementation in the public sector of UAE comparing to other vendors

Step 2: Weight or rank the modules/elements within one dimension, Where 1 is the most powerful module of your system comparing to other vendors

Step 3: Evaluate your ERP system that you know for each element/module on a scale of 1-7, where 7 max & 1 is min

APPENDIX C

FIGURES AND TABLES

I. Organizations' Graphical Profiles

I.1 ADIA

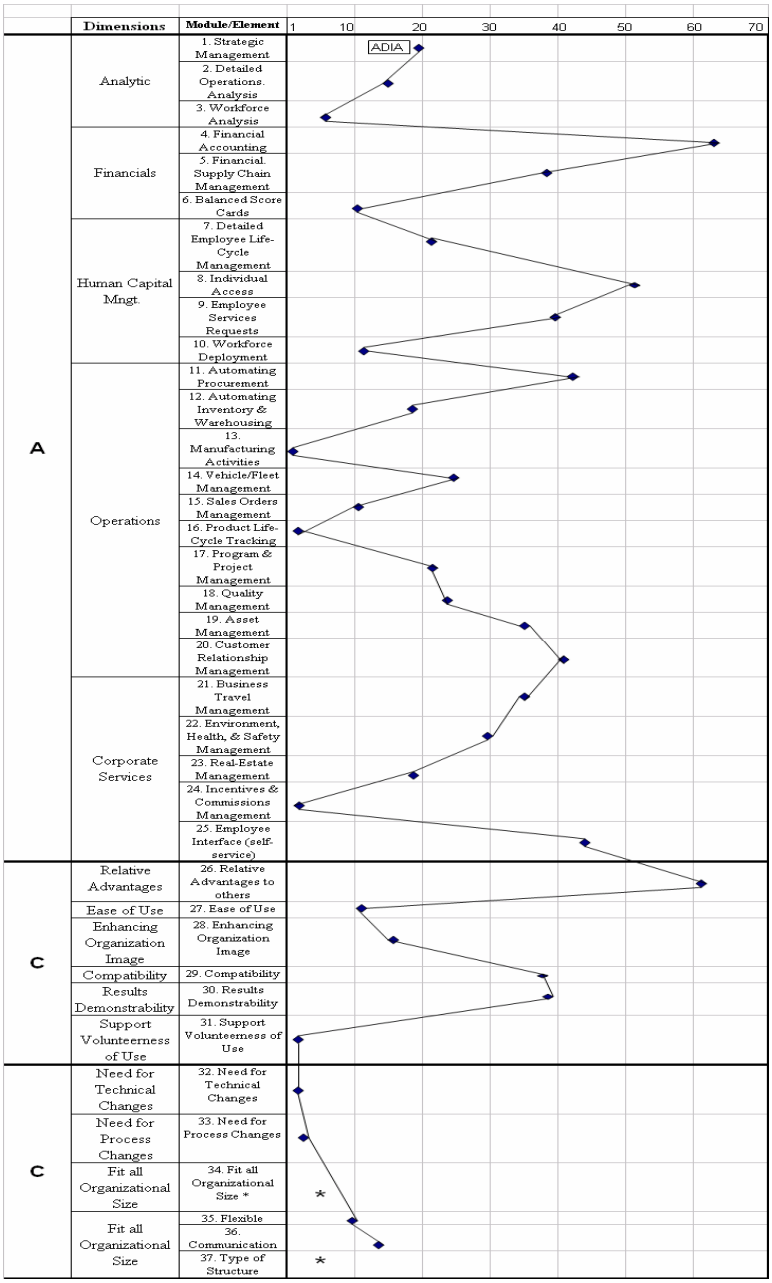

Figure C.1: ADIA Graphical Profile*

*Both organizational size and structure attributes were not measured on this scale.

I.2 FD

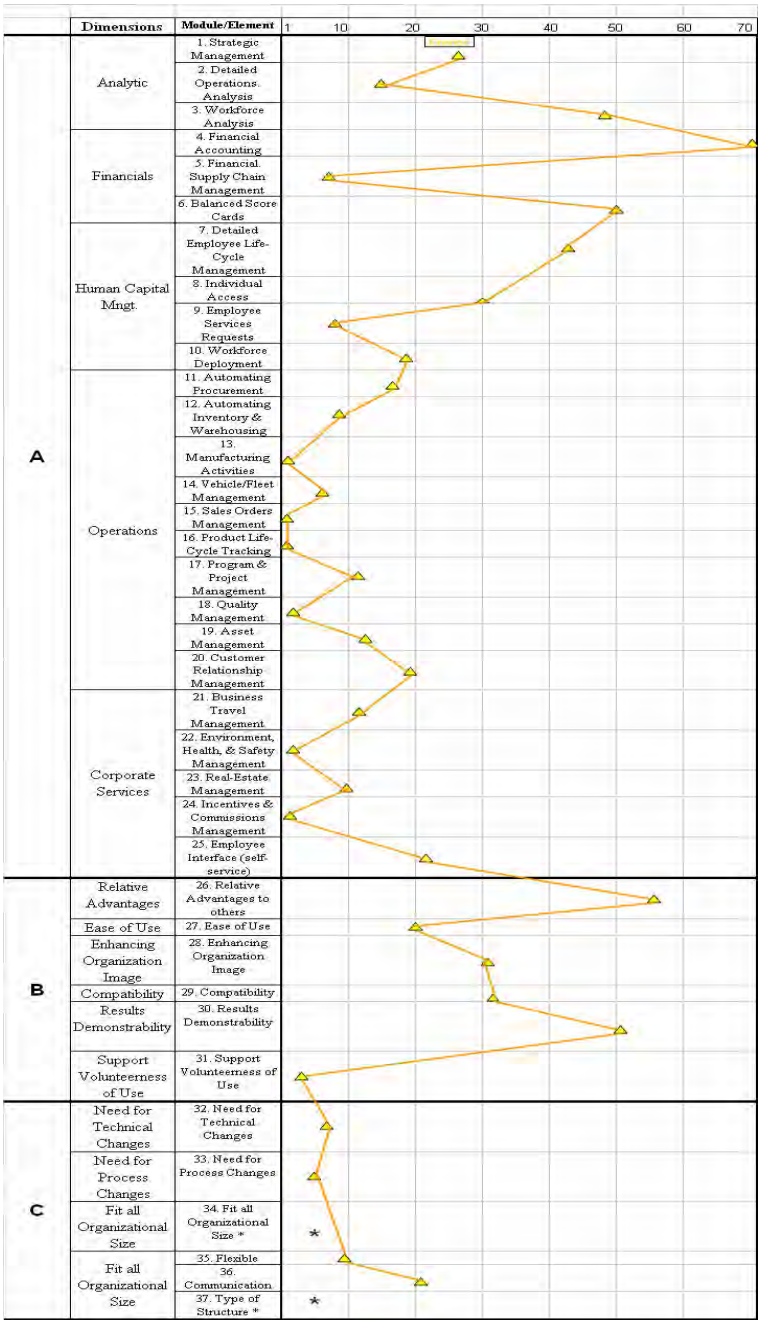

Figure C.2: FD Graphical Profile*

*Both organizational size and structure attributes were not measured on this scale.

I.3 DIC

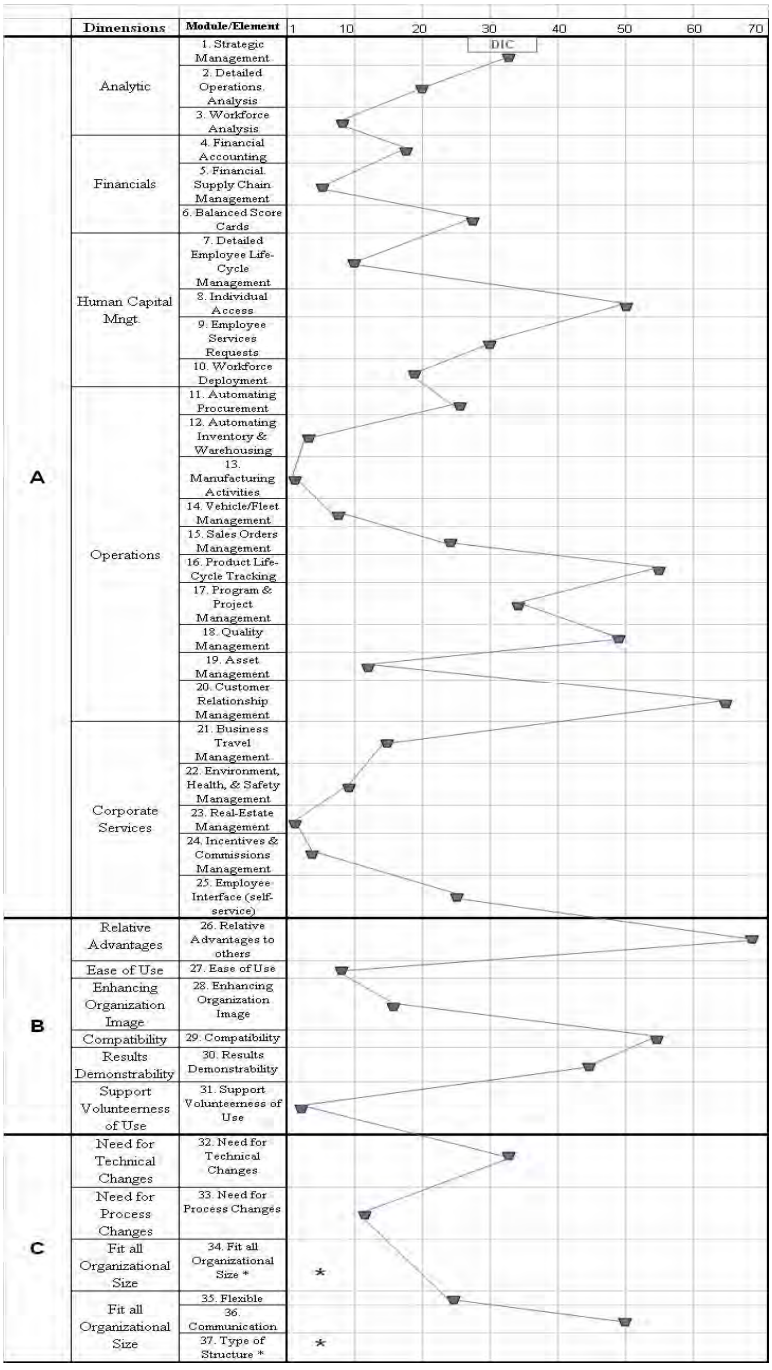

Figure C.3: DIC Graphical Profile*

*Both organizational size and structure attributes were not measured on this scale.

I.4 STD

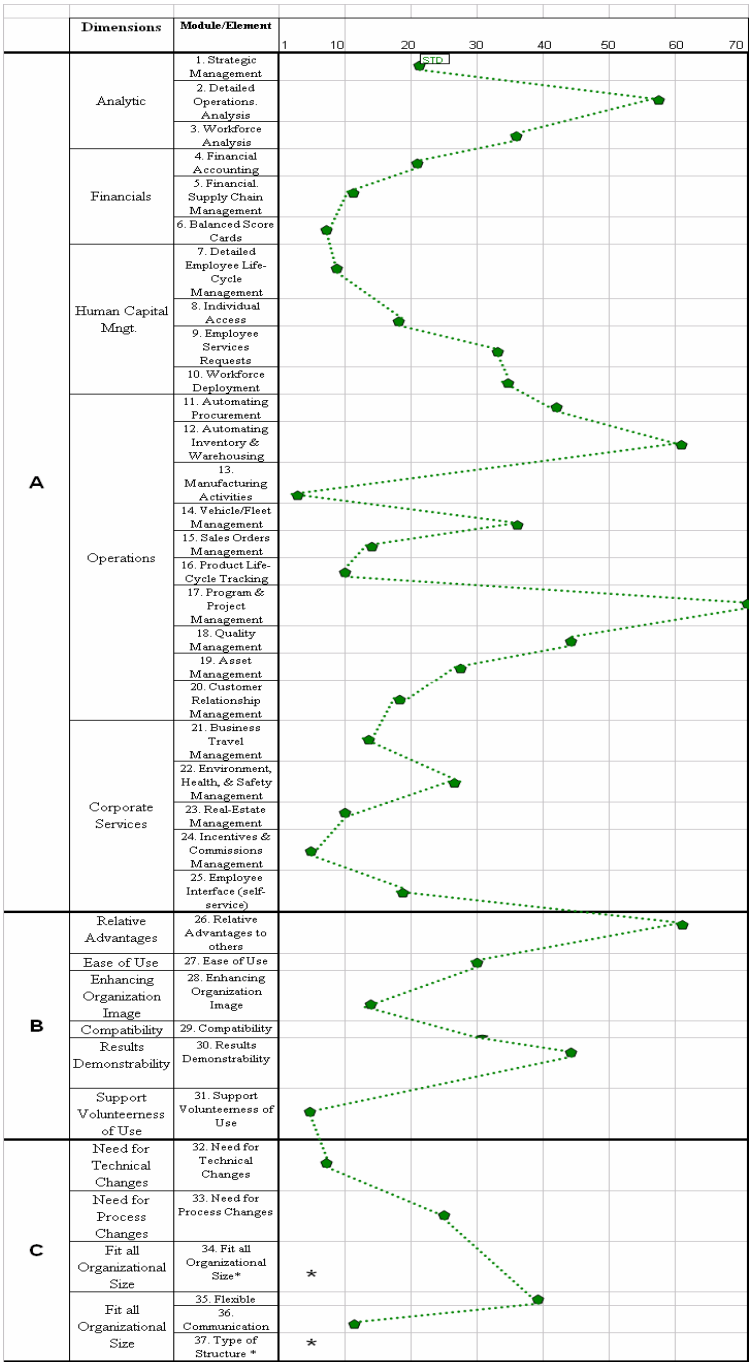

Figure C.4: STD Graphical Profile*

*Both organizational size and structure attributes were not measured on this scale.

I.5 DCA

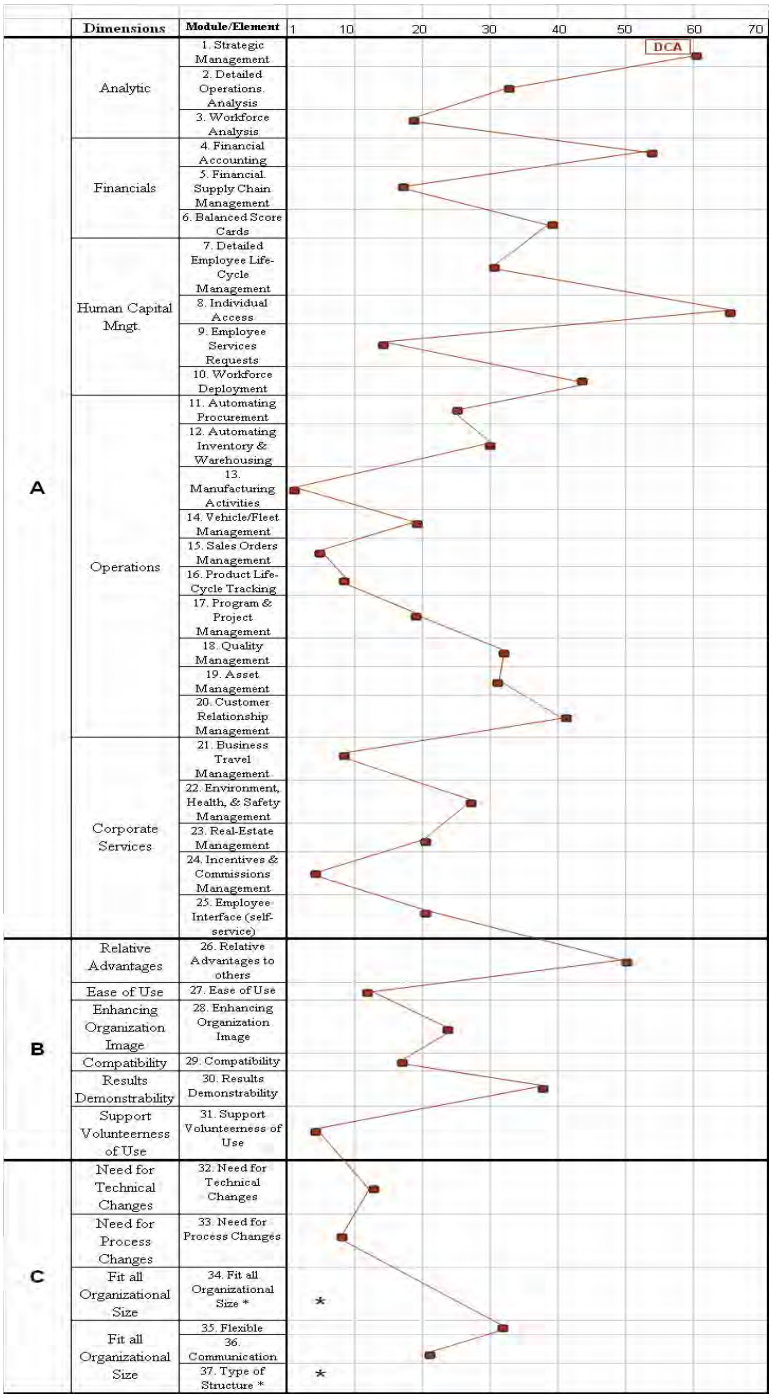

Figure C.5: DCA Graphical Profile*

*Both organizational size and structure attributes were not measured on this scale.

I.6 SME

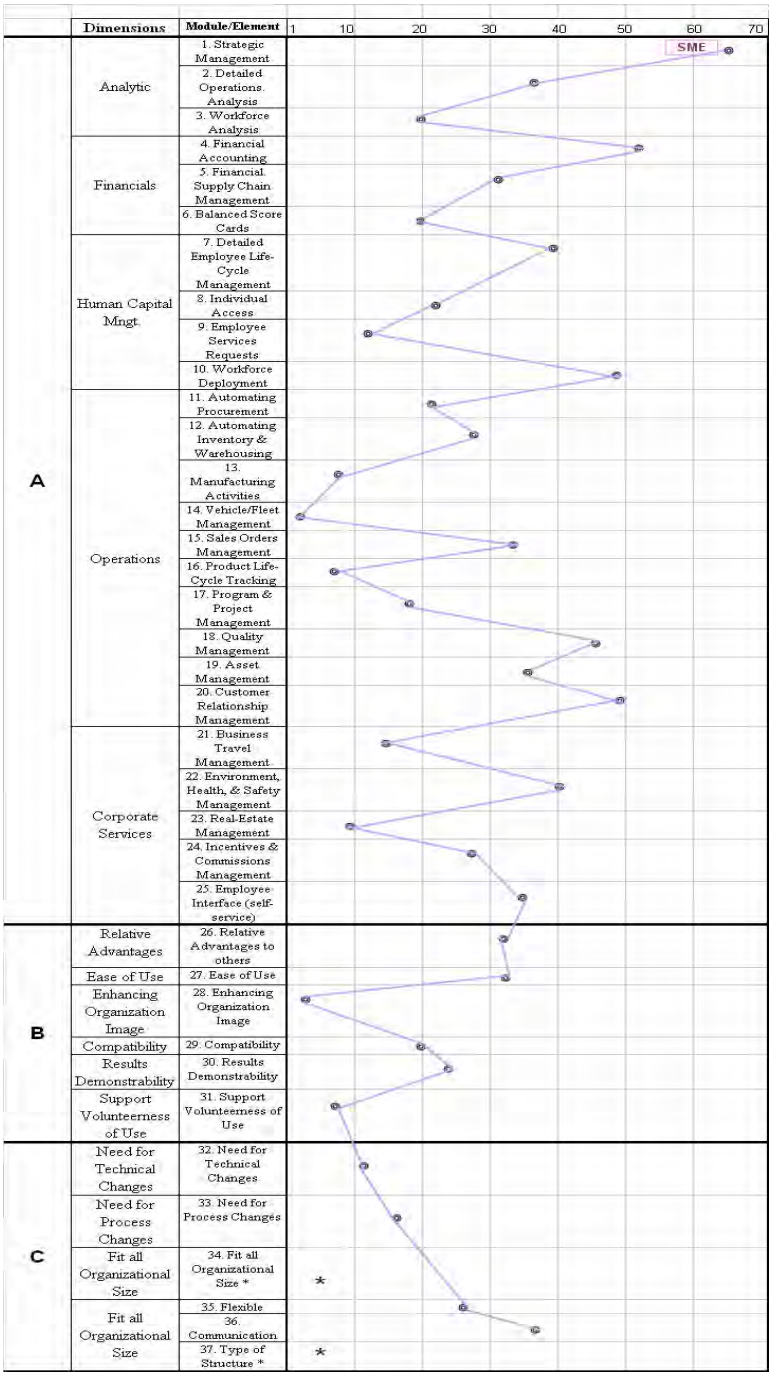

Figure C.6: SME Graphical Profile*

*Both organizational size and structure attributes were not measured on this scale.

II. Best-Fit ERP System Profiles

II.1 ADIA

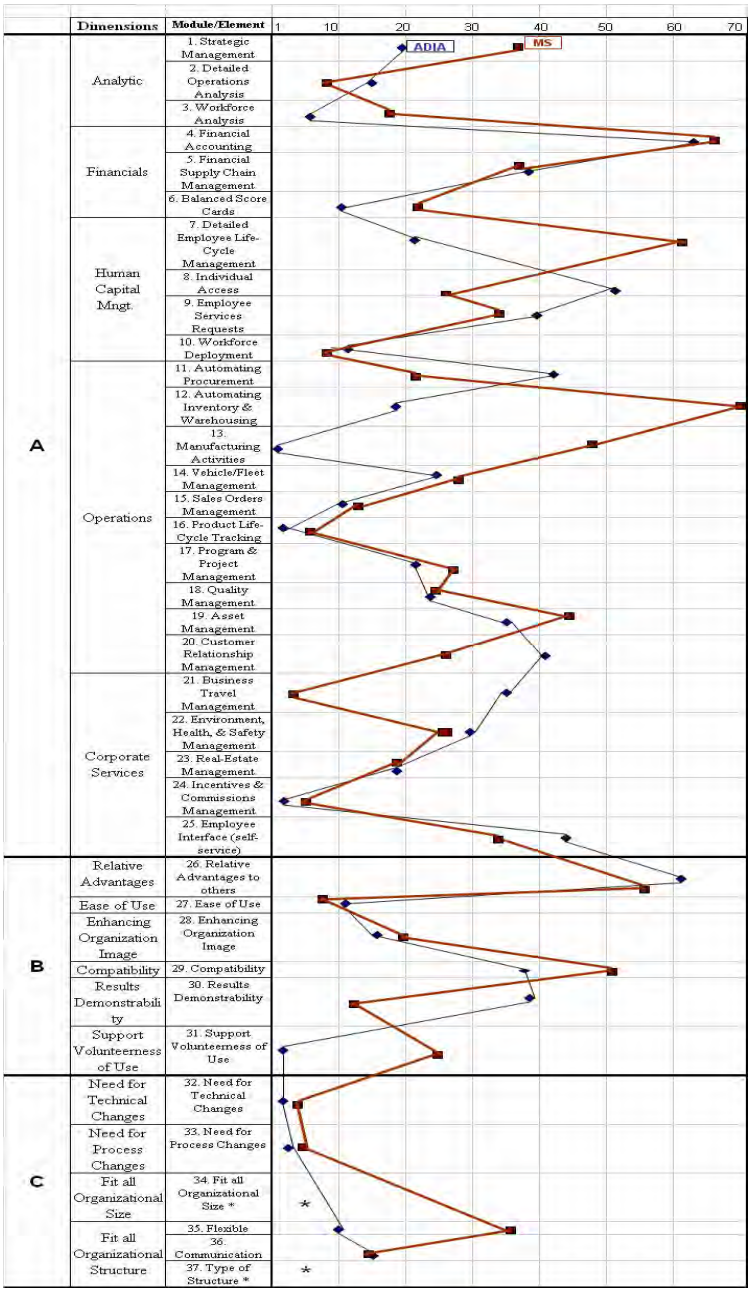

Figure C.7: ADIA with MS ERP Graphical Profiles*

*Both matching organizational size and structure are attributes and were not measured on this scale.

II.2 FD

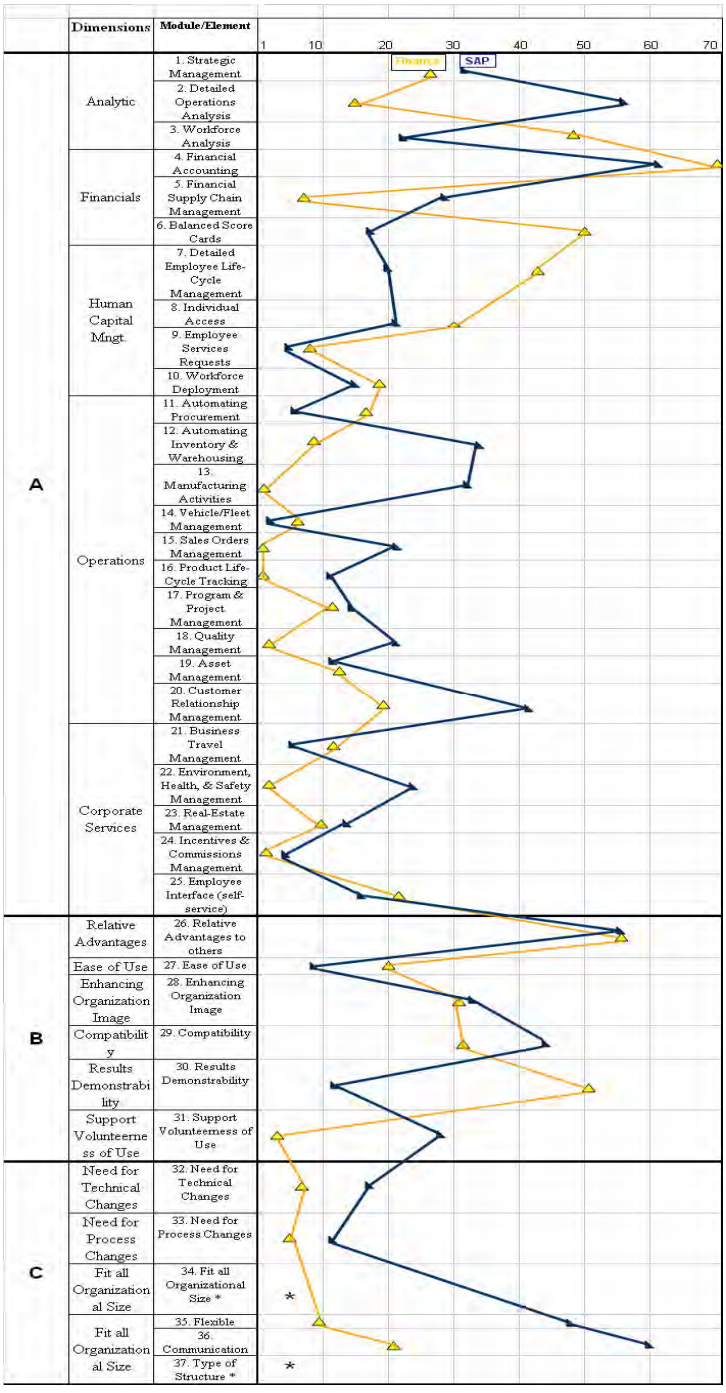

Figure C.8: FD with SAP ERP Graphical Profiles*

*Both matching organizational size and structure are attributes and were not measured on this scale.

II.3 DIC

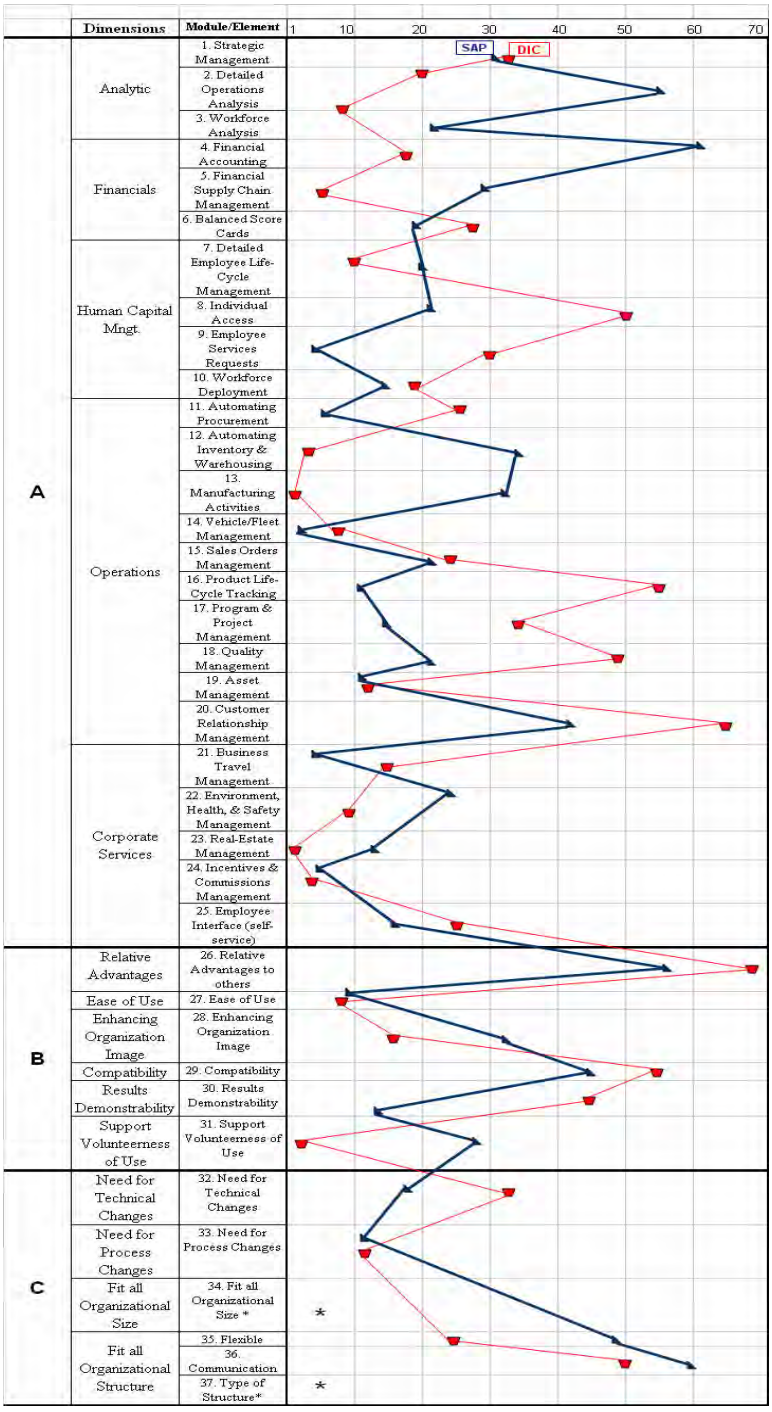

Figure C.9: DIC with SAP ERP Graphical Profiles*

*Both matching organizational size and structure are attributes and were not measured on this scale.

II.4 STD

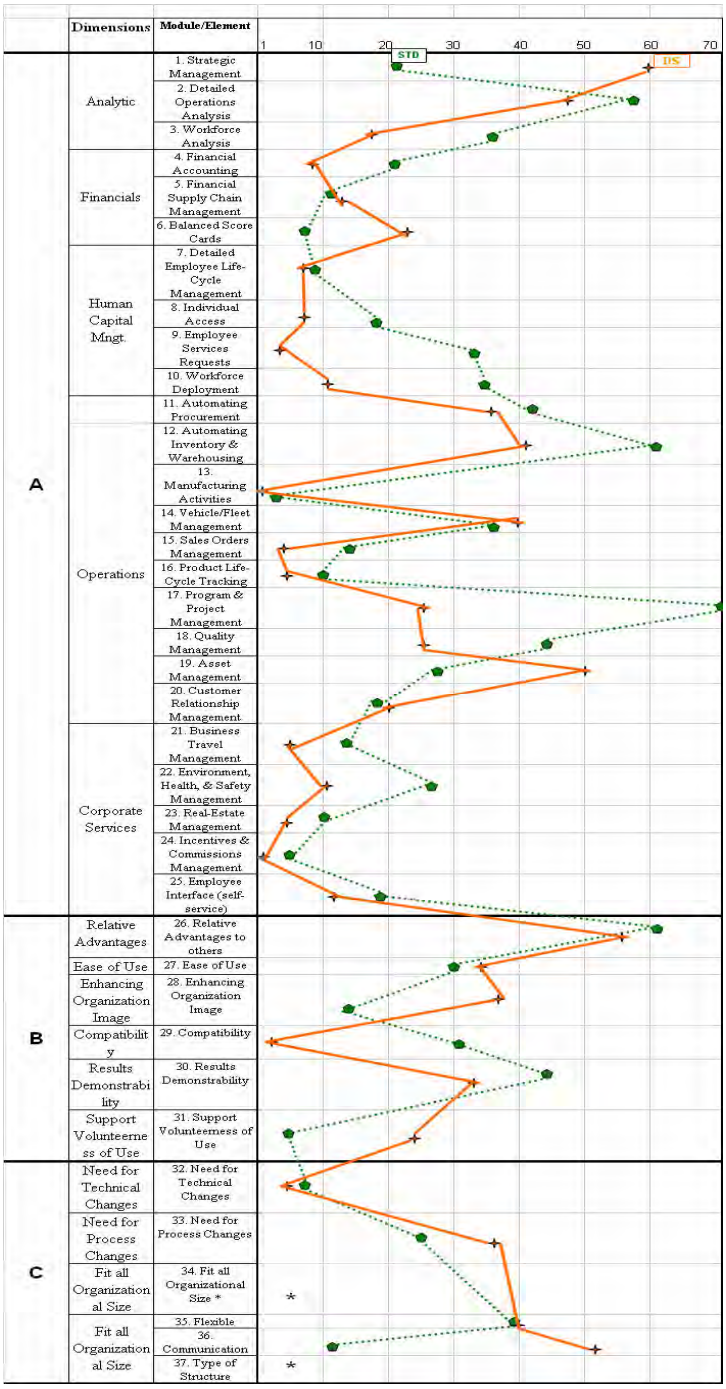

Figure C.10: STD with DS ERP Graphical Profiles*

*Both matching organizational size and structure are attributes and were not measured on this scale.

II.5 DCA

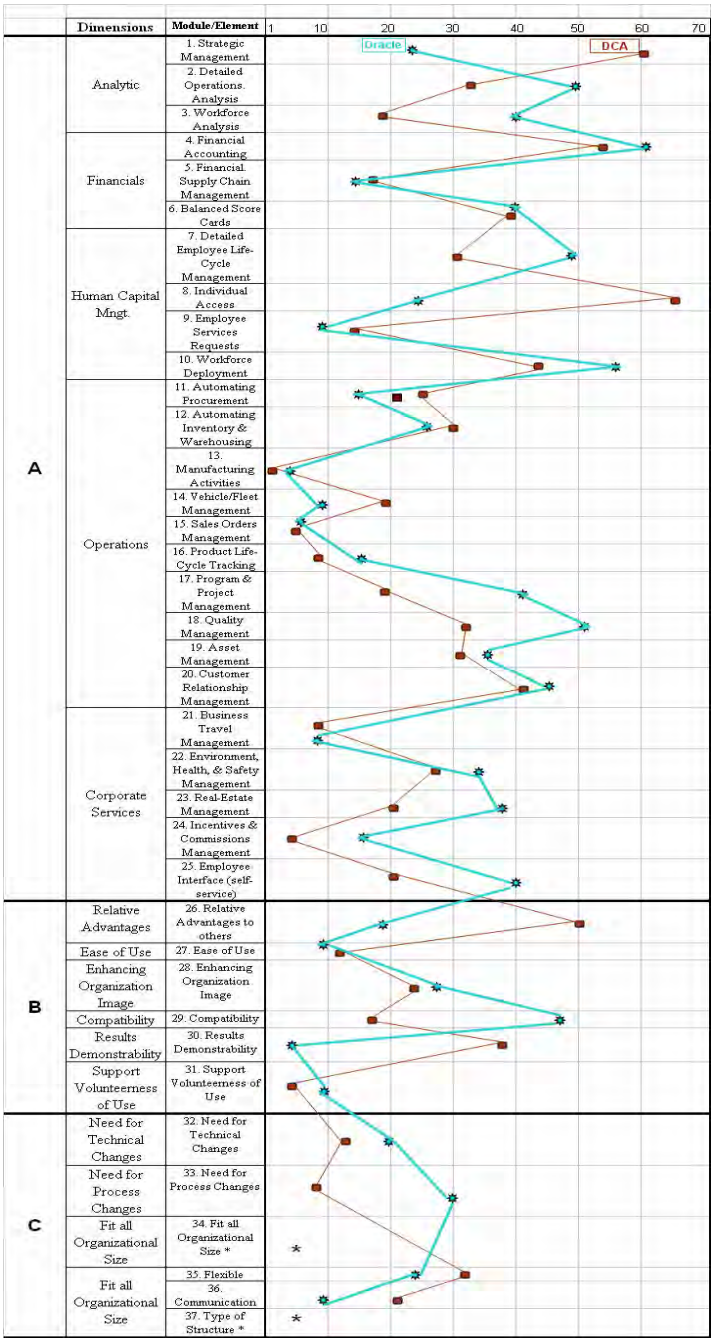

Figure C.11: DCA with Oracle ERP Graphical Profiles*

*Both matching organizational size and structure are attributes and were not measured on this scale.

II.6 SME

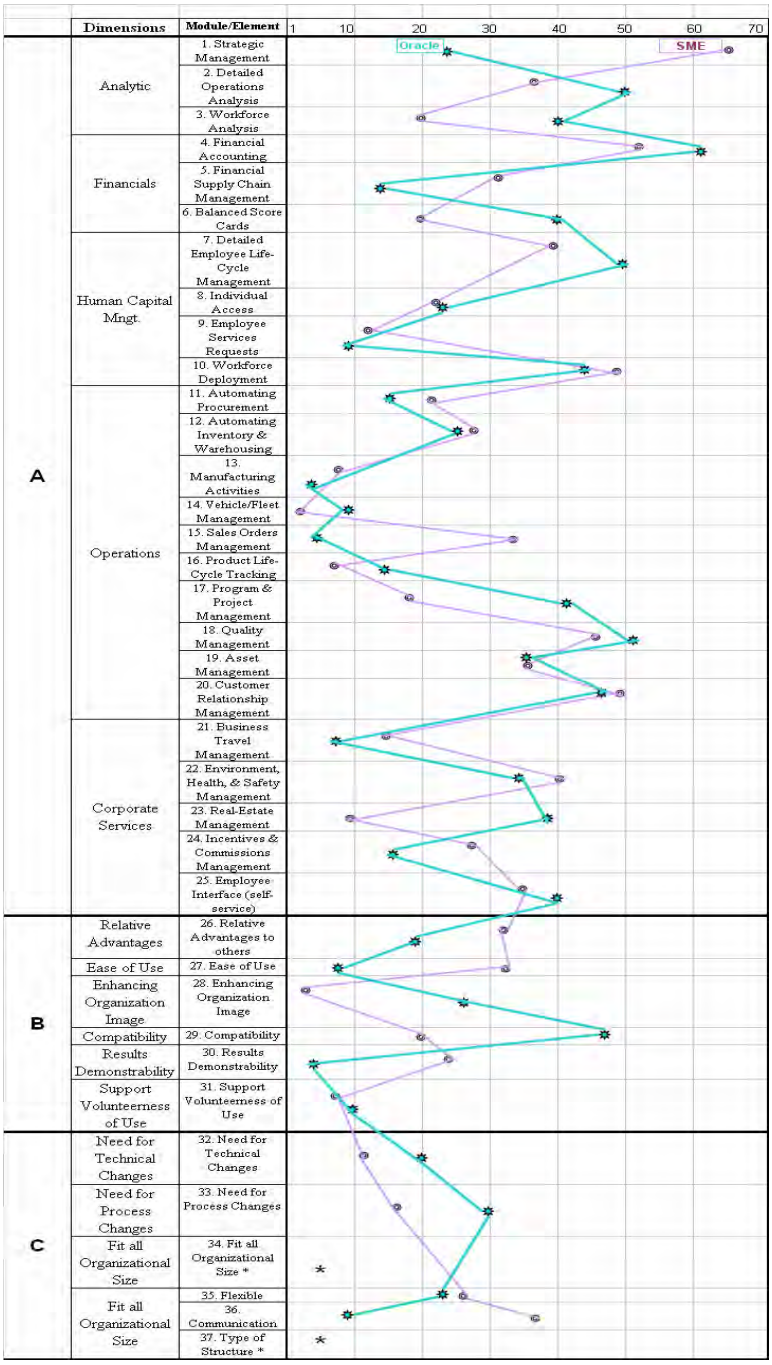

Figure C.12: SME with Oracle ERP Graphical Profiles*

*Both matching organizational size and structure are attributes and were not measured on this scale.

III. Process Frame Results

Table C.1

Process Frame Results of ADIA

	ERP Solution				
	Oracle	MS	SAP	DS	IDMS
δ_1	452	335	387	462	441
Rank	4	1	2	5	3
δ_2	124	81	-89	-144	53
Rank	1	2	4	5	3
δ_3	288	208	149	159	247
Rank	1	3	5	4	2
δ_4	-164	-127	-238	-303	-194
Rank	2	1	4	5	3

Table C.2

Process Frame Results of STD

	ERP Solution				
	Oracle	MS	SAP	DS	IDMS
δ_1	431	468	426	341	574
Rank	3	4	2	1	5
δ_2	103	60	-110	-165	32
Rank	1	2	4	5	3
δ_3	267	264	158	88	303
Rank	2	3	4	5	1
δ_4	-164	-204	-268	-253	-271
Rank	1	2	4	3	5

Table C.3

Process Frame Results of FD

	ERP Solution				
	Oracle	MS	SAP	DS	IDMS
δ_1	396	441	357	456	439
Rank	2	4	1	5	3
δ_2	298	255	85	30	227
Rank	1	2	4	5	3
δ_3	347	348	221	243	333
Rank	2	1	5	4	3
δ_4	-49	-93	-136	-213	-106
Rank	1	2	4	5	3

Table C.4

Process Frame Results of DCA

	ERP Solution				
	Oracle	MS	SAP	DS	IDMS
δ_1	315	404	328	345	404
Rank	1	4	2	3	4
δ_2	91	48	-122	-177	20
Rank	1	2	4	5	3
δ_3	203	226	103	84	212
Rank	3	1	4	5	2
δ_4	-112	-178	-225	-261	-192
Rank	1	2	4	5	3

Table C.5

Process Frame Results of DIC

	ERP Solution				
	Oracle	MS	SAP	DS	IDMS
δ_1	506	559	451	458	399
Rank	4	5	2	3	1
δ_2	200	157	-13	-68	129
Rank	1	2	4	5	3
δ_3	353	358	219	195	264
Rank	2	1	4	5	3
δ_4	-153	-201	-232	-263	-135
Rank	2	3	4	5	1

Table C.6

Process Frame Results of SME

	ERP Solution				
	Oracle	MS	SAP	DS	IDMS
δ_1	288	419	325	446	429
Rank	3	1	2	4	5
δ_2	28	-15	-185	-240	-43
Rank	1	2	4	5	3
δ_3	158	202	70	103	193
Rank	3	1	5	4	2
δ_4	-130	-217	-255	-343	-236
Rank	1	2	4	5	3

IV. DOI Frame Results

Table C.7

DOI Frame Results of ADIA

	ERP Solution				
	Oracle	MS	SAP	DS	IDMS
δ_1	109	74	82	110	145
Rank	3	1	2	4	5
δ_2	-51	6	16	20	51
Rank	5	4	3	2	1
δ_3	29	40	49	65	98
Rank	5	4	3	2	1
δ_4	-80	-34	-33	-45	-47
Rank	5	2	1	3	4

Table C.8

DOI Frame Results of STD

	ERP Solution				
	Oracle	MS	SAP	DS	IDMS
δ_1	141	71	24	96	49
Rank	5	3	1	4	2
δ_2	-69	-12	-2	2	33
Rank	5	4	3	2	1
δ_3	36	47	56	47	74
Rank	5	3	2	3	1
δ_4	-105	-59	-58	-45	-41
Rank	5	4	3	2	1

Table C.9

DOI Frame Results of FD

	ERP Solution				
	Oracle	MS	SAP	DS	IDMS
δ_1	123	102	88	88	97
Rank	5	4	1	1	3
δ_2	-79	-22	-12	-8	23
Rank	5	4	3	2	1
δ_3	22	40	38	40	60
Rank	5	2	4	2	1
δ_4	-101	-62	-50	-48	-37
Rank	5	4	3	2	1

Table C.10

DOI Frame Results of DCA

	ERP Solution				
	Oracle	MS	SAP	DS	IDMS
δ_1	109	94	94	80	103
Rank	5	2	2	1	4
δ_2	-31	26	36	40	71
Rank	5	4	3	2	1
δ_3	39	60	65	60	87
Rank	5	3	2	3	1
δ_4	-70	-34	-29	-20	-16
Rank	5	4	3	2	1

Table C.11

DOI Frame Results of DIC

	ERP Solution				
	Oracle	MS	SAP	DS	IDMS
δ_1	116	73	97	143	166
Rank	3	1	2	4	5
δ_2	-78	-21	-11	-7	24
Rank	5	4	3	2	1
δ_3	19	26	43	68	95
Rank	5	4	3	2	1
δ_4	-97	-47	-54	-75	-71
Rank	5	1	2	4	3

Table C.12

DOI Frame Results of SME

	ERP Solution				
	Oracle	MS	SAP	DS	IDMS
δ_1	111	124	132	102	131
Rank	2	3	5	1	4
δ_2	-5	52	62	66	97
Rank	5	4	3	2	1
δ_3	53	88	97	84	114
Rank	5	3	2	4	1
δ_4	-58	-36	-35	-18	-17
Rank	5	4	3	2	1

V. SF Frame Results

Table C.13

SF Frame Results of ADIA

	ERP Solution				
	Oracle	MS	SAP	DS	IDMS
δ_1	87	68	146	160	43
Rank	3	2	4	5	1
δ_2	77	68	146	160	43
Rank	3	4	2	1	5
δ_3	82	68	146	160	43
Rank	3	4	2	1	5
δ_4	-5	0	0	0	0
Rank	5	1	1	1	1

Table C.14

SF Frame Results of STD

	ERP Solution				
	Oracle	MS	SAP	DS	IDMS
δ_1	62	77	119	111	58
Rank	2	3	5	4	1
δ_2	24	15	93	107	-10
Rank	3	4	2	1	5
δ_3	43	42	106	109	24
Rank	3	4	2	1	5
δ_4	-19	-27	-13	-2	-34
Rank	3	4	2	1	5

Table C.15

SF Frame Results of FD

	ERP Solution				
	Oracle	MS	SAP	DS	IDMS
δ_1	88	79	133	151	40
Rank	3	2	4	5	1
δ_2	64	55	133	147	30
Rank	3	4	2	1	5
δ_3	76	67	133	149	35
Rank	3	4	2	1	5
δ_4	-12	-12	0	-2	-5
Rank	4	4	1	2	3

Table C.16

SF Frame Results of DCA

	ERP Solution				
	Oracle	MS	SAP	DS	IDMS
δ_1	74	65	101	131	36
Rank	3	2	4	5	1
δ_2	32	23	101	115	-2
Rank	3	4	2	1	5
δ_3	53	44	101	123	17
Rank	3	4	2	1	5
δ_4	-21	-21	0	-8	-19
Rank	4	4	1	2	3

Table C.17

SF Frame Results of DIC

	ERP Solution				
	Oracle	MS	SAP	DS	IDMS
δ_1	99	124	88	126	81
Rank	3	4	2	5	1
δ_2	-13	-22	56	70	-47
Rank	3	4	2	1	5
δ_3	43	51	72	98	17
Rank	4	3	2	1	5
δ_4	-56	-73	-16	-28	-64
Rank	3	5	1	2	4

Table C.18

SF Frame Results of SME

	ERP Solution				
	Oracle	MS	SAP	DS	IDMS
δ_1	78	93	95	111	52
Rank	2	3	4	5	1
δ_2	16	7	85	99	-18
Rank	3	4	2	1	5
δ_3	47	50	90	105	17
Rank	4	3	2	1	5
δ_4	-31	-43	-5	-6	-35
Rank	3	5	1	2	4

VITA

Saif Juma Al Dhaheri was born on October 29, 1975, in the Al-Ain. He received his education from public schools and graduated from Zayed High School in 1993. He completed his Bachelor in Electrical Engineering and Minor in Mathematics from the United Sates at Saint Louis University in 1998.

Mr. Al-Dhaheri is an officer in the UAE Armed Forces and currently working in the telecommunication division. In 1999, Mr. Al Dhaheri became an active member of the GCC telecom Bureau committees. In 2000, He participated for the first time in the World Radio Conference in Istanbul. His experience areas are: System and Project Management, Radio Spectrum Management, Radio Interferences, Information System Innovation, Database, Cryptography. Finally, Mr. Al Dhaheri received multi awards for his outstanding performance in his educational stage and his work career.