

Significant Factors Influencing Enterprise Resource Planning (ERP) Systems Implementation in Ghana

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Abstract: There has been an increase use of Enterprise Resource Planning (ERP) systems in large companies and government organizations in developed countries recently. While ERP systems have been widely adopted in the Western economies, developing countries such as Ghana lag far behind. The purpose of this research is to investigate both the organizational and national factors that influence the ERP implementation in Ghana and how these significant factors contribute to achieving competitive advantage. A quantitative approach based on a cross-sectional survey is used to collect data from our respondents. A questionnaire approach base on structured and semi-structured questions will be used to collect data from a random sample of organizations who have implemented ERP systems for one or more years. Findings of this research suggest that ERP implementation in Ghana is influenced by a number of national factors such as economic growth, government regulations, ICT infrastructure and many others. In addition to this, some organizational factors also play some significant role in the ERP implementation. The findings of this study also aid the management of organizations that are implementing ERP systems to gain a better understanding of the likelihood challenges they may face and to enable them to put in place appropriate measures to mitigate the risks of implementation failures. Finally this research also contribute to the body of knowledge since research of this nature lag far behind in developing countries such as Ghana.

Keywords: Ghana, Developing Country, ERP, Developed Country, Significant Factor.

1. GENERAL INTRODUCTION AND SUMMARY

1.1 Introduction:

This chapter presents an overview of this research study. The presentation will therefore, look at the research objectives, problem statements, and research questions. It will then look again at the background and justifications of the study, significance of the study, limitations and delimitations of the study and definitions of some terms. In summary, this chapter discusses the purpose, importance, timeliness, and relevance of this research study to information systems research and in particular to ERP implementation in developing countries such as Ghana.

1.2 Objectives of the study:

1.2.1 General objectives:

The general objectives of the study is to investigate both the organizational and national factors that influence the ERP implementation in Ghana and how these significant factors contribute to achieving competitive advantage.

1.2.2 Specific objectives:

To achieve the general objectives, the research will be aimed at addressing the following specific objectives:

- 1 To find out the percentages of industries that use ERP systems in Ghana
- 2 To determine the various ERP products and their modules used by the sampled companies
- 3 To ascertain the various ICT economic indicators that help to implement ERP systems in Ghana.
- 4 To ascertain the ICT infrastructural indicators that help to implement ERP systems in Ghana.
- 5 To examine how the implementation of ERP systems have helped to achieve competitive advantage

1.3 Research Problem Statement:

The challenges of ERP systems adoption and implementation in developing countries such as Ghana are enormous. Previous studies have shown that transfer of information systems like ERP typically developed in industrialized countries to developing countries is often marred by problems of mismatch with cultural values, economic, and regulatory requirements. Research has also acknowledged information technology's potential for helping to promote economic growth in developing countries, but its realization depends largely on the social and economic settings, cultural values, and technical issues such as availability of equipment, lack of trained and experienced personnel, the reliability of power supplies, and telecommunications infrastructures (Heeks, 2002). Bingi et al., (2002) also identified several issues that developing countries have to face that are not quite important or common in developed countries: human resources, technical concerns, and socio-political challenges. Regarding human resources, technology users in developing countries are limited in their opportunities for career development. Regarding technical issues, there are concerns about quality, security, and availability of data. Socio-politically, there are challenges that arise from illiteracy, language barrier, political instability etc. While there is wide adoption of ERP systems in Europe and North America, developing countries lag far behind (Huang & Palvia, 2001). However, due to economic growth, developing countries such as Ghana are becoming major targets for ERP vendors. In some developing countries, for example Ghana, a number of large and mid-sized organizations have implemented ERP solutions and more are expected to follow suit. For instance, (Huang & Palvia, 2001, page 276) state in the abstract that:

“Meanwhile, ERP is beginning to appear in many organizations of developing countries. Little research has been conducted to compare the implementation practices of ERP in developed vs developing countries”.

ERP technology faces additional challenges in developing countries related to economic, cultural, and basic infrastructure issues.

Developed countries are widely adopting and implementing ERP systems in their organizations as in comparison with developing countries. Statistics has shown that 88% of ERP market is in North American and European countries while the rest of market goes to the rest of the world (AMR, 2008). The statistics clearly show that Africa, Asia, South America, and Australia continents are not doing very well in the adoption and implementation of the ERP systems.

This gap of ERP adoption and implementation in developing countries is directly related to the problems outlined above. Huang and Palvia, (2001) came out with a general framework for implementing ERP systems in developing countries. This framework identified ten (10) CSFs which were grouped into two major categories: NATIONAL AND ORGANIZATION. The national factors were: Infrastructure, Economy and economic growth, Manufacturing, Regional, and Government. Again the organizational factors were: IT maturity, Computer culture, Business size, Management commitment, and BRP experience. Many researchers who have done works on ERP implementations in developing countries had appreciated this framework as an important framework of study in their research. Abdelghaffar and Azim, (2010) adopted this framework to investigate the significant factors influencing ERP implementation in large organizations in Egypt. Their results turnout that more factors in the national context were more significant than the organizational context factors. Also in the thesis of Vevaina, (2007) he made use of this same framework to investigate the factors affecting the implementation of enterprise systems within government organizations in New Zealand. Therefore, in this research an adopted framework discussed above will be used to explore the significant factors influencing ERP implementation in Ghana. Again the research will try to come out with a framework that will be used or lookup to by all organizations when implementing ERP systems in Ghana.

1.4 Research Questions:

The following are the research questions that this research study seeks to answer:

1. How many industries percentages do ERP systems have in Ghana?
2. Which ERP products and their modules were used by our sampled organizations?
3. What are the ICT economic indicators in Ghana?
4. What are the ICT infrastructural indicators in Ghana?
5. Do these significant factors help organizations in Ghana to achieve competitive advantage?

1.5 Background and Justification of Study:

Enterprise Resource Planning (ERP) Systems are integrated, enterprise wide systems, which automate core corporate activities such as operations and logistics, human resource, financials, sales and marketing and supply chain management . The module functionality overview of an ERP system is given in the figure 1 below:



Fig 1: Module Functionality of Overview of ERP System

Source: Adams and Sammon (2003)

Enterprise resource planning (ERP) systems are widely used to extract and process data from different functional areas across the enterprise (Gore, 2008). Enterprise systems are therefore known as ‘cross-functional ‘systems as they integrate business processes across different functional areas of an organization. These systems are highly complex systems which must be managed and implemented with lot of care across organizations. ERP systems are intended to deliver a significant improvement over the non-holistic nature of earlier organizational information systems. Traditional information systems are stand-alone systems which do not integrate any functional areas and business processes of an organization. Each department typically has its own information system configured to service that particular department or section of the organization. These systems do not interface with each other, thereby creating problems for the organization. It is on this note that this research is being conducted to help bring homogeneity and uniformity in organizational systems. Various research reports have shown that ERP systems provide benefits such as cost reductions, improved productivity, better managerial decision-making, and facilitation of business processes or structural changes. Due to the enormous benefits associated with ERP systems, this research is also design to educate and inform corporate organizations, government, and companies doing business in Ghana, about the significant factors needed to implement ERP systems in their respective organizations in Ghana.

1.6 Significance of the Study:

There are two main reasons why this research is being conducted. These are:

1. This research is being carried out to educate and inform all well-meaning Ghanaians and foreign businesses operating in the country about the significant factors influencing ERP systems implementation.
2. This research will also go a long way to contribute to the growing knowledge of body on ERP systems adoption and implementation. It will contribute, to the fact that a research of this nature has been done in a developing country like Ghana where ERP systems adoption and implementation has been a challenge.

1.6.1 Justification of the research study:

Since ERP systems are highly complex systems, they are very difficult and expensive project an organization can ever undertakes. It was reported that 75% of the ERP projects are classified as failures (Griffith, 1999). In Ghana, the success rate of implementing ERP systems is extremely lower than that in western companies. It is on this note that this research is being carried out to educate and inform the organizations and companies working here in Ghana about the real implementation problems or factors associated with ERP systems.

Statistics has also shown that 88% of ERP market is in the North American and European Countries while the rest (12%) of the market goes to the rest of the world (AMR, 2008). It is in this light that this research is also being carried out here in Ghana to at least sensitize the stakeholders about the issue of ERP systems adoption and implementation.

1.6.2 Implications of the research study:

1. To the practitioners, employees, managers, organizations, this research means a lot to them since it will go a long way to educate and inform them about the significant factors influencing ERP systems implementation in their respective organizations.
2. To the government, international community, development agencies etc, this research will help them to make and take decisions that will bring improvement and success in the lives of their citizenry.
3. To the research field, this research will also contribute to the body of knowledge since researches of this nature are highly welcomed especially from a developing country like Ghana.
4. The outcome of this study could establish or create a new theoretical framework which could serve as a guiding framework for implementing ERP systems in Ghana.

1.7 Limitations and Delimitations of the Study:

1.7.1 Limitations of the research study:

- Due to the time constraint for this research work which is to fulfill an academic work, a limited/small survey instrument items will be used to generalize the entire result of the study.
- The study uses a small sample size due to the low adoption rate of ERP systems in Ghana. The future research will look at this particular limitation and expand the sample size.
- The study again uses the cross-sectional survey as the only methodology to approach the research study. In future research both case study and survey approaches will be adopted for this research.

1.7.2 Delimitations of the research study:

- The research study will also not investigate into details the nature of ERP systems (products line) being used by the sample organizations.
- Although the study will be focusing on the significant factors influencing ERP implementation success in organizations in Ghana, it will not touch on certain factors that may also influence the successful ERP implementation, such as effective project management, project champion, suitability of software and hardware, ERP vendor support, etc.

1.8 Definitions of terms:

Competitive Advantage - A strategic advantage one business entity has over its rival entities within the same competitive industry, by

- offering more special products or services to its customers.
- Developed Country** - A country without much challenges in health, education, telecommunication economy, technical skills, etc.
- Developing Country** - A country with many challenges in health, education, telecommunication, economy, technical skills, etc.
- ERP System** - ERP system can be defined as a set of commercial or off-the-shelf packaged application software modules, within an integrated architecture that can be used by organizations as their primary engine for integrating data, processes, and information technology, in real-time across internal and external value chain.
- Implementation** -A realization of an application, or execution of a plan, idea, model or design.
- National factors** - These are factors relating to the country in general or the environment. They are factors that are under the control of the government, examples include IT infrastructure, economy and economic growth, government regulations, etc
- Organizational factors** - These are factors relating to an organization in general. They are factors that are under the control of the organization and sometimes refer to as internal factors. Examples include IT maturity, computer culture, management commitment, etc
- Significant factor** - An important or critical factor. A factor you cannot do away with or ignore

2. LITERATURE REVIEW

2.1 Introduction:

This chapter reviews the numerous academic and practitioner's literature published on Enterprise Resource Planning (ERP) systems relevant to this study. McGrath (1982) notes that it is important to respect the work of those who labored to create the foundation for your current work by keeping in mind that all research is flawed. An appreciation or respect given to the previous work relevant to this research served three major purposes. First, by appreciating the previous work done by other researchers in your field of study provides certain directions on how to conduct data collection activities. That is to say, various data collection instruments will be made available for you to select the one you think it fits your research study. Second, by appreciating the previous work done by others will help you to select a research design or methodology that fit your research study. Finally, this appreciation of previous work raised opportunities for articulating a critical analysis of the actual meaning of data collected when the data analysis stages of the research were reached. As discussed in chapter 1, the focal point of this study is to investigate the significant factors influencing ERP implementation in Ghana by looking at the organizational and national factors. The research broadly utilizes the current ERP literature in terms of its contribution to understanding the nature of ERP implementation project initiatives. This chapter begins by defining ERP, drivers of ERP, Evolution of ERP and Characteristics & Uses of ERP etc.

2.1.1 What is ERP?

Various definitions and interpretations have been given to Enterprise Resource Planning (ERP) system. According to Al-Mashari et al. (2003) ERP systems are not easy to define since numerous definitions have already been attributed to it. This assertion has also been supported by Boersma and Kingma (2005) who argue that there is no universally accepted

definition of ERP. Therefore, individuals and group definitions of ERP vary according to their own judgments. According to Deloitte (1998) report, an ERP system is a packaged business software system that allows a company to:

- Automate and integrate the majority of its business processes,
- Share common data and practices across the entire enterprise, and
- Produce and access information in a real-time environment.

Davenport (1998) defines an ERP system as “a commercial software package which promises the seamless integration of all the information flowing through a company – financial and accounting information, human resource information, supply chain information, customer information”. His definition emphasizes the integration, laid by ERP, between various organizational networks, in particular functional areas within organizations such as finance, marketing, sales, procurement, and human resource planning. In order to understand the full meaning of ERP, we first need to understand the problem they are designed to solve. According to Davenport (1998, p. 123) ERP systems are designed to solve “the fragmentation of information in large business organizations”. He made it clear that if a company’s information systems are fragmented, then its business is also fragmented. Therefore, if a company finds herself in this situation, the only best solution to deploy is an integrated software solution such as ERP. This assertion has also been supported by muscatello et al. (2003) who also argues that ERP systems are designed to address the problem of fragmentation of information or “islands of information” in business organization. Again the term ERP has been used differently in many IS literatures. Some refer to it as enterprise systems (ES) or enterprise-wide systems (EWS). In all of this the system still remains the same. In this research the term ERP will be used throughout to preserve consistency and prevent confusion to good readers of this research. The working definition of ERP system in this research study is based on two major characteristics associated with ERP systems identified in the above literature discussed. These two definitions were coined out of Jotieno (2010) thesis and they are as follow:

- ERP system can be defined as a set of commercial or off-the-shelf packaged application software modules, within an integrated architecture that can be used by organizations as their primary engine for integrating data, processes, and information technology, in real-time across internal and external value chain.
- ERP system can be defined as a generic semi-finished product with tables and parameters that clients or organizations and their implementation partners must configure, customize, and integrate with other computer-based information systems to meet their business needs.

2.1.2 ERP Drivers:

In the mid- and late- 1990s, Y2K compliance was a major concern for many companies as well as the wish to replace existing legacy systems. Management consultants and ERP vendors were there to give expert advice about operating in this new millennium. Therefore, consultancies and ERP vendors were the main driving force during the mid- and late-1990s. Other major reasons reported in the literature as drivers for ERP adoption relate to: improving firm’s performance and decision making, reducing labour costs, bureaucracy and errors. Other reasons include: pressure from the side of the competitors, business partner requirements for faster service, integration between functional units, and globalization of business. According to Esteves (2009) there are four key drivers to ERP adoption and implementation. These are:

1. Corporate growth;
2. Improved customer service;
3. Efficient distribution system; and
4. Reduced operational expenses.

He further explained that of these, corporate growth is the most compelling driver. O’Leary (2004) also grouped the ERP drivers into four categories: technology, business practices, strategy, and competitiveness. Holland et al. (1999) also recognized three main drivers namely technology, operational and strategic. Parr and Shanks (2000) summarize the motivation for ERP implementation into the following table.

TABLE 2.1 MOTIVATIONS FOR ERP IMPLEMENTATION

Technical	Operational	Strategic
Common platform/obsolescence of legacy systems	Process improvement	Y2K compliance
	Data visibility	Multi-site standardization
	Operating cost reductions	Customer responsiveness
		Decision-making improvement
		Need for efficiencies and integration
		Business restructuring

Source: Parr and Shanks (2000)

2.1.3 Evolution of ERP:

ERP have evolved from the need of the manufacturing systems in the 1960’s in Europe, for having stable control over the organizations inventory. In the 1960’s, IT or Legacy systems only offered support for inventory control and worked only in one section of the supply chain . The need to integrate the resource planning with the production schedule saw the evolution of Material Resource Planning (MRP) systems. The shortcomings of the MRP systems in being unable to optimize the production processes led to the development of MRP II systems which encompassed the entire manufacturing / production environment of the organization . The MRP II technology evolved over time with the creation of the just-in-time methodology which allowed organizations to automate some of the tasks. However, the inability of MRP II systems to cover the entire supply chain, led to the evolution of ERP systems. ERP systems cover the entire supply chain for the manufacturing industries, covering not only the manufacturing / production environment but also the suppliers and the customers of the organization. The key differentiating factor between MRP II systems and ERP systems is the ability of ERP systems to not only plan and schedule the organization’s resources but also those of its suppliers. Today’s Extended ERP (EERP) systems provide complete enterprise integration for the organization by integrating the ERP, Supply Chain Management (SCM) and Ebusiness functionalities of the organization. Figure 2.2 shows the evolution of ES systems from the early MRP systems in 1960s to EERP in the 2000s.



Fig. 2.1 Evolution of ERP (Source: Rashid et al., 2002).

2.1.4 ERP Characteristics and uses:

ERP systems have number of characteristics which qualify them as true integration software solution for business processes and functional units of an organization. These systems are purported to be flexible; encompass open system architecture and are modular in nature; provide a comprehensive coverage of all the business processes and functions of the organization; central common database; automatic generation of information and Provide a simulation of the real processes for strategic decision making. Traditionally, ERP systems were used mainly in manufacturing industries. ERP systems are now used in a wide variety of industries such as education, health, power generation, telecommunication, banking, government and many more.

ERP systems comprise of various modules, such as financial, sales and marketing, human resource, and operation and logistics. The modules which the ERP systems embody vary from system to system and organization to organization. Vevaina (2007) in his thesis gave typical modules of an enterprise resource planning system shown in the figure 2.2 below:

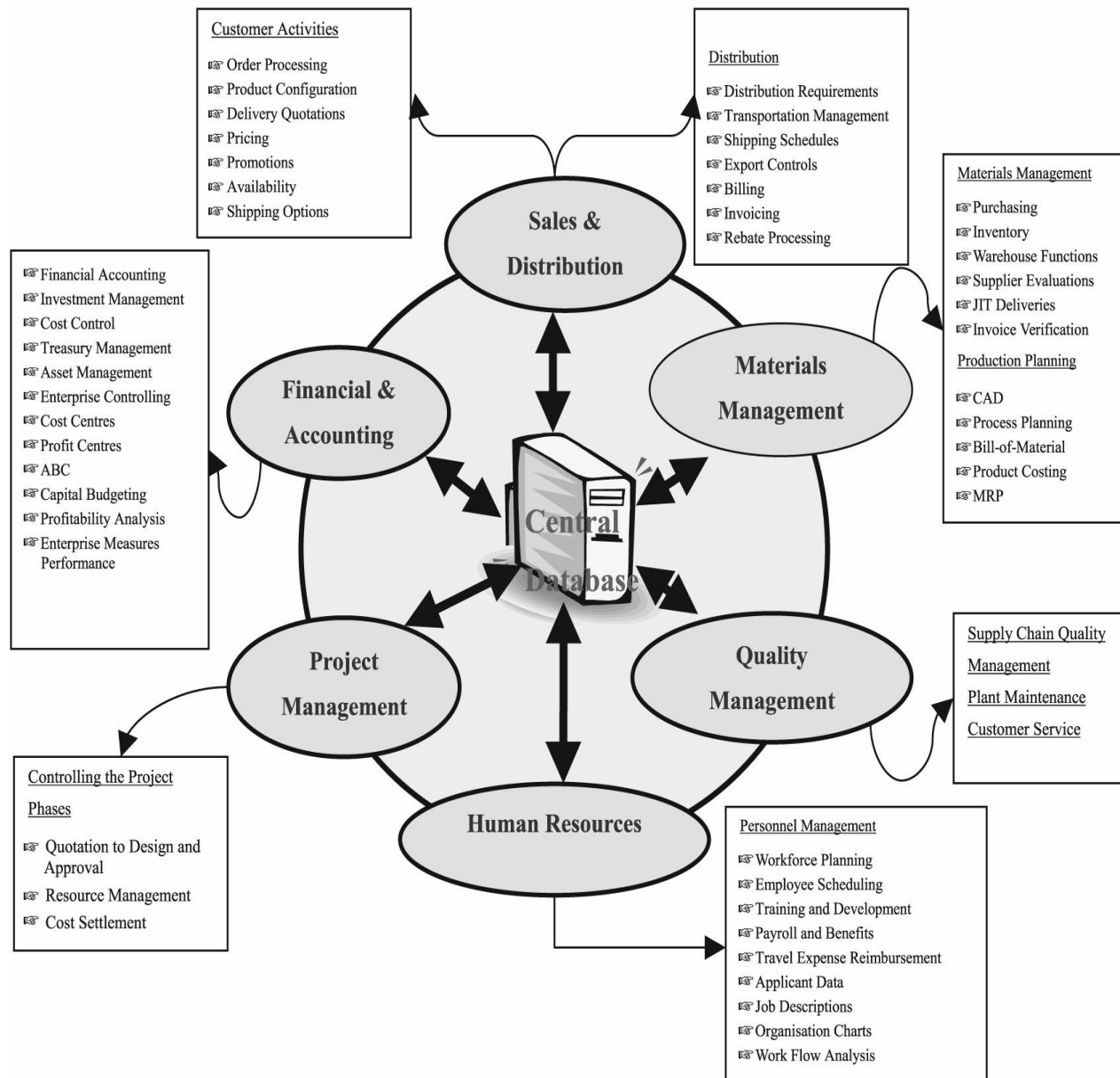


Fig 2.2 Typical ERP System Module (Source: Vevaina, P. (2007))

2.1.5 Business Process Re-engineering (BPR) - A Critical Factor for ERP Implementation:

ERP implementation often involves some degree of business process re-engineering (BPR) and some customization. According to Arif et al. (2005) if a company is not conducting a business in the manner assumed in the ERP software package they acquire, then the organization must re-engineer its business processes and practices to suit the best practices of the ERP software package. Most experts agree that customization of the ERP software results in higher implementation costs and longer implementation period (Davenport, 1998). Therefore, most organizations will prefer to re-engineer their business processes to suit the software more than customizing the software. In BPR the goal is to replace the existing business processes with ones that are much more efficient and effective for both the customer and the organization as a whole. As a result of this, BPR has been conceived as a technique for restructuring business operations to achieve improvements. However, BPR is not a new technique; it has widely been used by management consultancy companies in

the 1990s. The introduction of ERP systems in organizations according to Eardley et al. (2008) has made organizations to rethink and redesign their processes to fit in with the ERP system.

2.1.6 ERP adoption in developing countries:

ERP systems are increasingly being adopted by organizations in developing countries (Heeks and Hawari, 2010). This rate of adoption is still at its infancy stage in these countries. Many researchers have researched and found out some factors that affect ERP adoption in developing countries. For example, Koh et al. (2006) conducted an ERP adoption research and identified a more comprehensive list of factors affecting the adoption of ERP systems in developing countries. In their analysis six different case studies were conducted on six different companies in Greece. For an organization to have ERP implemented, the first step is ERP adoption. According to Ross and Vitale (2000) successful ERP adoption is affected by several drivers some of these drivers have been categorized into three groups: infrastructure, capacity and performance. Similarly, Parr and Shanks (2000) also grouped these drivers into three different categories including: technological, operational, and strategic. These drivers help organizations to improve productivity, reduce cost of production and enhance overall performance. These reductions in cost eventually lead to achieving competitive advantage. One major reason for every organization adopting and implementing ERP is to gain and sustain competitive advantage over its competitors (Adhikari, 2007) and (Heeks, 2007). Porter's model for the five 'competitive forces' on any organization in an industry, identifies information technology (IT) as the driving factor for competitive advantage. Heeks (2007) uses the porter's 'Competitive Advantage Theory' as a tool to analyze the IT sector in developing countries and explained how ERP systems can gear up the competitive advantages for organizations functioning in such countries. Adopting ERP in developing countries is faced by several obstacles that delay adoption compared with that in developed countries. Some of these challenges are: ERP implementation cost, Lack of knowledge about ERP, Maturity of the IT infrastructure and some organizational culture. ERP systems can never be considered as stand-alone systems where they could be implemented inside the enterprise boundaries without being linked externally to outside world. Therefore, the NATIONAL FACTORS of a country have a great impact on the ERP adoption. In the case of developing countries such as Ghana, ERP adoption is affected by the information and communication technology (ICT) infrastructure. For example, the SCM system that connects the organization with its suppliers might fail due to weak ICT infrastructure.

2.1.7 ERP implementation in developing countries:

Several researchers have done research on the critical success factors (CSFs) that need to exist in any organization for it to have successful ERP implementation. These factors have been tested in different organizations in many developed and developing countries by many researchers; (Jarrar et al., 2000), (Bradford and Florin, 2003), (Holland and Light, 1999), (Parr and Shanks, 2000), (Al-Mashari et al., 2003), (Akkerman and Holden, 2002), etc. These factors include: User involvement, effective communication, change management, project team, project management, consultants, BPR with minimum customization, top management support, project champion, and user training and education. According to Hong and Kim (2002) there are two alternative approaches to the implementation of ERP packaged software: packaged adaptation to organizational needs and organizational adaptation to the packaged. According to Doom and Milis (2008) these CSFs can be grouped into five core categories in order to test their importance for ERP implementation and include: (1.) Vision, Scope, and Goals (2.) Culture, Communication, and Support (3.) Infrastructure (4.) Approach and (5.) Project management. These factors and their sub-factors were considered as a core part of successful ERP implementation in an organization (Raymond et al., 2005). Also Khaled et al., (2008) in their research emphasis that top management's support and the selection of the appropriate ERP system are major success factors for the implementation of successful ERP systems. Koh et al., (2006) mentioned that there are two main driven factors for ERP implementation in organizations; increase demand for real-time information and the need for information for decision making. In Woo (2007) analysis of ERP implementation in Chinese enterprises, he made mentioned of a number of CSFs for implementing ERP systems. These CSFs are: Top management, Project team, Project management, Process change, Education and training and Communication. Many studies have investigated the impact of implementing ERP in developed countries, but only a few studies have evaluated the ERP success in large organizations in developing countries. Furthermore, these studies done are mainly focusing on the organizational factors and ignoring the impact of the national factors which is a major factor for implementing successful ERP in developing countries such as Ghana. A framework introduced by both Huang and Palvia (2001) and Koh et al., (2006) has been adopted in this study to examine the ERP success in developing country like Ghana. The framework categorizes into two major factors categories: Organizational and National. The organizational factors consist of five factors which are; IT Maturity, Computer culture, Business size, Management commitment, and

BPR experience. Again the national factors are; Infrastructure, Economy and economic growth, Manufacturing, Regional and Government. Literatures have made us known that national factors have a greater impact on organizational factors. This is because developing countries are facing many challenges in the ICT sector that negatively affect organizations when they implement ERP systems (Heeks, 2007). This framework has been tested and applied in many developing countries such as India, Egypt, and Brazil.

2.1.8 The Competitive advantage and the ERP implementation framework:

A firm is said to have a competitive advantage when it is implementing a value creating strategy which is not simultaneously being implemented by the current or potential competitors (Meta et al., 1995). Competitive advantage may also be described as the positional superiority based on some combination of differentiation, and/or cost superiority, or through operating in a protected niche (Porter, 1980). Competitive advantage may again be regarded as the ability of an organization to earn returns on investment persistently above the average for the industry. Considerable works have been done on the role of IS in creating competitive advantage. A survey of the evidence suggests that in a wide variety of circumstances IS has the potential to add value to organizations (McFarland, 1984, Parsons, 1983, Porter, 1985). For instance, Porter (1980) suggested that a firm that can discover a better technology for performing the value activity better than its competitors will gain a competitive advantage (CA). However, many other researchers suggest that due to constant innovation and development of IT, the rapid reduction in its costs and the easy availability of similar (or improved) technology to competitors, technology in itself cannot be deemed as a source of competitive advantage (Meta et al. 1995, Porter and Millar, 1985). This observation is particularly relevant for most firms in developing countries who face significant constraints to develop and compete based on proprietary systems. Earl (1992) argued that in order for an organization to obtain CA and sustain it, IS must be complimented by an organization's unique resources (including human, business, organizational as well as technological). Research has also made it clear that combining IT with critical resources tend to stand a better chance of gaining a sustainable competitive advantage than just investing heavily on IT. In particular, firms that create closer manager-computer interface develop a difficult-to-replicate ambiguity, which can eventually lead to competitive advantage (Scott and Vessey, 2002). However, research indicates that most firms in developing countries face significant resource constraints and make limited use of IT. Often, managers either ignore or idolize IT, making the creation of effective manager-computer interface difficult. This implies that, for firms in developing countries, the enablers of IT related CA might be rare and the constraints many. Huang and Palvia (2001) framework was adopted in this research study to examine the significant factors influencing the successful ERP implementation in large organizations working in Ghana. That is to say, in order to accurately assess the influence of diverse factors over the ERP implementation, a benchmark criteria or a set of pre-determined factors is required. The framework provides the set of factors needed for organizations to efficiently and effectively implement their ERP packaged software. It also provides tools to measure how effectively the implementation may achieve a competitive advantage for these organizations at large. Research has shown that the main motive that encourages organizations to adopt ERP systems is obtaining a competitive advantage over their competitors. That is to say, in highly competing business environment, organizations with different scales and in different business fields, all seek to have a leading role in the enterprise world or in the industry. The adoption and implementation of ERP systems provide them with the leading edge in their respective markets over their competitors (Adhikari, 2007).

2.1.9 ERP implementation challenges – Developing Countries:

The challenges discussed were derived from studies conducted in developed countries where ERP systems emanate. Previous studies state that transfer of information systems like ERP- typically developed in industrialised countries - to developing countries is often marred by problems of mismatch with local cultural, economic and regulatory requirements. Research has also shown that computer-based solutions which work in one organisation in a specific country will not be applicable to another organisation or country if a different rationale prevails. An evaluation of the applicability of any information system should therefore consider the cultural characteristics and social values of the environment (Galliers et al., 1998), which can reveal the level of risk expected when a system created in the West is implemented in a developing country.

Bingi et al. (2002) also identified several issues that developing countries have to face that are not quite important or common in developed countries: human resources, technical concerns, and socio-political challenges. Regarding human resources, technology users in developing countries are limited in their opportunities for career development. Regarding technical issues, there are concerns about quality, security, and availability of data. Socio-politically, there are challenges that arise from illiteracy, language barrier, political instability etc.

As a result, Heeks & Kenny (2002) suggest that there is a strong need to understand the contextual setting of developing countries being studied in order to effectively apply information technologies developed in the west (Europe and North America) to these countries. In the same light, the following are the likely challenges to be faced by organizations implementing ERP in developing countries.

- Incompatibility with work practices
- ICT infrastructure and ICT policy

2.1.10 Critical Success Factors (CSFs):

ERP systems have been touted by ERP vendors as tools to enhance control over the company's operations, empower employees and streamline business processes, yet the expected benefits have not been achieved by many organizations. This has prompted research on critical success factors associated with the implementation of an ERP package (Markus et al., 2000). Bullen and Rockart (1981) define critical success factors (CSFs) in IS as "the few key areas of activity in which favorable results are absolutely necessary for a particular manager to research his goals".

Willcocks and Sykes (2000) have identified nine core capabilities necessary for a successful ERP implementation, those being: IT leadership, business systems thinking, relationship building, architecture planning, technology fixing, informed buying, contract facilitation, contract monitoring, and supplier development.

Similarly, Sarker and Lee (2003) have examined from a social perspective three key enablers for a successful ERP implementation, those being (a) strong and committed leadership, (b) open and honest communication and (c) balanced and empowered implementation team. Their results indicate that although strong and committed leadership is a necessary condition of a successful ERP implementation, the same does not necessarily hold for an open and honest communication and a balanced and empowered implementation team.

In a similar vein, Nah et al. (2001) have identified eleven critical success factors associated with the implementation of ERP systems, those referring to are: ERP teamwork and composition, change management program and culture, top management support, business plan and vision, business process reengineering with minimum customization, project management, monitoring and evaluation of performance, effective communication, software development, testing and troubleshooting, use of a project champion, and appropriate business and IT legacy systems. Again according to Huang and Palvia (2001), the implementation of ERP is affected by two broad categories of factors: national/environmental and organizational/internal, each of which comprises five variables.

2.1.11 Critical Failure Factors (CFFs):

In implementing ERP systems, it is imperative to consider the critical failure factors (CFFs). A successful implementation process must note the CFFs and devise strategies to avoid them. Pairat and Jungthirapanich (2005) in their review of literature concerning ERP implementation have identified CFFs as lack of change management, inadequate training, poor reporting procedures, inadequate Business Process Reengineering (BPR), lack of staff for managing operation of the system, inadequate support, poor software, lack of software functionality, underperforming project team, lack of monitoring and performance evaluation, unprepared IT functions, lack of understanding of the system by the business and inadequate system testing. These findings have been ably supported by Al-Mashari and Al-Mudimigh (2003), who in their study have identified CFF as lack of ownership of the ERP implementation project, absence of knowledge transfer from the consultant to the business, absence or lack of change management, lack of communication within the business, lack or absence of performance measurement and lack of alignment between it strategy and business strategy.

2.2 Theoretical Framework:

A theoretical framework actually provides a process or factor model which guides the investigative process of collecting data to answer the research questions. This research has adopted a framework of Huang and Palvia (2001) to investigate the research questions. The framework which covers two broad categories of factors: national/environmental and organizational/internal, each of which comprises five variables.

2.2.1 National/Environmental Factors:

In developing countries such as Ghana, there are number of ERP implementation challenges. One group of these challenges is the national/environmental factors. This group factors are: (a) Economy and economic growth, (b) Infrastructure, (c) Manufacturing strengths, (d) Regional environment, and (e) Government regulations.

Infrastructure: This factor reflects the ICT readiness of the country in terms of hardware, database, software, networking tools, and IS/IT needed facilities which serve as prerequisite for ERP implementation. It serves as an important factor for every organization in a country who wants to implement ERP system.

Economy and economic growth: Economic status of a nation is an important indicator for ERP vendors and implementers to watch when implementing ERP systems. Sound economic background provides a solid foundation for IT/IS development as well as ERP implementation.

Manufacturing strengths: Industries play an important role in the implementation of ERP systems. Since ERP systems were made solely for the manufacturing sectors and that more businesses are now implementing ERP systems, it is important that vendors and consultants of ERP systems must be vigilant enough at the strengths of every industry.

Regional environment: This represents the country's place of business for the organization. It also takes into consideration the basic environmental and cultural impact on the ERP implementation. The culture could tend to utilizing humans rather than integrating systems, or the region where the country is located imposes a certain acceptance or rejection to ERP implementation.

Government regulations: This factor refers to whether the government of the country, where the organization is holding its business in, is committed to facilitating obstacles and barriers on the implementation of ERP systems. Strong government regulations can foster well IT/IS and ERP implementation diffusion among businesses in the country.

In the light of the identified national/environmental factors, it is therefore necessary to verify the association between these factors and the implementation of ERP systems by testing the following five main hypotheses:

H1: The IT/IS infrastructure of a country or a nation affects the implementation of ERP systems.

H2: The economy and economic growth of a country affects the implementation of ERP systems

H3: The manufacturing strength of a nation or a country affects the implementation of ERP systems.

H4: The regional environment of a country affects the implementation of ERP systems.

H5: The government regulation of a country affects the implementation of ERP systems.

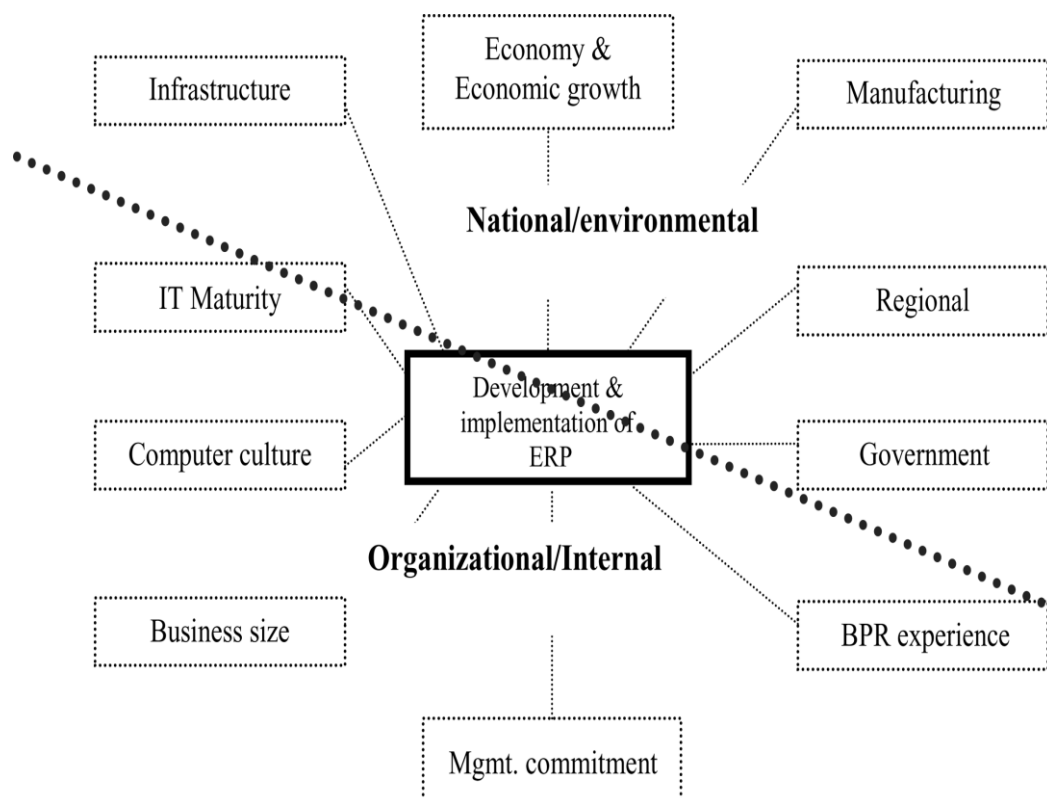


Fig2.3 A framework for investigating ERP implementation (based on Huang and Palvia, 2001)

2.2.2 Organizational/Internal Factors:

There were again a number of ERP implementation challenges which had been considered in Huang and Palvia (2001) literature review. One group had already been discussed above. The other group is organizational/internal factors. This group factors are: (a) IT Maturity, (b) Computer Culture, (c) Business Size, (d) Management Commitment, and (e) BPR Experience.

IT Maturity: Organizations who are mature in IT/IS acquisition and deployment stand a better chance of implementing ERP successfully. Maturity in IT/IS help businesses and organizations to sustain their competitive advantage through an effective implementation of ERP systems.

Computer Culture: In general, this factor looks at the company's history of computing, employees' attitudes towards computers, and organizational dependence on computers. The adoption and implementation of ERP system is affected by the organization's capabilities on computing, data management, application functionalities, and all related software integrated users.

Business Size: This factor reflects the capabilities of an organization to invest and use IS/IT systems. It is indicated that the size of an organization whether small or medium or large, affect the amount of investment in ERP systems. ERP systems are dominated by large scale companies, but recently the trend has changed to small and medium size enterprises. ERP vendor are now beginning to perceive benefits from ERP implementation in these small and medium size enterprises similar to those in large enterprises.

Management Commitment: This factor is considered as a major player in the ERP implementation in both developed and developing countries. Given the complexity and resource requirements for ERP implementation, management commitment is a necessary factor which must not be compromised upon.

BPR Experience: Business Process Re-engineering is part of the deployment of ERP systems. BPR is done in order to streamline the business and to facilitate the ERP implementation process. Therefore, a company having a richer experience in process management and BPR is more likely to success with ERP implementation.

Again in the light of the identified organizational/internal factors, it is therefore necessary to verify the association between these factors and the implementation of ERP systems by testing the following five main hypotheses:

H6: The IT Maturity of an organization affects the implementation of ERP systems.

H7: The Computer Culture of an organization affects the implementation of ERP systems.

H8: The Business Size of an organization affects the implementation of ERP systems.

H9: The Management Commitment of an organization affects the implementation of ERP systems

H10: The BPR Experience of an organization affects the implementation of ERP systems

2.3 Methodological and Other Issues:

This section of the study discusses the methodological issues arising from the gaps relating to sampling, instrumentation, data collection procedures and data analysis.

2.3.1 Research methods and sampling techniques used for studying ERP implementation:

Of all the literature reviewed, the majority of the papers used either a case study approach, survey approach, or a literature review approach. Survey methodology has been reported extensively in the literature reviewed on ERP implementation. The reason for the extensive usage of surveys in information systems and information technology research is on account of surveys being easy to manage, help in quantification of results; results can be easily generalized and are reusable. Again during the literature review, some few papers also reviewed existing literature on ERP implementation to draw conclusions about factors affecting ERP implementation. Apart from the three most prominent methods outlined above, some other methods used in studying ERP implementation also include generating frameworks/models for improving the implementation approach, using an ethnography for finding the effects of strategy conflicts on ERP implementation in organizations, using a mixed approach of case study along with grounded theory methodology for discovering the effects an ERP has on an organization and using approach of case study and action research to study a certain phenomenon in a single organization.

Of all the literature reviewed, the majority of them used either random sampling, or stratified sampling, or a purposive sampling. Random sampling has been widely used across information systems research. The reason for the extensive usage of random sampling technique in IS research is that in random sampling equal chance is given to each member of the population and it eliminates unbiased in the selection of the samples.

2.3.2 Data collection methods used in studying ERP implementation:

There are many data collection methods used to study information systems research. From the literature review done on all the papers reviewed, the most extensive used data collection methods were questionnaires and interviews. These data collection instruments were used extensively because for instance, in questionnaire respondents were allowed freely to express their views on the subject matter under discussion without any compulsion whatsoever. Again it also introduced anonymity in the data collection processes. In the case of the interview, the researcher was able to enquire directly from the respondents and get a response. Apart from these two major data collection instrument reviewed, we also had equivalent data collection methods. Among them were observations and some secondary sources of data collection such as publications, records, research reports, and service records.

2.3.3 Data Analysis Tools used in studying ERP implementation:

Data collected from questionnaires and other instruments in quantitative research methods have to be analyzed and interpreted. From the literature reviewed on quantitative research, various statistical approaches were used to analyze the data collected. Some of the statistical instruments used were descriptive statistics (Arithmetic mean and standard deviation), one sample K-S Test, Non-parametric Tests (Friedman Test, Kendall's W Test), t-Test, Correlation coefficients Test, Reliability Test (Cronbach's Alpha), Validity Test and etc. From the literature review perspective on quantitative researches, arithmetic mean and standard deviation were the common statistical instruments used in analyzing and interpreting most data collections. Again, other statistical instruments such as t-Test, Correlation Coefficients, Non-parametric Tests, had also been extensively used in studying ERP systems implementations.

2.4 Definitions of terms:

Business Process Re-engineering (BPR) - Is the process of changing or replacing the existing business processes with one that are much more efficient and effective for both the customer and the organization as a whole.

Critical Failure Factors (CFFs) – Factors which are necessary or mandatory to cause ERP implementation failure.

Critical Success Factors (CFFs) – Factors which are necessary or mandatory to cause implementation success to ERP systems.

ERP Adoption – This is about accepting to use the ERP system. ERP systems must first be accepted or decided upon before implementing it in your organization.

ERP Drivers – These are factors that bring about adoption and implementation of ERP systems in an organization. They are more like the reasons why ERP systems must be adopted and implemented.

ERP Evolution – This talks about the history and origination of ERP systems.

ERP Implementation – This is all about rolling out the ERP system in your organization. ERP implementation involves some critical stages in order to rollout the software.

Fragmentation – Breaking a whole into pieces or creating division in a whole.

Material Resource Planning (MRP) – This is one of the earliest systems used in production planning and inventory control in managing manufacturing processes.

Manufacturing Resource Planning II (MRP II) – This system was produced to improve the shortcomings of the MRP. It was made to encompass the entire manufacturing/production environment of the organization.

3. RESEARCH METHODOLOGY

3.1 Introduction:

This chapter discussed the research methodology that has been chosen for this project. Potential research methods are then described and evaluated for usefulness regarding the research project and its nature. Following this, all the data collection techniques used within this research were discussed. The dominant research methodology used was cross-sectional survey method. This chapter gives the detailed and sufficient information in order to make estimates of reliability and validity of

the survey instruments (questionnaires) used. It explains and justifies the choice of methodology and approaches that were adopted in order to answer the research questions. The purpose of this chapter was to provide information regarding the research contexts, and research strategies with briefly discussion of the statistical techniques that were used.

3.1.1 Research Approach:

In light of the research study's objectives, the quantitative research paradigm was considered the most suitable approach for the study. Statistical techniques like descriptive statistics, reliability test, validity test, exploratory factor analysis and non-parametric tests were used for analysis. The approach for the research was quantitative survey. Quantitative research is the systematic scientific investigation of quantitative properties or phenomena and their relationships. There are number of methods such as surveys, simulation and experiments that are considered to belong to the quantitative tradition. The advantage of a quantitative approach is that it is possible to measure the reactions of a great many people to a limited set of questions, thus facilitating comparison and statistical aggregation of the data (Kothari, 1991).

3.1.2 Research Strategy:

Research strategy is a general plan of how to answer the research questions. The research strategies in this study were carried out in a two phase fashion. After reviewing the relevant literature on study's themes to familiarize with the necessary concepts, a preliminary survey was conducted to examine practitioners' views for research themes. This was followed by pilot survey with some Ghanaian ERP consultants/practitioners to increase understanding of the study's themes. Finally, the main survey was conducted, which was hoped would add to the body of knowledge in area of ERP study in future research. This research thesis adopts "Exploratory Type" of research. The research methodology used for the thesis was kept very simple. Primary data was collected by questionnaires sent to various respondents and secondary data was collected from the internet, newspapers, magazines and journals. Exploratory studies are practical if wish to clarify understanding of a problem. It is a method of finding out "what is happening" to seek new insight, to ask questions and to asses' new phenomena in new light (Kothari, 1991).

3.1.3 Relevant research methods/approaches:

Research methods can be classified in various ways; however there is a major distinction between qualitative and quantitative research. Myers & Avison (2002) state that quantitative research methods were originally developed in the natural sciences to study natural phenomena. Example of quantitative research methods now well accepted in the social sciences include survey methods, laboratory experiments, formal methods (e.g. econometrics) and numerical methods such as mathematical modeling.

Qualitative research methods on the other hand were developed in the social sciences to enable researchers to study social and cultural phenomena. Examples of qualitative research are action research, grounded theory, ethnography, content analysis and case study research.

Action research aims to contribute both to the practical concerns of people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable framework (Rapport, 1970 as cited in (Myers, 1997)). Ethnographic research comes from the discipline of social and cultural anthropology where an ethnographer is required to spend a significant amount of time in the field. Ethnographers immerse themselves in the lives of people they study and seek to place phenomena studied in their social and cultural context. Grounded theory is a research method that seeks to develop theory that is grounded in data systematically gathered and analysed. Case study research is the most common qualitative method used in information systems (Myers, 1997). According to Myers & Avison (2002), qualitative research methods are aligned to the interpretive paradigm whereas quantitative research methods are aligned to the positivist Paradigm.

3.2 Sampling:

Sampling is a process by which a small part of a population is used to make judgments about the entire population which is under study. Sampling involves selecting a number of units from a defined population. The thing which sampled can be anything for example, a person, a clinical episode, or a health facility etc (Kothari, 1991).

3.2.1 Population/Universe of the study:

Universe or population is the whole mass under study. The population of study was Ghanaian organizations who have implemented ERP systems over a period of one year or more.

3.2.2 Sample Selection:

The study's population sample was organizations which had implemented ERP system and the implemented ERP system had been operational for at least one year. In each organization, the respondents were drawn across different organizational hierarchies and departments. There is no documentation of how many organizations have implemented ERP systems in Ghana. However, a list of companies which had implemented ERP systems was obtained from a group of ERP consultants or practitioners. Given the reputation of this group of ERP consultants/practitioners, 25 sampled organizations are likely to be representative of organizations which have implemented ERP systems in Ghana. The respondents to be targeted will include top managers, project managers, ERP consultants and system end users as they were identified as the most appropriate informants for this study.

3.2.3 Sampling Techniques:

Sometimes it is very difficult to get the kind of information about populations required for probability sampling that may complicate and limit statistical analyses, in that case non-probability sampling is often well-suited. Convenience sampling (a type of non-probability sampling) relies on available respondents that are most convenient method. It studies the units available at the time of data collection (Kothari, 1991). It won't be reliable to collect the data from the limited sectors therefore for the data collection the respondents were selected from different organizations and from different ERP vendors. In order to make the findings more reliable, validate and diversified information gathered by the respondents through questionnaires based on Likert five point scales so that conscious comparison and analysis can be done. This ensured a fair representation of each group since their operations are significantly different.

3.3 Data collection:

In order to collect the data in any research project, such as in this thesis, primary and secondary are the two types in which data were classified. To start with, secondary data were the data that was collected through another source or an existing material, that is; previous knowledge, such as; literature, research articles, magazines, newspapers and internet, while primary data is regarded as own data collected through interview, observation and questionnaire or by any other personal means for a purpose (Kothari, 1991). In order to collect the data, this thesis focused vividly on both secondary and primary data. Secondary data include both quantitative and qualitative data as they were used principally in both pilot and final research. In using secondary data, this thesis aims at focusing more on the written materials for the documentary. Primary data were collected with the help of exploratory quantitative survey based method.

3.3.1 Data Collection Methods/Procedures:

This thesis was based on two sources of data. The first source (secondary data) was an academic literature review, the articles drawn from the web and respected practitioners, magazines, reports, ERP cases and for the second source of data (primary data) three close ended questionnaires with few open ended questions based survey was conducted through email and hand delivery with the help of various ERP respondents. The Primary data for this thesis was collected using close ended questionnaires from individual organizations who have implemented ERP for one or more years. It was a structured questionnaire which comprised of sequenced questions. A collective administration based questionnaire was used to collect the primary data from each organization. This questionnaire was sent to the various ERP organizations in Ghana to get the opinion and to test the exploratory statements (hypotheses).

Secondary data: The Secondary data was collected using a) Internet: The Sites of all ERP providing software's were visited b) Journals: research papers from various journals were used to collect data. c) News Papers: daily business news papers were also used as a source for secondary data collection. d) Magazines, On-line database research / Internet or email, Face-to-face, Telephone etc were also used. Data were collected using questionnaires based survey administered in Ghana. The respondents received initial email message explaining the purpose of the project and inquiring whether the individual would be willing to participate in the study. A contact person was identified at each organization; this person was asked to distribute the self-administered questionnaires to all ERP respondents in their respective organizations.

3.3.2 Data Collection Instruments:

Invitations were sent to respondents for participating in the survey through a request supported by a cover letter. Respondents were from organizations who have implemented ERP systems for one or more years. The respondents were also supposed to have associated with the ERP implementation in their respective organizations for quiet sometime.

Questionnaire based survey method was used; it was followed by the previous study to examine the significant factors influencing ERP implementation in organizations that have been found through literature review. Questionnaires were used as the research instruments. The questionnaires were focused on the identification and ranking of these significant factors for ERP implementation in Ghanaian organizations. It identifies the respondents' perception of these significant factors in relation to competitive advantage. The questionnaires were again focused on various ERP products and their modules used by our sampled organizations. This survey used administrative questionnaire approach to examine the relationship between the hypothesized factors and the ERP implementation systems.

Three close ended questionnaires were used. The first questionnaire collects data about ERP products and their respective modules. It also collects data about ERP systems percentages used in Ghanaian industries and the general information about the respondents. Second questionnaire collect data regarding the identification of significant factors necessary for ERP implementation in Ghana. Third questionnaire collect data regarding the ranking of these significant factors necessary for ERP implementation in Ghana. All the adopted items were modified for the context of this study and, if necessary, paraphrased to suit a five-point Likert-type scale where 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree. All questions were closed-ended questions with only few being open-ended questions. Closed-ended questions are quick to answer, easy to code and there are no differences between articulate and inarticulate respondents (Kothari, 1991). There are two types of scales of measurement used in this survey, namely nominal scale and ordinal scale. The questionnaire was pilot tested with ten ERP consultants in Ghana for content validity and instrument reliability. Based upon the modification the final questionnaires were sent to all respondents. Data were secured by mail questionnaires. In nominal scales, numbers may be substituted for the names of the various classes of variable. The numbers serve only to identify the classes and do not indicate anything about the classes other than their difference. This coding allows identification of variables during statistical analysis. In some cases, observations may be ordered in such a way that one observation represents more of a given variable than any other observation (Kothari, 1991). For example, in third questionnaire ten factors were ranked on one to ten point scale have the degree of importance of the factors for the ERP consultants and respondents. They were scaled from most important (1) to least important (10). Most important were identified by assigning 1 and least important were identified by assigning 10, then this observation would be described as constituting an ordinal scale, a scale that was used in this survey has a special name which is the Likert scale. A Likert scale is a type of ordinal scale. The numbers used in identifying the observations were called ranks. Ranks tell about the degree of the variable within the set of observations at hand these numbers discussed in more detail in the code book where the numbers of codes that were used in this survey were explained. The questionnaires used in this study attempted to measure the theoretical model or framework illustrated and discussed in chapter two. The instrument development methodologies were adopted to generate the pool of items for each construct. Items were drawn from the literature review and based on the interviews with experts.

3.3.3 Survey Methods:

The survey instruments were designed based on the theoretical ERP model for this research. Each variable had one question for reliability purposes. Most of the questions in the survey were primarily adapted from the relevant previous research related to ERP implementation of the developing countries. All items were measured on a five point Likert scale from strongly disagree to strongly agree. Detail items in the survey were also described in the Appendix section of this research. The survey method is one of the most common methods in used.

A survey is a means of gathering information about the characteristics, actions or opinions of a large group of people, referred to as population. Survey research is usually a quantitative method require standardized information from subjects being studied and is structured in the sense that sampling and questionnaire construction are conducted prior to start of data collection. It is necessary to think through the whole research process before deciding on sample and questionnaire. Survey research can be used for exploration, description, or explanation purposes (Kothari, 1991). The main survey was administered through email and hand delivery technique. This technique provides several necessary functions such as tracking responses, managing the list of respondents, knowing your respondents personally etc. The survey was administered through email and some hand delivery technique to the individual respondents so that they could take the survey at their convenient time. Thank you telephone calls and email messages were later sent to each participant after completing the survey successfully. The purpose of survey research is to find out what situations, events, attitudes or opinions are occurring in a population (Kothari, 1991). The first step in the survey was identifying the population. Organization or company selection was based on the fact that these large-size companies are implementing and relying on

ERP systems as their backbone infrastructure for their functionalities. Then the sample was drawn from the identified population. The sampling covered ERP organizations who have implemented ERP for one or more years. Thus, it was enough sample size to get the correct results from the research. Because the survey was sent only to companies which implement ERP systems, the expected results were reliable. In other words the sample chosen from a reliable target population so that findings about the sample can be applied (generalized) to the population.

3.3.4 Survey Items:

To conduct a broad exploratory study of ERP implementation in Ghana through a quantitative survey based on Likert five point scale questionnaires, the following items were included in the customized survey instruments (questionnaires):

- Respondent Name
- Organization Name
- ERP Products
- Respondent's Experience
- Minimum Number of ERP implementation in Ghana
- Information Systems used in various organizations
- Competitive Advantages
- Significant factors for implementing ERP systems in Ghana

3.3.5 Data Analysis Tools:

The data analysis tool that will be used to carry out the research analysis would be SPSS version 20 software. Both descriptive and inferential statistical analyses will be used in data analyses. The inferential statistical analysis will be carried out using both parametric techniques such as independent t-test; and non-parametric such as one-sample Kolmogorov-smimov test, factor analysis and chi-square test to determine the significance of the formulated hypotheses using p values. The one-sample Kolmogorov-smimov test can be used to test that a variable is normally distributed or not (Kothari, 1991).

3.3.6 Data Analysis Framework:

Table 3.1 Framework of Data Analysis

QUESTIONS	TECHNIQUE OF ANALYSIS	SOURCE OF DATA	TYPES OF DATA
Questionnaire (Part A) General information about significant factors needed for the implementation of ERP systems in Ghana.	Descriptive Statistics (Arithmetic mean and standard deviation) One-sample K-S Test Non-parametric Test (Friedman Test, Kendall's W Test)	Primary source of data	Nominal and Ordinal data
Questionnaire (Part B) Identification of significant factors for the implementation of ERP systems in Ghana.	Descriptive Statistics (Arithmetic mean and standard deviation) Reliability Test (Cronbach's Alpha) Validity Test Exploratory Factor Analysis	Primary source of data	Nominal and Ordinal data
Questionnaire (Part C) Ranking of the significant factors on 1 to 10 points scale, needed for the implementation of ERP systems in Ghana.	Descriptive Statistics (Arithmetic mean and standard deviation) Reliability Test (Cronbach's Alpha) Validity Test Exploratory Factor Analysis	Primary source of data	Nominal and Ordinal data

Source: Author

3.4 Pilot survey:

Prior to sending the questionnaire to target sample, it was pre-tested. The pre-test revealed that the respondent had no difficulty in understanding the content of the questionnaires. The main round of data collection took place between September and October 2012. A one-phase pilot test of the survey instrument has been conducted, with ten (10) academics and ERP practitioners / professionals. The feedback has been incorporated into the survey instrument and where necessary modifications have been made to suit the context of the present study. The researcher requested that the pilot subjects identify and suggest improvements for any omission, error, or inconsistency in the survey. The pilot test resulted in several small revisions to the primary instrument that included rewording of a few items and alterations to the instructions to make them easier to understand. No scaled item was dropped or added as a result of the pilot study. The purpose of the pilot test was to confirm the completeness and importance of each item in the instrument and eliminate logically duplicative ones.

3.4.1 Validity:

Content validity was used to measure the validity of the survey instruments. Content validity refers to the representativeness and comprehensiveness of the items used to create an instrument. Evaluating content validity involves judging each item for its presumed relevance (Kothari, 1991). In this study, the significant factors of the ERP implementation was initially proposed based on the journal written by Huang and Palvia (2001). To ensure instrument completeness, items selected were taken from several sources, for example major prior studies, examination of ERP system characteristics and from expert opinions etc were gathered by the researcher. Ten Ghanaian ERP Consultants or academicians were asked to examine the importance and relevance of each item in the instrument for the pilot study of the instruments. This rigorous approach tends to lend credence to the claim of content validity. The content validity of a questionnaire refers to the representativeness of item content domain (Kothari, 1991). It is the manner by which the questionnaire and its items are built to ensure the reasonableness of the claim of content validity. The conceptualization of survey instrument constructs were based on preliminary literature review to form the initial items, the personal interviews with practitioners and experts used for scale purification suggest that the survey instrument has strong content validity.

Construct validity was established by showing that the instrument measures the construct it was intended to measure. Construct validity was evaluated by performing correlation and factor analysis. High correlations considered to indicate construct validity. The core meaning of validity was explained entirely by accuracy. From this perspective, researcher's data were valid to the extent that the results of the measurement process were accurate. In other words, a measuring instrument was valid to research when it measures what it was supposed to measure. A survey was used for the research topic and for the hypothesis testing. It explained that the questions in the survey were related to the research topic. Surveys are one of the best tools to observe for the relationships between variables. A key part of the survey is the analysis which obtains accurate results for the research. Reliability is one of the basic elements of establishing validity. Reliability is the degree of random variation in the results of the study. An important cause of overall unreliability is a too-small sample size (Kothari, 1991). In this study; the sample size was significant enough to be representative. Reliability is roughly the same as consistency and repeatability. Internal validity in research relates to making proper inferences from the data, considering alternative explanations, use of convergent data and related tactics. This tactic occurred during the data analysis phase, and was done by looking at each specific area across all items and by weighing the views to insure there was consistency. External validity was addressed by multiple respondents to cover all possible responses. Replication of observations across multiple responses means external validity has been met and that results can likely be generalized outside of the studied respondents.

3.4.2 Reliability:

Reliability is one of the most critical elements in assessing the quality of the construct measures and it is a necessary condition for scale validity. A statistically reliable scale provides consistent and stable measures of a construct. Composite reliability estimates are used to assess the inter-item reliability of the measures. Estimates greater than 0.70 are generally considered to meet the criteria for reliability. Some items may be removed from the construct scales if their removal results in increases in the reliability estimate, however, care must be taken to ensure that the content validity of the measures is not threatened by the removal of a key conceptual element (Kothari, 1991). Testing reliability performance of the survey was done by measurement in SPSS V 20. There are several ways to do this, the most common of which is Cronbach's alpha. Cronbach's alpha is a measure of reliability. More specifically, alpha is a lower bound for the true reliability of the survey. Mathematically, reliability is defined as the proportion of the variability in the responses to the survey that is the result of differences in the respondents. That is, answers to a reliable survey will differ because

respondents have different opinions, not because the survey is confusing or has multiple interpretations. The computation of Cronbach's alpha is based on the number of items on the survey and the ratio of the average inter-item covariance to the average item variance.

4. DATA ANALYSIS AND RESULTS

Introduction:

This chapter analysis and present findings from the research work which was carried out in chapter three. The findings in this chapter focus on the significant factors necessary to implement ERP systems in Ghana and whether these significant factors are helping to achieve competitive advantage among businesses or organizations in Ghana. A total of 112 out of 150 (74.66%) questionnaires distributed to individual companies who have implemented ERP were received. Also a total of 38 out of 150 representing 25.33% questionnaires were not able to retrieve due to some challenges.

4.1 Descriptive Statistics:

Table 4.1 and table 4.2 present the coding keys which were used to analyze and present the findings of this research work. Various statistical analyses such as mean, standard deviation, pie chart, and bar chart were used to analyze the various questionnaires.

Table 4.1: Questionnaire Part A Coding Table

Questionnaires Part A	Variable Type	Codes
Question 7	Categorical (Nominal and Ordinal)	1= SAP ERP 2=ORACLE ERP 3=SAGE ERP 4=BAAN 5= TALLY 9 ERP
Question 8	Categorical (Nominal and Ordinal)	1= SAP ERP 2=ORACLE ERP 3=SAGE ERP 4=BAAN 5= TALLY 9 ERP
Question 9	Categorical (Nominal and Ordinal)	1= FINANCIAL 2=SALES AND MARKETING 3=HUMAN RESOURCE 4=OPERATION AND LOGISTICS
Question 10	Categorical (Nominal and Ordinal)	1= MANUFACTURING 2=BANKING 3=SERVICE 4=GOVERNMENT 5= TRADING
Question 13	Categorical (Nominal and Ordinal)	1= SALES AND MARKETING 2=ACCOUNTING & FINANCE 3=MANUFACTURING & PRODUCTION 4=HUMAN RESOURCE
Question 14	Categorical (Nominal and Ordinal)	1= CRM 2=SCM 3= ERP 4=KMS
Question 15	Categorical (Nominal and Ordinal)	1= LOW COST 2=PRODUCT DIFFERENTIATION 3= CUSTOMER-SUPPLIER INTIMACY 4= MARKET NICHE
Q1, Q2, Q3, Q4 were excluded from this data analysis stage because they were personal information concerning our respondents and they had no relation whatsoever with the research work being studied.		
Q5 & Q6 were not coded but will be analyzed with the SPSS V20 software.		
Q11 & Q12 were also not coded but will be analyzed manually during our analysis discussions.		

(Source: Author)

Table 4.2: Questionnaires Part B & C Coding Table

Questionnaires	Variable Types	Codes
Questionnaires Part B	Categorical (Nominal and Ordinal)	1= STRONGLY DISAGREE 2=DISAGREE 3=NEUTRAL 4=AGREE 5= STRONGLY AGREE
Questionnaires Part C	Categorical (Nominal and Ordinal)	Ranking of 10 CSFs on 10 to 1 point scale. 10=MOST SIGNIFICANT FACTOR 1=LEAST SIGNIFICANT FACTOR

(Source: Author)

4.1.1 Descriptive Statistics of Response from Questionnaire Part A:

The analysis of the data collected from the survey shows that 52.7% of organizations have different functional areas in Sales&Marketing, Accounting&Finance, Manufacturing&Production, and Human Resource. 21.4% have Sales&Marketing, Accounting&Finance, and Human Resource. The rest of the organizations also have different combinations of functional areas as appear in table 4.3.

Table 4.3: Functional areas in organizations

Functional areas or business departments	Percentage
Accounting & Finance	0.9
Sales&Marketing, Accounting&Finance	5.4
Sales&Marketing, Manufacturing&Production	0.9
Sales&Marketing, Human Resource	0.9
Accounting&Finance, Manufacturing&Production	2.7
Accounting&Finance, Human Resource	1.8
Manufacturing&Production, Human Resource	1.8
Sales&Marketing, Accounting&Finance, Manufacturing&Production	6.3
Sales&Marketing, Accounting&Finance, Human Resource	21.4
Accounting&Finance, Manufacturing&Production, Human Resource	5.4
Sales&Marketing, Accounting&Finance, Manufacturing&Production, Human Resource	52.7

(Source: Author, SPSS V 20)

Regarding which information systems (IS) organizations are using, analysis of the data collected from the survey shows that 28.6% of organizations were using only ERP, 20.5% were using both CRM and ERP, and 17.9% were also using CRM, SCM, and ERP combination. The rest of the organizations were also using different combinations of IS as appear in table 4.4. Again fig 4.1 shows the bar chart representation of the information systems in use in organizations. The result from the analysis shows that more organizations were using only ERP systems than any other information systems. Some organizations were also using some combinations of these information systems. The least was the combination of ERP and KMS which has a percentage of 1.8%.

Table 4.4: Information system(s) used in organizations

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ERP	32	28.1	28.6	28.6
	CRM, ERP	23	20.2	20.5	49.1
	SCM, ERP	11	9.6	9.8	58.9
	ERP, KMS	2	1.8	1.8	60.7
	CRM, SCM, ERP	20	17.5	17.9	78.6
	CRM, ERP, KMS	10	8.8	8.9	87.5
	SCM, ERP, KMS	7	6.1	6.3	93.8
	CRM, SCM, ERP, KMS	7	6.1	6.3	100.0
Total	112	98.2	100.0		
Missing	System	2	1.8		
Total		114	100.0		

(Source: Author, SPSS V 20)

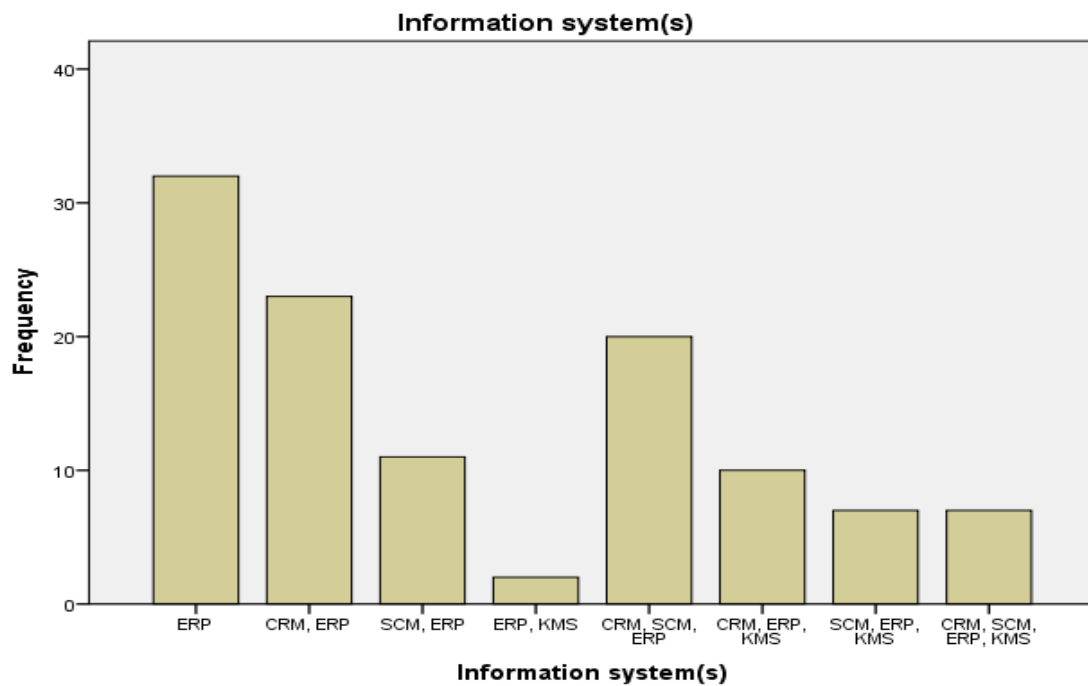


Fig 4.1: Information system(s) in use in organizations (Source: Author, SPSS V 20)

The analysis of the data collected from the survey shows that 15.2% of the respondents had implemented ERP in Banking, Service, and Government industries or sectors, 10.7% had also implemented ERP in Banking and Government sectors only. 8.9% had been able to implement ERP across all the five industries or sectors. There were also some implementations of ERP which were carried out in various industries or sectors as shown in table 4.5. Fig 4.2 shows the bar chart representation of the various industries or sectors. The result from the analysis shows that there were abysmal performances of individual sectors or industries, but their combinations saw some steady rise in performance. Banking, Service, and Government combination has the majority of the percentage which might be related to the attractiveness of these industries or sectors.

Table 4.5: ERP industries or sectors

Industries or sectors using ERP systems	Percentages
Manufacturing	4.5
Banking	5.4
Service	8.0
Manufacturing, Banking	4.5
Banking, Service	5.4
Banking, Government	10.7
Manufacturing, Banking, Service	7.1
Manufacturing, Banking, Government	4.5
Manufacturing, Banking, Trading	7.1
Manufacturing, Service, Government	4.5
Banking, Service, Government	15.2
Banking, Service, Trading	4.5
Manufacturing, Banking, Service, Government	5.4
Manufacturing, Banking, Service, Trading	4.5
Manufacturing, Banking, Service, Government, Trading	8.9

(Source: Author, SPSS V 20)

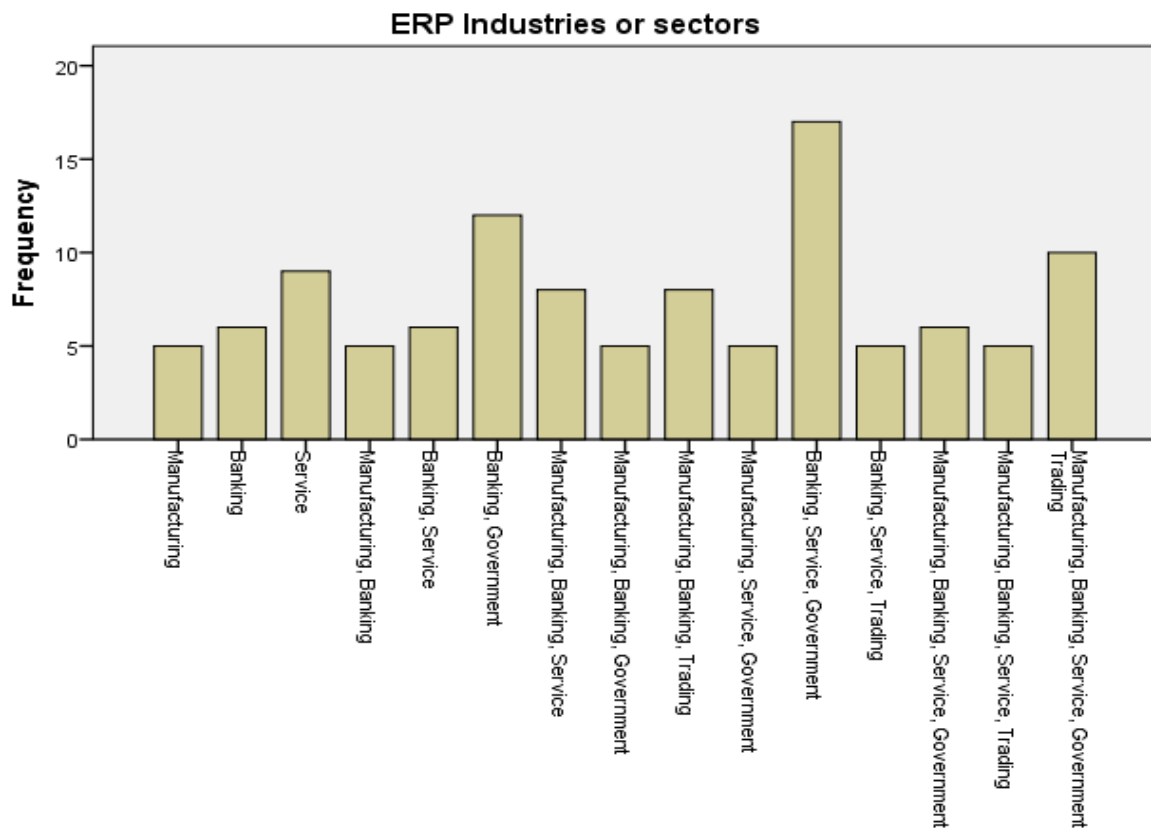


Fig 4.2: ERP industries or sectors (Source: Author, SPSS V 20)

Regarding which ERP modules organizations are using, analysis of data collected from the survey shows that 22.3% were using Financial, Human Resource modules, 19.6% were either using Financial, Sales&Marketing, Human Resource or all the four modules outlined. The rest of the organizations were using different combinations of ERP modules as appear in table 4.6. The result from the analysis shows that more organizations or businesses were implementing Financial and Human Resource modules than any of the modules discussed. The least were the combinations of the Financial, Operations&Logistics and Sales&Marketing, Human Resource, and Operations&Logistics.

Table 4.6: ERP Modules used in organizations

ERP Modules used in organizations	Percentage
Financial	12.5
Financial, Sales&Marketing	1.8
Financial, Human Resource	22.3
Financial, Operations&Logistics	1.8
Sales&Marketing, Human Resource	4.5
Sales&Marketing, Operations&Logistics	2.7
Financial, Sales&Marketing, Human Resource	19.6
Financial, Sales&Marketing, Operations&Logistics	2.7
Financial, Human Resource, Operations&Logistics	10.7
Sales&Marketing, Human Resource, Operations&Logistics	1.8
Financial, Sales&Marketing, Human Resource, Operations&Logistics	19.6

(Source: Author, SPSS V 20)

In terms of ERP products used in organizations, analysis of the data collected from the survey shows that 41.1% of organizations in Ghana use SAP ERP products, 33.0% use SAGE ACCPAC ERP products, 23.2% use ORACLE ERP products while the remaining 2.7% use TALLY 9 ERP. Table 4.7 shows the percentages of ERP products used in organizations in Ghana. Fig 4.3 shows the pictorial representation of the ERP products in organizations. The result of this

analysis shows that more organizations were using SAP ERP products than any other ERP products. The least used products were the TALLY 9 ERP which has the percentage of only 2.7% from our analysis.

Table 4.7: Organization ERP Product

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SAP ERP	46	40.4	41.1	41.1
	ORACLE ERP	26	22.8	23.2	64.3
	SAGE ACCPAC ERP	37	32.5	33.0	97.3
	TALLY 9 ERP	3	2.6	2.7	100.0
	Total	112	98.2	100.0	
Missing	System	2	1.8		
Total		114	100.0		

(Source: SPSS V 20)

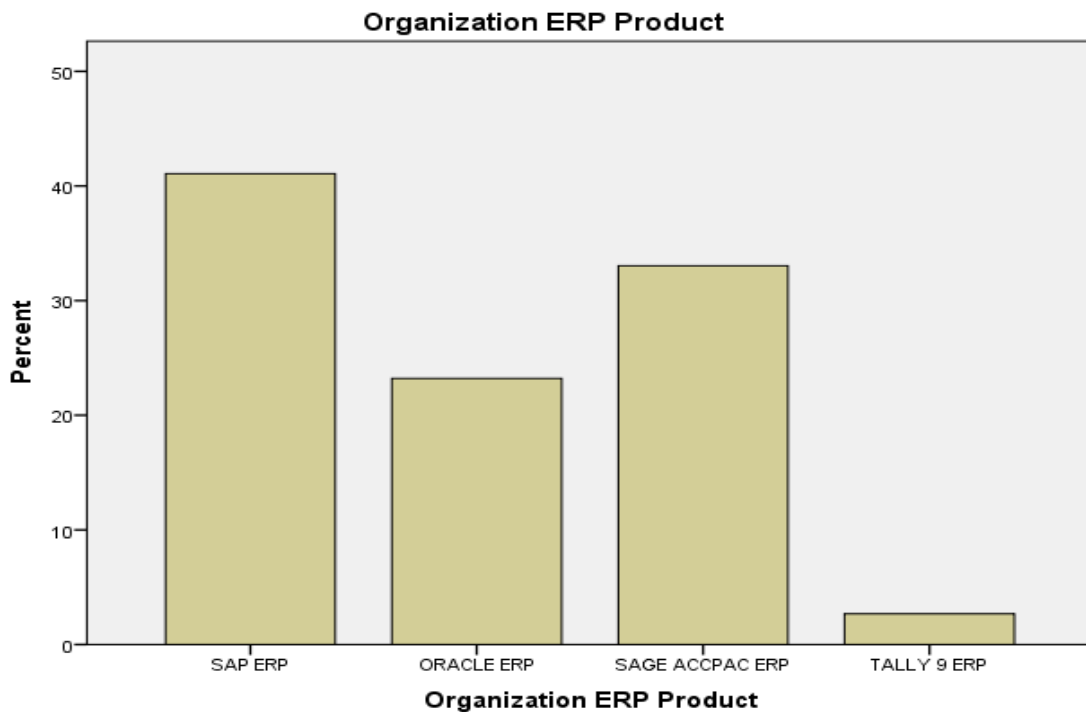


Fig 4.3: ERP products used in organizations (Source: Author, SPSS V 20)

The analysis of the data collected from the survey shows that 33.9% had used and implemented ERP systems for two (2) years. 25% had also used and implemented ERP systems for three (3) years. 13.4% had implemented and used ERP systems for four (4) years. The rest of the analysis can be viewed in table 4.8.

Table 4.8: Years in ERP systems usage

Years in ERP usage	Percentages
ONE YEAR ERP USAGE	10.7
TWO YEARS ERP USAGE	33.9
THREE YEARS ERP USAGE	25.0
FOUR YEARS ERP USAGE	13.4
FIVE YEARS ERP USAGE	6.3
SIX YEARS ERP USAGE	.9
SEVEN YEARS ERP USAGE	.9

EIGHT YEARS ERP USAGE	3.6
NINE YEARS ERP USAGE	1.8
TWELVE YEARS ERP USAGE	1.8
FIFTEEN YEARS ERP USAGE	.9
TWENTY YEARS ERP USAGE	.9

(Source: Author, SPSS V 20)

With regard to ERP products expertise by the respondents, 40.2% responded to SAP ERP products, 32.1% responded to SAGE ACCPAC ERP products, 25% also responded to ORACLE ERP products while 2.7% responded to TALLY 9 ERP products.

The analysis of the data collected from the survey shows that a total number of 89 ERP systems projects had been implemented successfully in the manufacturing sectors. A total of 112 had also been implemented successfully in banking sectors, 111 had been implemented in service sectors, 74 in Government sectors, and 70 in trading sectors.

Again with regard to years of experience in each sector or industry, for instance in manufacturing sector, 30 respondents had 1 year experience, 39 had 2 years of experience, 12 had 3 years' experience, 3 had 4 years' experience and 28 had no experience in manufacturing sectors. For banking sectors, 30 had 1 year experience, 38 had 2 years of experience, 24 had 3 years of experience, 2 had 4 years of experience, and 16 had no experience in the banking sectors. For service sectors, 25 had 1 year experience, 37 had 2 years' experience, 16 had 3 years of experience, 5 had 4 years' experience, 3 had 5 years' experience, 1 had 10 years of experience and 25 had no experience in service sectors. For Government sectors, 30 respondents had 1 year experience, 20 had 2 years' experience, 18 had 3 years' experience, 1 had 14 years of experience, and 43 had no experience whatsoever in government sectors. Finally in trading sectors, 24 respondents had 1 year of experience, 36 had 2 years of experience, 4 had 3 years of experience, 2 had 5 years of experience, and 46 had no experience in trading sectors.

The output or the findings were that great majority of our respondents had 2 years of experience in manufacturing industries which represent 34.82%. 28 had no experience whatsoever in this industry representing 25%. So for a short in manufacturing sectors more people believe to have 2 years' experience in ERP systems implementation more than any other years. In banking sectors, great majority of the respondents had 2 years' experience as compared to all other years. All these were boiled down to the fact that ERP systems implementations have not gained or received enough grounds or coverage here in Ghana. We are still at our infantry stage in terms of ERP systems implementation in Ghana. In the service sectors a great number of our respondents also had 2 years of experience representing 33%. 36 representing 32.14% had 2 years' experience in trading sectors while 30 respondents representing 26.78% had 1 year experience in government sectors.

A core part of the survey was a question that ask respondents whether the significant factors of ERP systems help their organizations to achieve competitive advantage or not. These were classified according to Porter's model competitive forces. 18.8% of responses mentioned that ERP systems did not achieve any competitive advantage for their organizations. 9.8% achieved all the competitive forces mentioned while the rest have different combinations of achievement as appear in table 4.9. Also fig 4.4 shows the bar chart representation of the competitive advantage in use in organizations.

Table: 4.9 Competitive Advantage Elements

Competitive advantage elements in use in organizations	Percentages
Low Cost	12.5
Market Niche	2.7
NONE	18.8
Low Cost, Customer-Supplier Intimacy	17.0
Low Cost, Market Niche	7.1
Product differentiation, Customer-Supplier Intimacy	5.4
Low Cost, Product diff, Customer-Supplier Intimacy	8.9
Low Cost, Product Diff, Market Niche	7.1
Low Cost, Customer-Supplier Intimacy, Market Niche	10.7
Low Cost, Product Diff, Customer-Supplier Intimacy, Market Niche	9.8

(Source: SPSS V20)

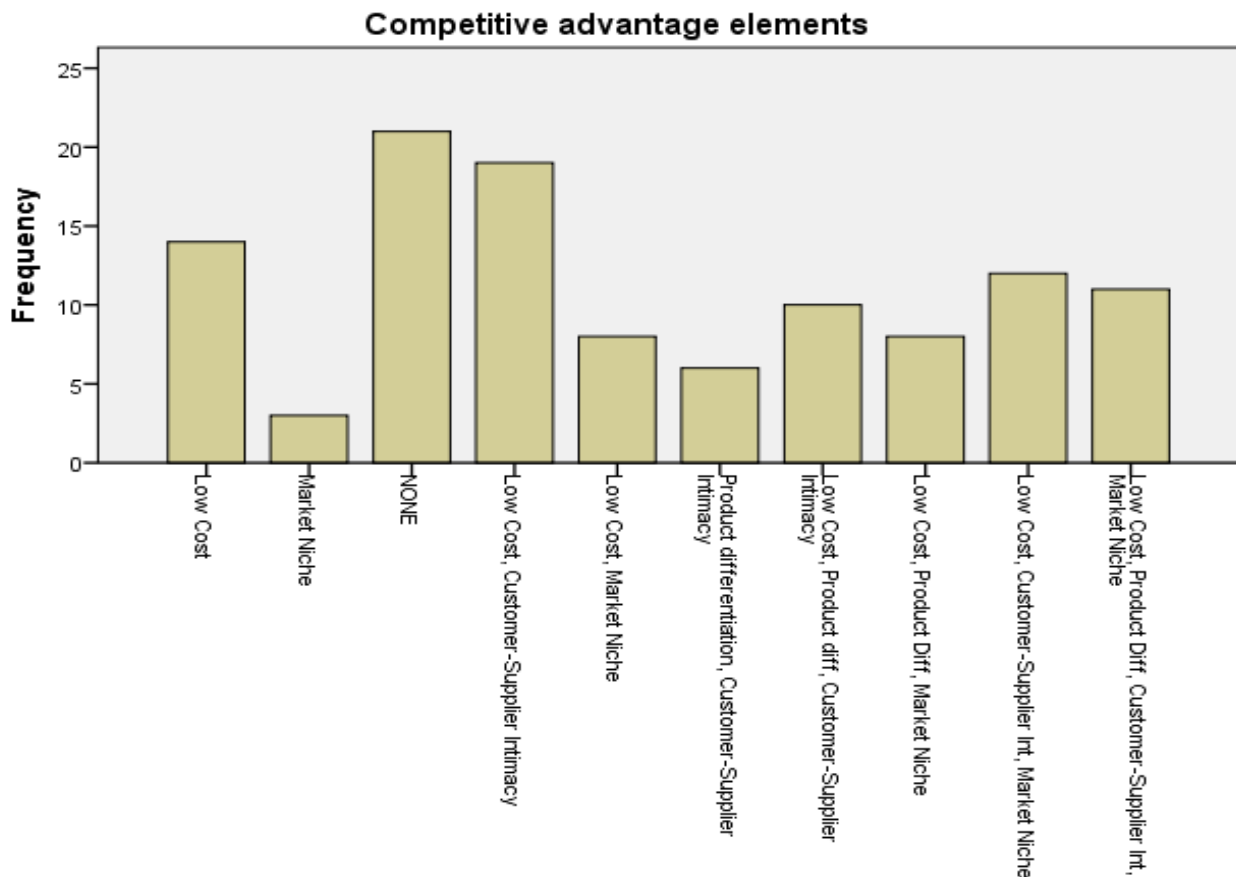


Fig 4.4: Competitive Advantage Elements (source: SPSS V20)

4.1.2 Descriptive Statistics of Response from Questionnaire Part B:

In this section arithmetic mean and standard deviation were the statistical tools used to analyze the data collected from the survey. Table 4.10 shows the analysis of the questionnaire part B using arithmetic mean and standard deviation.

Table 4.10: Identification of significant factors for implementing ERP systems

Identification of significant or critical success factors - CFSs	Arithmetic Mean	Standard Deviation	Sample (N)
Top Management Commitment	4.38	0.661	112
ICT Infrastructure	4.41	0.623	112
Business Process Re-engineering	4.11	0.662	112
Manufacturing Strength	3.74	0.825	112
Computer Culture	3.83	0.761	112
IT Maturity of a company	4.04	0.576	112
Business Size	3.57	0.681	112
Government Regulations	3.86	0.669	112
Regional Environment	3.73	0.794	112
Economy and economic growth	4.24	0.633	112

(Source: Author, SPSS V 20)

The findings from the Arithmetic mean were as below: Based on the likert 5 point scale (Strongly Agree =5, Agree =4, Neutral =3, Disagree =2, strongly Disagree =1) all the ten factors were showing mean value of more than 3.50 which indicate above neutral position. Five of the factors were showing position which was above neutral but not just agreed upon. The other five were already showing a mean value more than 4(Agree). This really shows the perception of Ghanaian ERP consultants or ERP users toward these ten factors. They all agreed on five critical or significant factors for the successful ERP implementation in Ghana while they all remained neutral on the other five factors.

4.1.3 Descriptive Statistics of Response from Questionnaire Part C:

Also in this section arithmetic mean and standard deviation were the statistical tools used to analyze the data collected from the survey. Table 4.11 shows the analysis of the questionnaire part B using arithmetic mean and standard deviation.

Table 4.11: Ranking of the significant factors

Ranking of the significant factors	Arithmetic Mean	Standard Deviation	Sample (N)
Importance of Top Management Commitment	9.34	1.353	112
Importance of ICT Infrastructure	7.40	1.679	112
Importance of Business Process Re-engineering	7.20	1.553	112
Importance of Manufacturing Strength	6.89	2.207	112
Importance of Computer Culture	3.63	2.110	112
Importance of IT Maturity of a company	3.68	2.310	112
Importance of Business Size	2.59	1.799	112
Importance of Government Regulations	4.04	1.907	112
Importance of Regional Environment	6.41	2.129	112
Importance of Economy and economic growth	3.84	2.240	112

(Source: Author, SPSS V 20)

The findings from the Arithmetic mean were as below: Based on 10 to 1 point scale (Most Important =10, Least Important =1) all the ten factors were showing different mean values. This clearly shows the perception of Ghanaian ERP consultants or ERP users toward the ranking of these ten factors.

4.2 Factor Analysis:

Table 4.12: Correlation Matrix of the significant factors

	Top Mgmt.	ICT Infr.	BRP	Manu. Strength	Computer Culture	IT Maturity	Bus. Size	Gov. Regulations	Regional Environment	Econ. Growth
Top Mgmt	1.000	.007	.234	-.213	.060	.049	.049	.207	-.146	.100
ICT Infr.	.007	1.000	-.042	.174	-.233	-.001	.143	.077	-.103	.089
BRP	.234	-.042	1.000	-.015	.277	-.013	-.137	.157	-.082	.131
Manu. Strength	-.213	.174	-.015	1.000	-.009	.138	-.071	-.182	.031	.190
Comp. Culture	.060	-.233	.277	-.009	1.000	-.111	.000	.159	.213	-.012
IT Maturity	.049	-.001	-.013	.138	-.111	1.000	-.112	.157	-.052	.069
Bus. Size	.049	.143	-.137	-.071	.000	-.112	1.000	.220	-.031	-.030
Gov. Regulations	.207	.077	.157	-.182	.159	.157	.220	1.000	-.022	.167
Reg. Environment	-.146	-.103	-.082	.031	.213	-.052	-.031	-.022	1.000	.094
Econ. Growth	.100	.089	.131	.190	-.012	.069	-.030	.167	.094	1.000

(Source: Author, SPSS V 20)

Factor Analysis is a type of statistical procedure that is conducted to identify clusters group of related items (called factors) on a test analysis. Factor analysis again is an m by n matrix of correlations between the original variables and their factors. Where n is number of variables and m is the number of retained factors.

4.2.1 Factor Analysis of Responses from Questionnaire Part B:

The data collected about the significant factors or critical success factors were perused to check whether the data could be analyzed using factor analysis or not. The result of this analysis indicates that the correlations among the factors were below 0.5 as shown in table 4.12.

4.2.2 KMO and Bartlett's Test with Exploratory Factor Analysis:

Kaiser-Meyer-Olkin measure of sampling adequacy is an index used to examine the appropriateness of factor analysis. High values (between 0.5 and 1.0) indicate factor analysis is appropriate. Values below 0.5 imply that factor analysis may not be appropriate. It can clearly be seen from table 4.13 that KMO has a value below 0.5, which means that factor analysis may not be appropriate for this data analysis.

Bartlett's Test of Sphericity is one of the statistics associated with factor analysis. It is one of the test statistic used to examine the hypothesis that the variables are uncorrelated in the population. In other words, the population correlation matrix is an identity matrix; each variable correlates perfectly with itself ($r = 1$) but has no correlation with the other variables ($r = 0$). Let H_0 and H_1 represent the hypothesis to be tested by Bartlett's Test of Sphericity.

H_0 : The factor analysis was not valid

H_1 : The factor analysis was valid

Table 4.13: KMO and Bartlett's Test for Questionnaire Part B

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.466	
Bartlett's Test of Sphericity	Approx. Chi-Square	88.551
	df	45
	Sig.	.000

(Source: Author, SPSS V 20)

The significance value (0.000) is less than assumed value (0.05) so we reject the Null Hypothesis H_0 . This means that factor analysis was valid in analyzing this data. The value of KMO coefficient (0.466) was less than 0.5, so this implies that factor analysis is not appropriate for analyzing this data even though Bartlett's Test of Sphericity stated that factor analysis was valid for this data analysis. In fact the KMO coefficient value was the overall determinant factor in determining whether factor analysis should be conducted or not.

4.3 Non-Parametric Test (Normality Test):

H_0 : The Distribution was Normal about the Mean

H_1 : The Distribution was not Normal about the Mean

From the results of the normality test (one-sample Kolmogorov-Smimov Test) it was derived that all of the asymptotic significance levels (Asymp Sig-2 tailed) has value below 0.05 and this value was an alpha value for the Kolmogrov-Smimov test. So, the null hypothesis was rejected. Thus, these variables were not belonging to a normal distributed sample. Especially, it was really important to find out if the ordinal data was normal or not. In this case, the ordinal data gathered from the survey was not normal so, as a result, non-parametric tests were applied to search for a possible relationship.

4.3.1 Non-Parametric Tests Analysis of Responses from Questionnaire Part C:

Following K-related sample tests (Non-Parametric test) were used for the questionnaire part C

- Friedman Test
- Kendall's W Test

Friedman Test:

A Non-Parametric test is used to compare observations repeated on the same subjects. The Friedman test is an alternative for repeated measures analysis of variance (ANOVA) which is used when the same parameter has been measured under different conditions on the same subjects. Many non-parametric tests use the ranks of the data rather than their raw values to calculate the statistic. The Null Hypothesis for the Friedman test is that there are no differences between the ranks. The test statistic for the Friedman's test is a chi-square with a 1-degree of freedom, when the p-value for this test is small (usually < 0.05) that means there is an evidence to reject the null hypothesis.

H0: All the ten factors have the same ranking and hence important for the implementation of ERP systems in Ghana.

H1: All the ten factors do not have the same ranking and hence important for the implementation of ERP systems in Ghana.

Table 4.14: Friedman Test for Questionnaire Part C

Test Statistics ^a	
N	112
Chi-Square	543.965
df	9
Asymp. Sig.	.000

a. Friedman Test

(Source: Author, SPSS V 20)

The significance value (.000) was less than a 0.05. While comparing degree of freedom and chi-square value, calculated value being higher this means H0 was rejected. The rank given to all 10 factors were not same. The order of importance was understood from the descriptive statistics, See Table 4.11. The most important factor was top management commitment (mean rank was 9.34), ICT Infrastructure (mean rank was 7.40), Business Process Re-engineering (mean rank was 7.20) and so on.

Table 4.15: Ranking of the significant factors

Ranking of the significant factors	Arithmetic Mean	Ranking
Importance of Top Management Commitment	9.34	1
Importance of ICT Infrastructure	7.40	2
Importance of Business Process Re-engineering	7.20	3
Importance of Manufacturing Strength	6.89	4
Importance of Regional Environment	6.41	5
Importance of Government Regulations	4.04	6
Importance of Economy and economic growth	3.84	7
Importance of IT Maturity	3.68	8
Importance of Computer Culture	3.63	9
Importance of Business Size	2.59	10

(Source: Author, SPSS V 20)

Kendall's W Test:

Kendall's W Test (also known as Kendall's coefficient of concordance) is a non-parametric statistic. It is a normalization of the statistic of the Friedman test, and can be used for assessing agreement among raters. Kendall's W ranges from 0 (no agreement) to 1 (complete agreement). Kendall's coefficient of concordance (W test) is linearly related to the mean value of the Spearman's rank correlation coefficients between all pairs of the rankings over which it is calculated. If the test statistic W is 1, then all the judges or survey respondents have been unanimous, and each judge or respondent has assigned the same order to the list of objects or concerns. If W is 0, then there is no overall trend of agreement among the respondents and their responses may be regarded as essentially random. Intermediate values of W indicate a greater or lesser degree of unanimity among the various judges or respondents (Kothari, 1991).

Table 4.16: Kendall's W Test for Questionnaire Part C

Test Statistics	
N	112
Kendall's W ^a	.540
Chi-Square	543.965
df	9
Asymp. Sig.	.000

a. Kendall's Coefficient of Concordance

(Source: Author, SPSS V 20)

Kendall's W ranges between 0 (no agreement) to 1 (100% agreement). From our test analysis, Kendall's W was 0.540 as shown in the table 4.16. This value means that more than half (>50%) of the judges or respondents were in agreement with their responses. Over 50% of the judges or respondents have assigned the same order to the list of objects or concerns (ten factors). Although different ranks were given to different factors (all the factors were not given the same ranks) but there was a trend of agreement among the responses while ranking them.

4.4 Validity and Reliability Test for Questionnaire Part B:

Reliability is the extent to which a questionnaire, test, observation or any measurement procedure produces the same results on repeated trials. In short, it is the stability or consistency of scores over time or across raters.

Validity is the extent to which the instrument measures what is purport to measure. Reliability is one of the basic elements of establishing validity. An important cause of overall unreliability is a too-small sample size (Kothari, 1991). The condition used to access the reliability of a research instrument is that the cronbach's alpha (which is used to measure reliability) must be a value greater than 0.70 (>0.70). Table 4.17 shows the reliability statistics for questionnaire part B.

Table 4.17: Cronbach's Alpha/Reliability Test for Questionnaire Part B

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.249	.266	10

(Source: Author, SPSS V 20)

Clearly, from table 4.16 cronbach's alpha value was below the expected value (0.70 and above). This means that reliability of the research instrument was not achieved. This was due to some number of factors. One of the factors was the small sample size used in this research study. Others relate to some external factors which will be outlined later in our research study.

4.5 Analysis of secondary data collected:

Table 4.18: Information and Communication Technology (ICT) Indicators in Ghana

ICT Infrastructure Indicators	Year 2008	Year 2009	Year 2010
Access Lines (Mobile & Fixed Lines)	11,714,330	15,376,305	17,714,846
Access Lines Penetration	52.4%	67.1%	75.4%
Internet Users	993,380.32	1,296,047.47	2,085,500.87
Internet Penetration	3.8%	4.2%	5.2%
Fixed Broadband Internet Subscribers	22,980.00	27,399.00	50,082.00
Mobile/Fixed Operators	6	6	6
ICT Economic Indicators			
	Year 2009	Year 2010	Year 2011
ICT Sector growth rate	8.5%	9.5%	10.5%
Telecommunication Service Revenues	87.4Million GHC	128Million GHC	165Million GHC

Source: National Communication Authority (NCA) and Ghana News Agency (GNA)

The analysis of the data collected from the survey about the ICT infrastructure indicators show that there were dramatic increases in the indicators as appear in table 4.18. In the year 2008, the numbers of access lines (mobile & fixed lines) were 11,714,330 as against 15,376,305 in 2009 and 17,714,846 in 2010 respectively. In terms of access lines penetration, we had 52.4% in the year 2008 as against 67.1% in 2009 and 75.4% in 2010 respectively. Internet usage also increased dramatically from 993,380.32 in the year 2008 to 1,296,047.47 in the year 2009 representing 30.46% rise in the number of internet users in Ghana. This followed another dramatic increase from 1,296,047.47 in 2009 to 2,085,500.87 in the year 2010 which represent 60.90% rise in the number of internet usage. Now about the fixed broadband internet subscribers, there were some increases from 2008, 2009, and 2010 as shown in table 4.18. These rapid ICT indicators prove beyond doubt that Ghana indeed is ready for ERP systems implementation in all its organizations. The availability and sustainability of these indicators help organizations to implement ERP systems without fear of any external agent.

The analysis of the data collected from the survey about the ICT economic indicators show that there were steady rise in the figures as appear in table 4.18. The ICT sector growth rate saw increases from 8.5% in 2009, 9.5% in 2010, and 10.5% in 2011 respectively. Telecommunication service revenues also increased dramatically from 87.4 Million GHC in 2009 to 128 Million GHC in 2010. It then increases again from 128 Million GHC in 2010 to 165 Million GHC in 2011. These rapid ICT economic indicators tell us something about the state of the Ghana's economy. The economy has seen a dramatic improvement in all its sectors including the ICT sector. The GDP growth rate in Ghana as of the beginning of this year stood around 14.4% which is a good sign for all investors and businesses working in Ghana. The ICT economic indicators figures provide a concrete foundation for ERP systems implementation in Ghana.

4.6 Chapter Summary:

The main survey was conducted between August and September 2012, and a total of 112 responses were analyzed. With extensive data analysis, significant factors of ERP were identified with descriptive statistics and non-parametric test. The results were also analyzed with SPSS V 20 software, which is a statistical software for analyzing various statistical tests.

5. DISCUSSION, CONCLUSION AND RECOMMENDATIONS

This chapter presents the research output by comparing the key findings of the work along with an evaluation of the research project. Based on the previous chapter, in this chapter, I will provide the answers to my research questions. First I will provide my findings and thereafter what conclusions I have drawn based on the analyzed data. Finally I will present the implications of the findings and the direction for the future research. This research was conducted to investigate the significant factors from a given set of factors that were necessary for the implementation of ERP systems in Ghana. Those significant factors were also tested to see whether they contribute to the achievement of competitive advantage in our businesses or organizations. A survey methodology was employed to investigate these significant factors from a sample of respondents. Quantitative research analyses were carried out on the sample with various statistical tests and various results or findings were obtained.

5.1 Summary of research findings:

The theoretical framework proposed for this research study was adopted to help access which of the ten (10) factors has more significant impact on the successful implementation of ERP systems in Ghana. Extensive readings were done to bring out the best of frameworks or models that will lead us to solve the research questions. Data were collected and analyzed through various statistical tests. Some of the tests lead us to our results or findings while others did not do us any good.

In terms of the findings, we were able to come out with major functional areas or departments in organizations that were using ERP systems. We had 52.7% of organizations that were having all the four functional areas - Sales&Marketing, Accounting&Finance, Manufacturing&Production, and Human Resource. 0.9% of organizations were having only Accounting&Finance departments in their organizations. In terms of information systems 28.6% of organizations were using only ERP products while 1.8% were using ERP and KMS. Again 15.2% of the respondents had implemented ERP systems in Banking, Service, and Government sectors while only 4.5% had implemented ERP systems in manufacturing and other combined sectors. With regard to ERP modules used in organizations, 22.3% were using Financial and Human Resource modules. The least which was 1.8% were the combinations of the Financial, Operations&Logistics and Sales&Marketing, Human Resource, and Operations&Logistics. With regard to ERP products, 41.1% of organizations were using SAP ERP products than any other ERP products. The least used products were the TALLY 9 ERP which has the percentage of only 2.7% from our analysis. Again in terms of competitive advantage, 18.8% of responses mentioned that ERP systems did not achieve any competitive advantage for their organizations. Only 9.8% of responses mentioned that they were able to achieve all the competitive forces mentioned. Finally we were also able to come out with the significant factors that will be used in the future to implement most of our ERP systems in Ghana. These were top management commitment, ICT infrastructure, Business Process Re-engineering, Economy and economic growth, and IT maturity of a company.

5.2 Discussion:

In this section, I discussed the findings which were realized during the data analysis stage. Many findings were discovered which really helped to answer the research questions. This discussion was structured in three form folds and they were:

- Discussions of research findings for questionnaire part A

- Discussions of research findings for questionnaire part B
- Discussions of research findings for questionnaire part C

5.2.1 Discussions of research findings for questionnaire part A

Functional Areas/Departments:

The analysis and the result obtained in chapter 4 about the functional areas/departments in organizations showed that more organizations were using all the functional areas listed. In fact about 52.7% were using all the functional areas. This was due to the fact that most organizations implementing ERP systems were large enterprises. Therefore, they have several functional areas/departments cut across the whole organization.

Information Systems (ISs):

The information system that was used by the majority of organizations was the ERP system. The survey conducted showed that 28.6% of organizations were using ERP systems. 20.5% were using both CRM and ERP and 17.9% were using CRM, SCM, and ERP together. The majority usage of the ERP system was due to the fact that our research study was geared towards ERP systems implementation. Also ERP systems have greater advantages over any other information systems discussed. Most organizations preferred to use ERP systems because of its vast functionalities.

Industries or Sectors:

Banking, Service, and Government industries received the highest implementation of ERP systems that was represented by 15.2%. Individual sectors such as banking, manufacturing, service, government, and trading performed poorly due to the increasing demand for the use of ERP systems across all sectors. Most of the respondent's responses showed that they have indeed implemented more than one ERP systems across more than one industry or sector. The banking, service, and government industries recorded the highest percentage usage of ERP system implementation together due to the high attractiveness and top management commitment and support.

ERP Modules:

Financial and Human Resource were the major modules of ERP system representing 22.3%. This result was due to the fact that most businesses and organizations are now concentrating more on their finances and human resource capabilities. In addition, they contribute or drive the whole business or organization to its proper destination. There were also some other combinations of ERP Modules which were implemented in some other organizations. All these were due to the kind of work or business activities the organization or business was engaged in.

ERP Products:

The ERP product used in many organizations in Ghana was the SAP ERP. From the analysis of the survey conducted, 41.1% said they preferred SAP ERP over any other ERP products. The reason was that SAP ERP had integrated all its modules into one big software or product which you can easily buy and install at a goal. Other ERP products such as SAGE ACCPAC, ORACLE, and TALLY 9 ERP were also in the market gaining some level of market shares and competing favorably with the SAP ERP Products.

Years in ERP usage:

The analysis and the result from the survey show that 33.9% of the respondents had 2 years of experience in the usage of ERP systems. 25% had 3 years in the usage of ERP systems. Only 0.9% had 6, 7, 15, and 20 years of usage of ERP systems respectively. The 2 years usage of ERP systems among the respondents was due to the fact that ERP systems were not popular in developing countries such as Ghana. For that matter, most of the organizations and businesses were not using them to transact their businesses. Not long ago that some businesses and some organizations started transacting businesses with ERP systems. Another key reason contributing to the low years in ERP usage in Ghana was the cost of implementation. ERP systems cost millions of dollars to implement and this had really created a challenge to most of the businesses and organizations in Ghana.

ERP Product Expertise:

About the ERP products expertise, 40.2% of the respondents responded to SAP ERP products. 32.1% responded to SAGE ACCPAC ERP, 25% responded to ORACLE ERP while 2.7% responded to TALLY 9 ERP products. Now the main

reason why some of the respondents had much expertise in SAP ERP was that SAP ERP comes with integrated software solutions. It had all its modules installed in one program or application. Hence it is easy to use and configured.

Competitive Advantage:

The analysis and the result from the survey show that 18.8% of responses mentioned that ERP systems did not achieve any competitive advantage for their organizations. 9.8% achieved all the competitive forces mentioned while the rest have different combinations of achievement as appear in table 4.9. 18.8% of the organizations did not achieve competitive advantage because most of the organizations or businesses had only used ERP systems for only 2 years. Therefore, most of the organizations could not realize the competitive advantage during those years.

5.2.2 Discussions of research findings for questionnaire part B:

Descriptive statistics (arithmetic mean and standard deviation) were the statistical tools used to analyze the data collected from the survey. The findings were as follow: Based on the likert 5 point scale, all the ten factors were showing mean value above 3.50 which indicate a neutral position. Five of the factors which include Top Management Commitment, ICT Infrastructure, BPR, IT Maturity, and Economy and economic growth were showing a mean value more than 4(Agree). The other five factors were also showing a mean value above 3(Neutral). In conclusion, five factors were considered the most significant factors for the successful ERP implementation in Ghana.

National/Environmental factors:

Factor # 1: ICT Infrastructure

This factor encompasses hardware, software, networking, database, and telecommunication devices. In Ghana the ICT infrastructure has indicators covering the access lines (mobile & fixed lines) subscribers, access lines penetration, internet users, internet penetration, fixed broadband internet subscribers and mobile/fixed operators. The indicators for the ICT in Ghana show a rapid growth in the request of ICT services and products as shown in table 4.18. The mean value for this factor also shows 4.41 which is above an agreed value 4. Therefore, ICT infrastructure was a significant factor to consider when implementing ERP in Ghana. Hence, the hypothesis H1 was accepted.

Factor # 2: Economy and Economic Growth

Since the ICT infrastructure of the Ghanaian economy continue to grow so is the economy also grows. The ICT economic indicators such as ICT sector growth rate and Telecommunication service revenues show a rapid growth as shown in table 4.18. The mean value of this factor also shows 4.24 which is above an agreed value 4. These positive indicators show that businesses and organizations can implement ERP systems to gain more competitive advantage. Therefore, economy and economic growth of a country was a significant factor that must be considered when implementing ERP systems in Ghana. Hence, the hypothesis H2 was accepted.

Factor # 3: Manufacturing Strength

ERP solutions were initially developed to serve the manufacturing industry and its supply chain. Times have changed and now ERP systems can be implemented in all sectors of the economy. In this research, manufacturing industry only was 4.5% but other industries combined with manufacturing industry were analyzed in table 4.5. The mean value for this factor shows a value of 3.74 which is below the agreed upon value 4. Therefore, manufacturing strength cannot be considered as a significant factor for implementing ERP systems in Ghana. Hence, the hypothesis H3 was rejected.

Factor # 4: Regional Environment

Ghana is strategically positioned in the West Africa and also as a gateway to West Africa. This makes it a good investment destination and a place of doing business. This regional factor has a clear influence on attracting large scale companies and multinational organizations to work in Ghana. The mean value analyzed for this factor shows 3.73 which is below the agreed value 4. Therefore, regional environment factor cannot be considered as a significant factor for implementing ERP systems in Ghana. Hence, the hypothesis H4 was also rejected.

Factor # 5: Government Regulation

The government of Ghana is responsible for regulating the usage and deployment of ICT services. In Ghana, the government is responsible for initiating a regulation the encourages organizations to implement ERP systems. The mean value for this factor shows a value of 3.86 which is below the agreed value 4. Therefore, Government Regulation factor

cannot be considered as a significant factor for implementing ERP systems in Ghana. Hence, the hypothesis H5 was also rejected.

Organizational/Internal factors:

Factor # 1: IT Maturity

IT Maturity is an important factor for a successful ERP implementation in Ghana. The use of IT/IS, its acceptance and deployment in an organization indicate the IT Maturity of the organization. The mean value for this factor shows a value of 4.04 which is above the agreed value 4. Therefore, IT Maturity was a significant factor for implementing ERP systems in Ghana. Hence, the hypothesis H1 was accepted.

Factor # 2: Computer Culture

Computer Culture looks at the employee’s acceptance to technology and computer usage in an organization. In order to implement ERP systems successfully in an organization, we must consider the computer culture. The mean value for this factor shows a value of 3.83 which is below the agreed value 4. Therefore, Computer Culture was not considered a significant factor for implementing ERP systems in Ghana. Hence, the hypothesis H2 was rejected.

Factor # 3: Business Size

For organizations to capture the full potential benefits of ERP implementations, a decision for heavy investment in IT/IS has to be taken. Large organizations achieve more benefits in ERP implementation than small and medium size organizations. The mean value for this factor shows a value of 3.57 which is below the agreed value 4. Therefore, Business Size was not considered a significant factor for implementing ERP systems in Ghana. Hence, the hypothesis H3 was rejected.

Factor # 4: Management Commitment

Top Management Commitment and support is an important factor that must be considered when implementing ERP systems in Ghana. Top management commitment factor plays a vital role in both the pre-stages and post-stages of ERP implementation in Ghana. The mean value for this factor shows a value of which is below the agreed value 4.38. Therefore, Top Management Commitment and Support was a significant factor considered for implementing ERP systems in Ghana. Hence, the hypothesis H4 was accepted.

Factor # 5: Business Process Re-engineering (BPR)

The Business Process Re-engineering (BPR) is a factor for determining a successful ERP implementation in Ghana. There will be no ERP implementation in any business or organization without a prior BPR for all businesses activities and processes taking place. The mean value for this factor shows a value of 4.11 which is above the agreed value 4. Therefore, Business Process Re-engineering was a significant factor that must be considered for implementing ERP systems in Ghana. Hence, the hypothesis H5 was accepted.

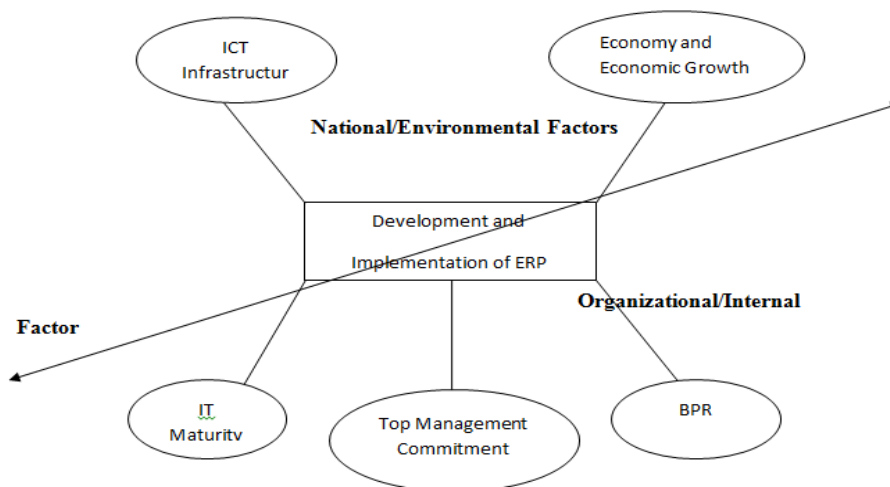


Fig 5.1: Significant factors influencing successful ERP implementation in Ghana.

(Source: Author)

Table 5.1: Hypotheses Table

Hypotheses	Factors Accepted	Factors Rejected
National/Environmental Factors		
H1	✓	
H2	✓	
H3		✓
H4		✓
H5		✓
Organizational/Internal Factors		
H1	✓	
H2		✓
H3		✓
H4	✓	
H5	✓	

(Source: Author)

5.2.3 Discussions of research findings for questionnaire part C:

In this section various statistical tools were used to analyze the data collected from the survey. The descriptive statistics (arithmetic mean and standard deviation) were used to rank the ten critical or significant factors. From table 4.15 we could see the rankings of these ten factors with their arithmetic means. Top management commitment and support was the topmost ranked factor in this research followed by ICT infrastructure. Management commitment and support is an important factor for any implementation that needs to be carried out in any organization or business. Business size was the least factor among the ten factors that were ranked. In conclusion, Ghanaians lay more emphasis on the top management commitment and support than any of the ten factors.

Friedman test was also used or applied in this part of questionnaire to analyze if there were differences in rankings or not. From the analysis of the test, the null hypothesis H₀ was rejected since there were clear differences in the rankings of the factors. Hence, H₁ hypothesis was accepted.

Again Kendall's W test was also conducted on this same questionnaire part C to investigate whether there were agreements among the raters or not. Kendall's W ranges from 0 (no agreement) to 1 (complete agreement). From the test analysis, Kendall's W was 0.54 which indicate that more than half of the respondents agreed on the questionnaires in this section. Hence, there were agreements among the raters in this part of questionnaires.

5.3 Implications:

In this section I will present the research implications and make a little recommendation based on my findings and conclusions. I will address research implications as well as management implications in this section.

5.3.1 Research Implications:

- This research will go a long way to contribute to the body of knowledge in the area of information systems.
- This research will open up a series of research in the area of information systems in developing countries such as Ghana.
- New theoretical frameworks or models will be established and applied in organizations and other institutions through research of this nature.
- New areas of research will be discovered and made known to researchers in developing countries such as Ghana.
- More graduate students in both developed and developing countries will be encouraged to do more research in the field of information systems.

5.3.2 Management Implications:

- ERP consultants, ERP vendors, Organizations and IS Managers should pay attentions not only to improve the quality of ERP products, but also to improve user knowledge and involvement and to select suitable ERP packages.

- ERP systems must be designed in such a way that they become easy to use, simple to learn, and flexible to interact with. ERP systems that are easy to use are less threatening to the users.
- Serious business process re-engineering should begin before choosing any ERP system for implementation.
- Top management needs to publicly and explicitly identify the ERP project as a top priority and managers should legitimize new goals and objectives
- The ERP team should consist of the best people in the organization. It is important that ERP be implemented by organizations themselves.
- ERP consultants should have in-depth knowledge of software and companies should be able to manage well these consultants.
- ERP project planning should not be taken lightly or with little forethought. Planning ERP project should be closely identified with maintaining scope during an implementation.

5.4 Directions for future research:

Given the findings of this research and the analyses of the data collected in the survey, future research directions could encompass:

- Critical failure factors influencing ERP systems implementation in Ghana
- What would ERP users/clients like to see in the new versions of ERP hardware/software?
- How can current ERP users customize their ERP systems to render them more productive and efficient?
- How can organizations better train their employees to accept and use ERP systems? How could employee resistance to new systems be overcome?
- How can ERP systems be upgraded to increase productiveness and efficiency in various organizations in Ghana

5.5 General Conclusions and Recommendations:

This chapter gives a summary of the research which has been performed, as well as the suitability of the findings to the research objectives and the research questions, which had been identified in the chapter one, at the start of the research. The chapter begins by giving a brief summary of the research done, which simulated the research objectives and subsequently the research questions. The research objectives and later the research questions helped me to identify various organizations where the research could be undertaken. The research was undertaken in various organizations that were found and results were discovered after analyzing the data collected. The results were then discussed with respect to the research objectives. The chapter discusses the overall findings in the context of the literature and the research methodology and its linkage to future research in similar arena.

5.5.1 Research Summary:

The research started by examining the background of the research problem and the formulation of research questions and research objectives that will guide the research to the discovery of findings or solutions. Various literatures were evaluated and thoroughly examined to help bring out the best of frameworks or models that may lead to the final results. A survey method was selected for this research after a careful evaluation of the research objectives and research questions. Various statistical tools were used to analyze the data collected from the survey. Findings or results were obtained after a thorough analysis of the data collected from the survey method. Discussions and various interpretations were assigned to the findings that were discovered from the analysis of the data and this led to the answering of the research questions and the achievement of the research objectives.

5.5.2 Result Summary:

- There are five main significant factors that were identified for the successful ERP implementation in Ghana.
- All the five significant factors were also ranked differently by Ghanaian ERP consultants and end-users.
- Competitive advantage was not achieved by after the analysis of the data.

- A theoretical framework has been developed for future research in the area of ERP implementation in Ghana.
- A common ERP model has been developed for the successful ERP implementation in Ghana.
- Top management commitment and support has been identified as the most significant factor for the successful ERP implementation in Ghana.

5.5.3 Research Approach Used:

- A cross-sectional survey was the method used to carry out this research.
- Population of the study: The population of study was Ghanaian organizations who have implemented ERP systems over a period of one year or more.
- Sample of the study: A sample of 112 respondents was surveyed for the research study. 150 questionnaires were distributed and only 112 questionnaires were returned representing 74.66%. Some responses were eliminated due to excessive missing data.
- Sample Techniques: The non-probabilistic sampling techniques (convenience sampling) were adopted for this research study.
- Cronbach's Alpha to find out the reliability of the survey instruments (questionnaires) was obtained to be 0.249. The low value was attributed to some challenges in the sample size determination.
- Descriptive statistics (arithmetic mean and standard deviation) to map the perception of respondents.
- Friedman mean rank test to rank the ten factors (critical success factors) for ERP implementation in Ghana.
- Kendall's W test to check the reliability and validity of the rank given by the respondents.
- A questionnaires consisting of three close-ended questions were designed for this research study.

5.5.4 Research Objectives Met:

The general objectives of the research were to investigate both the National/Environment and Organizational/Internal factors influencing the ERP implementation in Ghana and how these significant factors contribute to the achievement of competitive advantage. These objectives were met and fulfilled during the research analysis and discussion stages. Also all the five specific objectives outlined in the research were also achieved. Each specific objective was thoroughly examined and evaluated so that a successful results or findings from the research will be achieved.

5.5.5 Research Questions Met:

The following research questions were thoroughly examined and evaluated for their results or findings.

Q1: How many industries percentages do ERP systems have in Ghana?

This question was analyzed and answered during the data analysis phase of the research study. Data analysis from the survey shows that 15.2% of the respondents had implemented ERP in Banking, Service, and Government industries or sectors, 10.7% had also implemented ERP in Banking and Government sectors only. 8.9% had been able to implement ERP across all the five industries or sectors. There were also some implementations of ERP which were carried out in various industries or sectors as shown in table 4.5.

Q2: Which ERP products and their modules were used by our sampled organizations?

In terms of ERP products used in organizations, analysis of the data collected from the survey shows that 41.1% of organizations in Ghana use SAP ERP products, 33.0% use SAGE ACCPAC ERP products, 23.2% use ORACLE ERP products while the remaining 2.7% use TALLY 9 ERP. Table 4.7 shows the percentages of ERP products used in organizations in Ghana. Regarding which ERP modules organizations are using, analysis of data collected from the survey shows that 22.3% were using Financial, Human Resource modules, 19.6% were either using Financial, Sales&Marketing, Human Resource or all the four modules outlined. The rest of the organizations were using different combinations of ERP modules as appear in table 4.6.

Q3: What are the ICT economic indicators in Ghana?

ICT economic indicators show that there were steady rise in the figures as appear in table 4.18. The ICT sector growth rate saw increases from 8.5% in 2009, 9.5% in 2010, and 10.5% in 2011 respectively. Telecommunication service revenues also increased dramatically from 87.4 Million GHC in 2009 to 128 Million GHC in 2010. It then increases again from 128 Million GHC in 2010 to 165 Million GHC in 2011. These rapid ICT economic indicators tell us something about the state of the Ghana's economy. The economy has seen a dramatic improvement in all its sectors including the ICT sector. The GDP growth rate in Ghana as of the beginning of this year stood around 14.4% which is a good sign for all investors and businesses working in Ghana.

Q4: What are the ICT infrastructural indicators in Ghana?

ICT infrastructure indicators show that there were dramatic increases in the indicators as appear in table 4.18. In the year 2008, the numbers of access lines (mobile & fixed lines) were 11,714,330 as against 15,376,305 in 2009 and 17,714,846 in 2010 respectively. In terms of access lines penetration, we had 52.4% in the year 2008 as against 67.1% in 2009 and 75.4% in 2010 respectively. Internet usage also increased dramatically from 993,380.32 in the year 2008 to 1,296,047.47 in the year 2009 representing 30.46% rise in the number of internet users in Ghana. This followed another dramatic increase from 1,296,047.47 in 2009 to 2,085,500.87 in the year 2010 which represent 60.90% rise in the number of internet usage. Now about the fixed broadband internet subscribers, there were some increases from 2008, 2009, and 2010 as shown in table 4.18.

Q5: Do these significant factors help organizations in Ghana to achieve competitive advantage?

The five significant factors discovered from the analysis of the research did not help to achieve a competitive advantage. 18.8% of responses mentioned that ERP systems did not achieve any competitive advantage for their organizations. 9.8% achieved all the competitive forces mentioned while the rest have different combinations of achievement as appear in table 4.9.

5.5.6 Recommendations:

- Top Management Commitment and Support - The commitment and support of the top management (from both the side vendor as well as the client side) should be continuous throughout the process, for the successful ERP implementation in Ghana.
- Change Management Process - The change management approach will ensure the acceptance and readiness of the ERP consultants and ERP vendor for the successful ERP implementation as it allows the organizations to get the benefits from using ERP. It will also help to reduce the customization by facilitating best software fit process for organizations in Ghana.
- BPR and Software Configuration - Modifications in ERP package should be avoided to reduce the amount of errors and to take the full advantage of newer versions of the ERP systems in Ghana. Aligning the organization's business process to the ERP implementation package is important.
- Business Plan, Vision – Organizations in Ghana must carefully define why the ERP is being implemented and what critical business needs the ERP system will address, that will help ERP consultants, ERP vendors and clients organizations for better customization.
- Implementation Cost - The nature of ERP implementations in Ghana are such that there are usually unforeseen and unexpected occurrences that may increase the overall costs for ERP implementation. Therefore, ERP consultants, ERP vendor and client organizations should promote flexible budget policy for the successful ERP implementation in Ghana.
- IT Infrastructure - ERP implementation in organizations involves a complex transition from legacy systems business processes to an integrated IT infrastructure and common business process throughout the life cycle of the organization.
- Selection of ERP Package - The choice of the right ERP package for an organization involves important decisions regarding budgets, timeframes, goals, and deliverables that will shape the entire ERP implementation process along with the future of ERP implementation in Ghana. Right ERP package may help to ensure minimal modification and successful use of ERP implementation in Ghana.

- Project Management - It is necessary for the successful ERP implementation in an organization in that a detailed project plan related to ERP project goals and objectives must be defined to the all involve parties like ERP consultants, ERP vendor and client organizations etc.
- User Involvement - If the employees (ERP user) of an organization are not in the ERP implementation project team or are excluded from the entire ERP implementation process they may resist or fear the new ERP system, so user involvement should be as high as possible for the successful ERP implementation in Ghana.
- User Education and Training - Sufficient and timely training regarding the fundamental of ERP systems, education related to use and technical training in the area of the ERP project may help in successful ERP implementation in an organization in Ghana.
- Poor Project Management Effectiveness - Top management and project managers need to ensure sufficient knowledge, skills, resource, planning and expertise for the successful ERP implementation in an organization before the start of real ERP implementation, as poorly managed ERP projects may results in failure of ERP implementation in an organization.
- ERP Software Misfits - Project teams relied on heavy customization by changing the ERP system program, or writing many management reports, or conducting data transfer as workarounds to solve problems while implementation of ERP systems for an organization may leads to the complexity and makes ERP package misfit for an organization.

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