

**AN INVESTIGATION INTO ENTERPRISE RESOURCE
PLANNING SOFTWARE ADOPTION AMONGST FIRMS
LISTED ON THE NAIROBI STOCK EXCHANGE**

BY

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DECLARATION

This management Research Project is my original work and has not been presented for a degree in any other University.

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KEY WORDS AND ABBREVIATIONS

Capital Markets Authority (CMA)

Customer Relationship Management (CRM)

Diffusion of Innovations (DOI)

Enterprise Resource Planning (ERP)

Nairobi Stock Exchange (NSE)

Packaged Software

Technology acceptance Model (TAM)

Unified Theory of Acceptance and Use of Technology (UTAUT)

ABSTRACT

Enterprise Resource Planning systems are being adopted by many organizations in Kenya and all over the world. Many reasons have been advanced as to why such adoptions are taking place. This research aimed at studying ERP attributes that make organizations adopt or reject them within companies listed on the Nairobi Stock Exchange. By applying Rogers theory of Diffusion of Innovations, the research aimed at finding out the adoption status in the NSE listed companies and help other organizations that may want to adopt ERPs have a rich insight on how to go about the adoption process.

ERPs are expensive, huge and complex systems that warrant careful planning and execution for successful adoption. This is because they affect how businesses conduct themselves. They also affect processes and peoples jobs within the adopting organizations. A census was done by surveying all the 47 companies listed on the NSE for this study. The study found out that adoption of ERP systems within the NSE listed companies generally agreed with Rogers theory of diffusion of innovations and that management support is paramount in ERP adoption or rejection. It is therefore important for organizations to note that before they think of adopting ERP systems, such organizations must ensure that there is support for the ERP project right from the people at the top within the given organization.

1.0 INTRODUCTION

This study was about an investigation into Enterprise Resource Planning (ERP) software adoption amongst firms listed on the Nairobi Stock Exchange (NSE). At the time of the study, 47 such companies were listed at the stock market. ERPs are technological innovations and the study not only wanted to find out how such innovations have been adopted by applying Rogers theory of diffusion of innovation but also find out the factors and barriers that affect their adoption. In chapter one, the study begins by introducing ERP systems as innovations and how they can be adopted using Rogers theory of diffusion of innovations. It gives an overview of the NSE market and potential problems faced by such companies in adopting ERP systems. The relevant literature review on ERP systems and Rogers theory of diffusion of innovation is covered in chapter two. The research methodology adopted, results and conclusions made out of the study are covered in chapters three, four and five respectively.

1.1 Background

Enterprise Resource Planning software is a package that is usually licensed for use by a vendor to a client organisation. ERP packages are applications that are able to automate a wide range of processes within organisations. Some common reasons as to why they are perceived as innovative is that they have the ability to facilitate the integration of processes and allow users to tap into best practice functionality embedded within them (Klaus et al., 2000; Swanson, 2003). Rogers (2003) defines innovation as an idea, practice or object that is perceived as new by an individual or any other unit of adoption. Thus, ERP packages can be characterised as an innovation, which has the potential to trigger change at organisational and inter-organisational levels.

Rogers (2003) defines diffusion as the process in which an innovation is communicated through certain channels, over time, among the members of a social system. ERP packages can be viewed as innovations and diffusion of innovations theory can help deepen our understanding of the reasons behind their adoption. Although ERP packages have been studied extensively, research in this area has mostly focused on the implementation process (Holland and Light, 1999; Krumbholz et al., 2000; Parr and Shanks, 2000; Huang and Palvia, 2001). It is those in organizations that determine the appropriateness of a package, based upon the

functionality it contains and its fitness for purpose (Lucas et al., 1988; Chau, 1994). The more commonly recognised reasons for adoption are pro-innovation biased. For example, in one survey, success in package adoption and the attainment of business benefits were espoused by the majority of respondents (Swanson, 2003). In contrast, there are alternative interpretations of these reasons, as barriers to adoption or grounds for rejection.

1.1.1 ERP Technology Adoption

For technologies to improve productivity, they must be adopted and used by employees in organizations. Explaining user adoption of new technology is often described as one of the most mature research areas in the contemporary information systems (IS) literature (e.g., Hu et al. 1999). Research in this area has resulted in several theoretical models, with roots in information systems, psychology, and sociology that routinely explain over 40 percent of the variance in individual intention to use technology (e.g., Davis et al. 1989; Taylor and Todd 1995b; Venkatesh and Davis 2000). Researchers are confronted with a choice among a multitude of models and find that they must "pick and choose" constructs across the models, or choose a "favoured model" and largely ignore the contributions from alternative models.

This research was aimed at developing a greater understanding of the adoption of ERP packages when looked at as innovations whose adoption can be associated to Rodgers theory of diffusion of innovations. ERP adoption can be a difficult undertaking where compatibility with other systems is required (Umble et al. 2003). Similarly, the more complex an ERP system is, the more difficult it becomes to adopt it because specialised skills are required in the undertaking (Langenwalter, 2000). Attributes of ERP packages that may affect user adoption include their relative advantage, compatibility, complexity, and cost (Corbitt et al., 2004). Such ERP users' perceptions of the attributes may not be accurate and this research aimed at affirming or rejecting the conceptions. It also aimed at providing rich insights into the adoption of ERP packages and its results could arguably be of further interest to the more general study of packaged software.

1.1.2 Overview of the Nairobi Stock Exchange Listed Companies

All companies listed on the NSE are public and investors are free to trade in shares whose values are determined by market forces at the time of trading. There were 47

companies registered on the market with a value capitalization of 1.1 trillion Kenya Shillings at the time of the study (Custody and Registrars Services, 2010). The NSE was constituted in 1954 as a voluntary association of stockbrokers and it is registered under the parliament's Societies Act of 1997. The NSE has undergone transformations over the years and is charged with responsibility of developing the stock market and regulating trading activities in Kenya of which all listed companies belong.

The companies deal with different types of business operations. They range from telecommunications, utility supplies, manufacturing, banking, agriculture to hospitality, just to mention a few. In general, we may say that the listed companies straddle all sectors of the Kenyan economy and therefore in one way or another they affect most Kenyans. The listed companies operations at the NSE are managed under the Capital Markets Act (CMA) of parliament. The Capital Markets Authority, a body formed under the act works together with the NSE in regulating listed companies trading of shares and practises in general (Shah P. and Wanjau D, 2007).

Given that market capitalisation of these companies is over a trillion Kenya shillings, it follows that the companies combined have a total investment that is much higher than the budget estimates required to run the Kenya government for a whole year. The Ministry of Finance budget for the year 2010/2011 was 900 billion Kenya shillings (Ministry of Finance, 2010) at the time. One would also argue that because of their volume in terms of profit generation, the listed companies generate a lot of revenue for both government in terms of taxes and their owners in dividends. This is illustrated in the case of Safaricom, a listed company whose profits were in excess of Kenya shillings 20 Billion for the financial year 2009 (Safaricom, 2010). Kenya, just like most markets in Africa is less developed. This market can be improved by adoption of available technology to improve on efficiency in operations and therefore generate more profits. Such means of improving efficiency is by adoption of Enterprise Resource Planning Software systems for managing resources.

A host of ERP systems are available in the market for companies to choose from (Otieno, 2010). These range from low end systems for small businesses to the high end expensive ERPs for large enterprises. Major players in the Kenyan ERP vendor market consist of SAP, Oracle and Microsoft (Saphari, 2010). According to Saphari

(2010) SAP has over 40 installations in the Kenyan market, mostly comprising large manufacturing and service industries. The ERP installations span across all industries and ownership and comprise NSE-listed, public and privately owned enterprises. Oracle has mainly been adopted by financial and service institutions where as Microsoft has targeted medium enterprises (Otieno, 2010).

1.2 Research Problem

The Kenyan business sector faces many external and internal challenges which constrain its capability of adaptation to change, including its success in appropriate adoption of ERP projects. A lot of research has been done on successful implementation of ERP systems but not much has been done on ERP adoption factors and barriers in particular. In adoption of ICT systems, management policy matters a lot on which systems an organization can adopt (Mbihi, 2009). This may as well apply to the adoption of ERP software. ERP systems are huge and complex and warrant careful planning and execution for successful adoption (O’Leary, 2000). Moreover, they are not purely software systems, and neither is their adoption merely IT projects. An ERP system affects how a business conducts itself and affects an organisation’s business processes, people’s jobs, and information flows (Somers and Nelson 2001). ERPs are complex integrated packages and involve large investments in time and money and have a relatively high failure rate (Holland and Light 1999). It is therefore imperative for an organisation to study the experiences of others, and learn from their practices in adopting ERPs. In essence, organisations have to learn how to identify factors for adoption in order to realise the promised benefits and avoid implementation failure (Somers et al., 2000). According to Jenkins and Christenson (2001) the growth of ERP systems has been adopted in the manufacturing sector, but other large business systems have begun to take an interest in these ERP systems. Therefore, vendors are developing ERP applications that offer enterprise resource planning for the various sectors. This research aimed at investigating the factors that affect the adoption of ERP systems in Kenyan companies that are listed on the Nairobi Stock Exchange. The research was guided by the following questions:

- What is the extent of ERP adoption amongst NSE listed companies?
- What has been the rate of ERP Adoption amongst NSE listed companies over the years?

- What are the factors involved in deciding to adopt ERP systems?
- What are the barriers to ERP systems adoption?

1.3 Research Objectives

ERP systems adoption is a socio-technical challenge which requires a fundamentally different outlook from previous technologically driven innovations and will certainly depend on a holistic perspective where the organisation as a total system is considered (Al-Mashari et al. 2003). A broad objective of the study was to investigate ERP systems technology adoption. It focused on ERP software technology adoption, not only as a technology to increase efficiency and effectiveness of organizations, but also as a technology that is enabling new possibilities unfeasible before, especially through the online nature of the systems. Specific objectives of this research were therefore summarized as follows:

- To determine the extent of adoption of ERP systems amongst NSE listed companies.
- To determine rate of ERP Adoption amongst NSE listed companies over the years.
- To establish the critical factors that influence adoption of ERP systems.
- To determine the barriers to ERP systems Adoption.

1.4 Importance of the Study

1. It would be significant to the corporate Kenya, especially to decision makers involved in choosing and implementing information processing systems in the various companies.
2. Enterprises that are still hesitant to go “ERP” could use the findings of this research to clarify issues and get a greater insight into the adoption of ERP systems.
3. Implementation of the much talked about e-governance in Kenya could definitely get a lift from the findings of this study. The government could also use this research for comparative purposes. ERP adoption in Kenya could be compared to other economies to gauge the level of technological advancement. The study would also be of importance to government policy makers, since an understanding

of the environment of ERP adoption could enable them come up with appropriate policies that encourage market growth.

4. ERP Vendors may find the research useful in the development and market uptake of their products.
5. The study could be of value to researchers as a basis for future empirical and conceptual research, which may be helpful in refining and validating findings especially when a significant number of experiences is collected and studied.

2.0 LITERATURE REVIEW

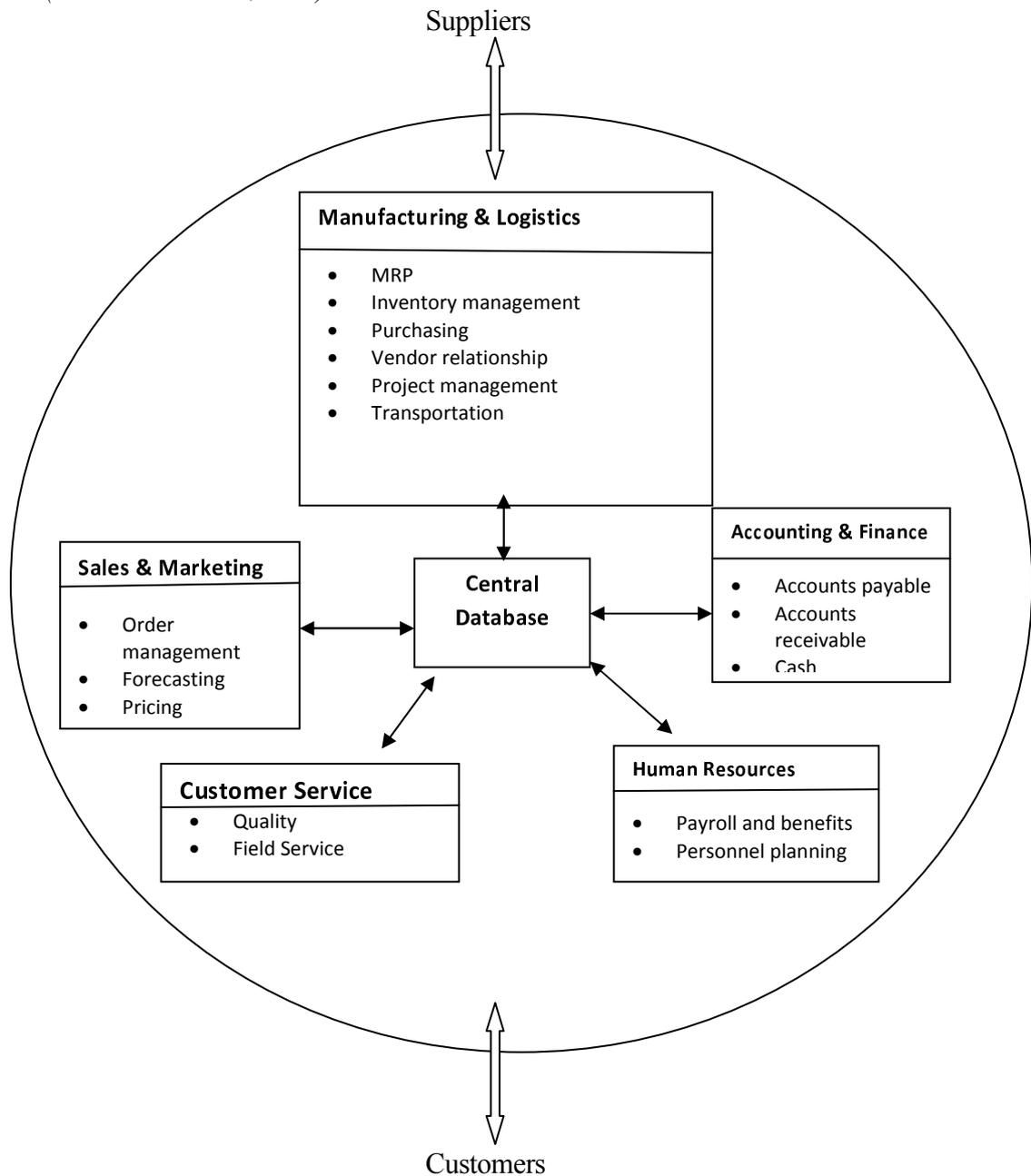
This chapter presents and discusses the literature relating to the adoption of ERP systems. The chapter begins by introducing an ERP system, the ERP industry and the concept of diffusion of innovations theory, reviewing the literature relating to the various approaches to understanding adoption of ERP systems technology. This is then followed by research into technology adoption by focusing on Diffusion of Innovations Theory of Everett M. Rogers (Rogers, 1995) for understanding the concept of technology adoption. The literature review then focuses on specific aspects of adoption relevant to this research in terms of how ERP technology has been conceptualized, the factors at play as well as research into the barriers to its adoption.

2.1 Understanding ERP Systems

An ERP system is a software package that has integrated modules that can enable an organization to manage resources efficiently and effectively (Markus and Tanis, 2000). Such resources managed by an ERP system may include materials, production, sales, human resource and finance. The system is capable of standardising business processes across an enterprise and support process oriented views of an enterprise (Markus and Tanis, 2000).

As an example, in a manufacturing concern, an ERP system can be used to plan and control processes by planning for the entire organization, (including branches that may be far apart) on raw material requirements for doing business over a given business period, say a month. Depending on how the system is configured, it can interact with suppliers systems to get the best price for procuring the raw materials. Once the materials are received from suppliers, the ERP system can be used to control processes such as manufacturing, quality control, stocks and distribution of the produced products. Sales of the finished products can also be done through the system to customers. From the time of procuring raw materials from suppliers to the point of receiving payment from customers, an ERP system does all the necessary financial accounting related to the processes. ERP systems are also used for planning and accounting for equipment and other supplies as well as the human resource function. Apart from manufacturing concerns, ERP systems are also used in other concerns like banking, utilities, mining, agriculture, etc. They can be applied virtually in all industries.

Figure 1. An overview of an ERP system
 (Source: Sheu et al, 2003)



ERP Functionality

In most organizations, not all business activities are contained within a single functional area. Such functional areas may consist of areas such as purchasing, production, sales, accounting, human resource, etc for a manufacturing concern. An ERP package is developed and built in such a way that it can integrate information from all functions into one information system (Laudon and Laudon, 2006).

To achieve this integration the ERP package normally comes with modules meant for specific tasks and functions. These may consist of modules such as manufacturing, Purchasing, Sales, Banking, etc. Because of the modular approach, organizations can buy only those modules that are applicable to their line of business.

Some business tasks may be subsets of a business process and some processes may be cross functional (Laudon and Laudon, 2006). A process is a manner in which work is organized, coordinated, and focused to produce a valuable product or service (Laudon and Laudon, 2006). In a manufacturing firm, these processes may transcend boundaries between sales, marketing, manufacturing, and research and development. An order fulfilment process is such an example. In such a case, ERP systems are built in a way such that process information can be passed on from one module to another.

In order to be used in an organization, an ERP package is installed on a central computer normally referred to as a server. The server hosts the enterprise database into which all master and transaction information is stored. Users in the enterprise connect to the central database through a client software interface that normally comes with the ERP system. Such users connect to the database via appropriate modules depending on the user function. For example a user in the sales function will often access the ERP through the sales module. Connection of client computers to the server is facilitated through Local Area Network (LAN), Wide Area Network (WAN) or via the internet. Users normally process enterprise information such as sales transactions on the central server. The database on the server collects the information and feeds it into the modular applications, that virtually end up supporting all company business activities across functions, business units and the world (Davenport, 1998). From this setup, users in any unit or function can access the information on a real-time basis. Because ERP systems work on real time basis, it is easy to put in controls that define business operations. Such controls help in enforcing management decisions that can improve the organizations efficiency and profitability.

2.2 Trends in Enterprise Resource Planning Systems adoption

Enterprise Resource Planning systems are increasingly being adopted by organizations all over the world for managing enterprise information (Nah et al, 2001). From the 1990s firms have rushed to implement enterprise resource planning systems. It was found out that more than 60 percent of Fortune 500 companies had adopted ERP systems

(Stewart et al, 2000). Although most organizations typically have software systems that performed much of the component functions of ERP, the standardized and integrated ERP software environment provides a degree of interoperability that was difficult and expensive to achieve with stand-alone, custom-built systems (Wheatley, 2000; Stewart et al.,2000). ERP systems hold the promise of improving processes and decreasing costs. Two important new frontiers for ERP are electronic business (e-business) and supply-chain management (Nah et al, 2001). This is because the systems can connect with suppliers, distributors, and customers, facilitating the flow of the products and information. Growth of ERP software market is fast and it is expected to hit \$47.7 billion by 2011 (Jacobson et al., 2007).

Because of many companies rushing to implement ERP systems many ERP vendors have come up with different products from which users can choose. This means that organizations all over the world have many options from which to choose and adopt an ERP system. Leading vendors of ERP systems worldwide are SAP AG and Oracle (Jacobson et al., 2007).

2.3 Factors Affecting ERP Adoption

Reduced operating, maintenance and time costs as well as improved customer service management, better production scheduling, reduced inventory and tightened supply chain links are some of the benefits that companies get when they adopt ERP systems (Davenport, 1998; Markus and Tanis, 2000). According to Light and Papazafeiropoulou (2004), the following review is a summary of factors that affect ERP adoption.

Change implementation

An organization may go for an ERP package adoption so that organizational changes can be achieved by using such an ERP system for information processing (Jacobson et al. 2007). This is because users have to conform to the way the ERP system has been built in order to use it. Markus and Tanis (2000) observed that many users in organizations believe that there is need for organizational change whenever ERP packages are adopted and indeed found out that to some degree, many organisations have to change in the way they work in order to conform to the ERP systems. As such change may be introduced in an organization by adopting an ERP system as a change agent. ERP packages can be used to reinforce control systems in organizations apart

from changing the way things are done and their relative advantages may be given by the users at the organizational level (Light and Papazafeiropoulou 2004).

Best Practices Attainment

ERP systems are designed to fit the needs of many organizations. Because of this they are built to support generic business processes in the best way. Best practices are a powerful reason for organizations to adopt ERP systems since such organizations may not need to change such processes that are tested and inscribed in the software (Hammer, 1990). However given different business environments, what may be good for one adopter may not be for another and mass media effects and promotion of products by vendors may overstate the value of standardised best practices to the adopting organization (Light and Papazafeiropoulou 2004).

The need for Standardization

According to Markus and Tanis (2000), organizations adopt ERP systems in order to achieve industry standards as well as standardize business processes across different locations. Industry standards are some of the features that are built into ERP systems. This has been a major factor that is making organizations adopt ERP systems (Light, 1999). Organizations adopt the systems to achieve synergy across operations in different countries and product lines by providing users with an interface that is open throughout the whole enterprise (Light, 1999). This is achieved by ERP systems which enable organisational communication on shared and standardised systems and have the ability to engender commonality.

Light and Papazafeiropoulou (2004) argue that problems may arise with blindly adopting ERP packages because of the perceived benefits of standardization. This is because, the standards embedded in the ERP system and its implications may not be compatible with adopters. Just because others in a particular social system have adopted an ERP system, the decision to also adopt the same may be a forced one, especially when combined with other promotional efforts of vendors and the effects of mass media campaigns. This may cause problems to those in the adopting organisation as the propensity to change in line with the standard may not be present. Even more seriously, the standards implied may neither match with existing nor future models of the particular organisation.

Reduce Applications Backlog

Managers in many organizations need to make timely decisions that require ICT based support systems (Nah et al., 2001). According to them, such organizations adopt ERP systems because they are faced with backlogs of application development. The backlogs mostly occur because such organizations quite often want to deploy new systems to keep pace with the strategic needs. Light and Papazafeiropoulou (2004) quote Li (1999) and PriceWaterhouse (1996) by stating that since ERP packages are pre-built, they require a shorter implementation time. This enables organizations realise their application needs in a much shorter time, thus reducing application development backlogs. Because ERP software is outsourced from the vendor, the resources required for maintenance at the organizational level go down (Chand et al., 2005).

Eliminate Legacy Systems

Old, most often user-specific developed applications are referred to as Legacy systems (Siriginidi, 2000). Organizations have experienced data and information inconsistencies due to use of legacy systems that have multiple points of data entry together with infrequent data updates. This inaccuracy of data and information has a direct impact on the ability of managers to make decisions. Through the adoption of ERP systems organizations normally eradicate data inconsistencies, thus aiding information quality and decision making ability (Spathis and Constantinides, 2003). Organizations also see ERP systems as a means to consolidate multiple software systems with hard to maintain interfaces, and multiple support services, into one integrated service offering, thus reducing the burden of software maintenance and support (Chand et al 2005).

Cost of Development versus ERP Package

The resultant cost of adopting an ERP system as compared to that of developing an in-house package has been mentioned in several researches as one of the factors that make organizations go for ERP systems adoption (Light and Papazafeiropoulou 2004). The authors also have quoted Klepper and Hartog (1992) and PriceWaterhouse (1996) as having found out that 72% and 42% of respondents respectively suggested that ERP costs were found to be cheaper in two independent surveys carried out on cost of ERP software versus custom application development. They further found out that ERP costs

were more predictable and therefore more manageable than for custom development. Due to economies of scale for some organizations, cost is one of the biggest advantages in adopting ERP software for some companies (Chau, 1995).

Freeing the IS Function Staff

Because ERP systems are normally outsourced from vendors, it follows that less work would be required from the staff within the IS function for development work. This, was observed by PriceWaterhouse (1996) and would result in the reduction of the IS staff and the same could be deployed in other functions. In their work, Light and Papazafeiropoulou (2004) also state that it was observed that usage of ERP systems relative advantages over custom development was that it could lead to the release of information systems personnel to work on other projects. This then follows that adoption of ERP software is a way of slashing the need for in-house information systems support.

Selling Influence

Selling may occur because of mass media communication or the supply push effects of vendor promotion (Light and Papazafeiropoulou, 2004). This implies that organisations may select ERP packages as a result of an approach by a vendor or their agents. Such selling influence may include the use of vendor promotions, publications, market surveys, the internet, mailing lists, etc. According to the authors, the vendor may do so by doing strong marketing that convinces the market by depicting the ERP software as being the right solution at the right time. ERP adoption can also occur by some people in the organization selling the idea to their fellow employees (Klaus et al., 2000). The selling activity may not be the best for all organizations because some adopters may not necessarily adopt the best product for their use. Some adopters may go for a product because of advice from the experts within the industry (Klaus et al., 2000).

Management Policy

In some organizations, management may decide to adopt ERP systems as a matter of policy. More so, this is common with multi-national companies which quite often decide to have all affiliate companies in different parts of the world running similar systems. This makes it possible to make common references and apply similar decisions across the enterprise (Otieno, 2010). Similarly some organizations may opt to use ERP as a technology to help

them reduce costs while at the same time help them deliver products in the market faster than their competitors (Otieno, 2010). Light and Papazafeiropoulou, (2004) view such adoption as an authority decision and refer to Hirt and Swanson (1999) observation about a decision made at Siemens Power Corporation, where the use of ERP packages was a company policy. This policy was specific because it specified SAP adoption as an ERP product. This shows that there is the potential for management policies to influence ERP package adoption up to the specific product within the market.

Tried and Tested Syndrome

Many organizations adopt specific ERP systems because such systems have been tried and tested elsewhere, thus giving such organizations some relative advantage (Chau, 1995). The system is normally promoted in the market as having been designed and tested by the vendor and in many cases as having been installed by other organisations that can be used as reference sites by potential adopters (Heikkila et al., 1991). Many ERP package vendor websites have lists of high profile companies that have installed the product for reference. Examples include official websites like SAP, Oracle and Microsoft. Such listings have the effect of promoting the benefits of implementing the products as well as having been tested and found to be working fine in good organizations elsewhere (Efinedo, 2006), thus propelling others into adopting them,

Product Skills and Manpower Availability

Because ERP packages are meant for mass market, it is perceived that there is normally a wider support for the software than there is for custom developed software where as custom developed software knowledge is in most cases limited to the application and its developers only (Light and Papazafeiropoulou, 2004). The authors have referred to an instance at Nokia where there were only a few employees who were capable of handling the administration and development of their existing custom developed software and they had thus to adopt an ERP system to overcome this problem. However, problems may arise if a particular ERP package becomes very popular with consumers because this may lead to a shortage of skills in the market. The same problem may occur if a product becomes less popular meaning that support for the package may be hard to find. In such a case vendors may stop providing upgrades meaning that it may become expensive to acquire services for the product

in the market (Brancheau et al., 1996). Consequently, the decision to purchase such an ERP package limits the option of finding someone who knows about the software.

Bravado

Bravado may be referred to as self esteem or impression creation. According to Light and Papazafeiropoulou (2004), a reason for the adoption of an ERP package in one study was “To be able to show the big boys” and in another, it was because many other companies were implementing it. Adoption might also be that the organisation wants to be seen to be at the cutting edge (Oliver and Romm, 2000). The promotional effects of change agents, mass media and pressures from the social system to adopt or die may also be reasons for adoption (Light and Papazafeiropoulou, 2004). This is supported by a survey in which 66 per cent of respondents agreed that “without the package they would be at a competitive disadvantage in their industry and 50 per cent were motivated to adopt because they were one of the first in the industry to adopt the package (Swanson, 2003). A summary of benefits of adopting ERP systems is as summarised in Table 1

*Table1. Reasons for adopting Enterprise Resource Planning Systems
(Source: Markus and Tanis, 2000)*

	Small Companies/Simple Structures	Large Companies/Complex Structures
Technical reasons	<ul style="list-style-type: none"> ▪ Integrate applications cross functionality ▪ Replace hard-to-maintain interfaces ▪ Reduce software maintenance burden through outsourcing ▪ Eliminate redundant data entry and concomitant errors and difficulty analysing data ▪ Improve IT architecture ▪ Ease technology capacity constraints ▪ Decrease computer operating costs 	<ul style="list-style-type: none"> ▪ Most small/simple company reasons plus ▪ Consolidate multiple different systems of the same type (e.g. general ledger packages)
Business reasons	<ul style="list-style-type: none"> ▪ Accommodate business growth ▪ Acquire multi-language and multi-currency IT support ▪ Improve informal and/or inefficient business processes ▪ Clean up data and records through standardization ▪ Reduce business operating and administrative expenses ▪ Reduce inventory carrying costs and stock outs ▪ Eliminate delays and errors filling customers' orders for merged businesses 	<ul style="list-style-type: none"> ▪ Most small/simple company reasons plus ▪ Provide integrated IT support ▪ Standardise different numbering , naming, and coding schemes ▪ Standardise procedures across different locations ▪ Present a single phase to the customer ▪ Acquire a worldwide 'available to promise' capability. ▪ Streamline financial consolidations ▪ Improve companywide decision support

2.4 Barriers to ERP Software Adoption

Despite the significant benefits that ERP software packages provide in managing and integrating cross-functional business processes there are several barriers that relate to their adoption. For any potential ERP application, barriers to its adoption may be summarised into organisational, managerial and technical barriers.

Organizational

Lack of change management: Many ERP systems have in-built processes that may require an adopting organization to change accordingly (Hawking et al., 2004). This is also referred to as business process re-engineering. It is important that for ERP adoption to occur, change management has to take place. This may be described as the fundamental rethinking and radical redesign of business processes aimed at achieving dramatic improvements in critical contemporary measures of performance such as cost, quality, service and speed that are endowed in the ERP systems (Corbitt et al., 2004). Organizations should be willing to change their businesses to fit the ERP software in order to minimize the degree of customization needed. Adoption of ERP systems requires examination of many business processes which are believed to be important and beneficial results of the adoption of ERP systems (Al-Mashari and Al-Mudimigh., 2003).

Long time required for ERP Implementation: The systems are complex and implementing them can be challenging and time consuming. As quoted by Light and Papazafeiropoulou (2004), implementation of SAP at Dell Corporation was going to take too long and because of this the project was abandoned. This was because deployment was going to take several years in their plan.

ERP is too expensive: ERP projects are expensive for organizations that adopt ERP systems (Davenport, 1998). For example, SAP installation for some companies cost some companies roughly \$30 million in licence fees and \$200 million in professional services (Ekanayaka et al., 2002). Such huge amounts in capital investments are indeed quite a big barrier to ERP adoption.

Managerial

Lack of technical staff and training: Lack of technical staff to handle ERP adoption and lack of training in adopting organizations is argued to be one of the barriers

towards ERP systems adoption. (Sarket and Lee, 2002; Hawking et al., 2004; Corbitt et al., 2004; Shanks et al., 2003; Yen et al., 2002) An adoption process may fail in the end due to lack of proper training. Many researchers consider users training and education to be an important factor of successful ERP adoption. The main reason for education and training program for ERP adoption is to make the user comfortable with the system and increase the expertise and knowledge level of the people (Hawking et al., 2004; Corbitt et al., 2004). ERP related concepts such as features of an ERP system, and hands on training are all important dimensions of a training program for ERP adoption (Sheikh, 2003; Umble et al., 2003; Yen et al., 2002). In this context, training is required not only for using the new system, but also in new processes and in understanding the integration within the system.

Poor project management: Project Management involves the use of skills and knowledge in coordinating the scheduling and monitoring of defined activities to ensure that the stated objectives of implementing projects are achieved (Hawking et al., 2004; Corbitt et al., 2004). The formal project implementation plan defines project activities, commits personnel to those activities, and promotes organizational support by organizing the implementation process (Huang and Palvia, 2001; Umble et al., 2003). ERP adoption requires that the same has to be treated and be implemented as a project. Lacking or having poor project management skills is thus a barrier to ERP adoption in organizations.

Lack of support from top management: Top management support has been consistently identified as the most important and crucial ERP adoption barrier (Huang and Palvia, 2001; Sarket and Lee, 2002; Umble et al., 2003; Al-Mashari and Al-Mudimigh., 2003; Yen et al., 2002). Top management is looked upon to provide the necessary resources and authority or power for ERP adoption. Top management support in ERP adoption has two main facets of providing leadership and necessary resources.

Technical

Poor IT infrastructure: It is argued that in order to adopt an ERP system, adequate IT infrastructure, that is hardware and networking are crucial (Huang and Palvia, 2001; James, 2004). Hardware selection is driven by the firm's choice of an ERP software package. The ERP software vendor generally certifies which hardware (and

hardware configurations) must be used to run the ERP system. Lack of appropriate IT infrastructure is thus a barrier to ERP adoption.

Complexity and Difficulty in integrating existing applications: Integration with the existing legacy systems and other applications with the ERP system to provide a common interface has been a major challenge. It has been cited that ERP adoption involves a complex transition from legacy information systems and business processes to an integrated IT infrastructure and common business process throughout the organization (Spathis and Constantinides, 2003; Umble et al., 2003). This is a critical barrier to ERP adoption since many legacy systems hold crucial company information and lack of integration may be a big barrier to the adoption of ERP systems within such organizations.

From the analysis of the various literature it should be noted, that not all companies that have adopted ERPs are satisfied with the results of using such systems. Many companies consider their adoption attempts to have failed (Langenwalter, 2000; and Umble et al., 2003). Examining the barriers encountered in adopting ERP systems may help to explain why the related benefits have not been fully realised by the organisations, and it may also provide an understanding of the potential of using such systems.

2.5 Theoretical framework for ERP software Adoption

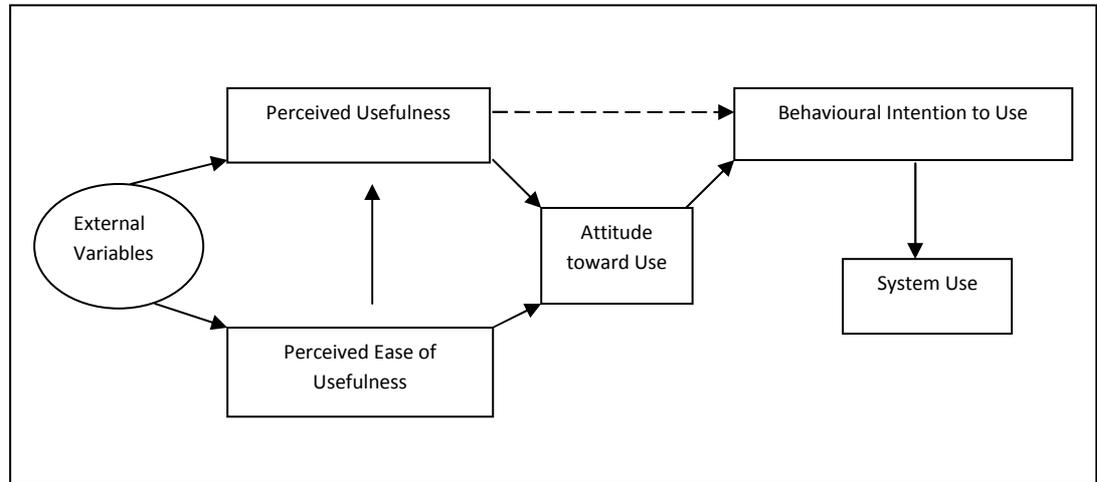
A number of theoretical models have been proposed to help in understanding the factors that impact the acceptance of information technologies (Davis, 1989; Chau, 1995, Venkatesh and Davis, 2000). Enterprise Resource planning systems are technological innovations and these models of technology adoption can be applied to understand how they are adopted in organizations. Following are some of the technology adoption models:

2.5.1 Technology Acceptance Model

Technology Acceptance Model (TAM) is one of the models that is mostly used in explaining information technology systems adoption behaviour. TAM assumes that beliefs about usefulness and ease of use are always the primary determinants of information technology adoption in organizations (Marchewka et al. 2007). According to TAM, these two determinants serve as the basis for attitudes towards

using a particular system, which in turn determines the intention to use, and then generates the actual usage behaviour. Perceived usefulness is the extent to which a user believes that the system will enhance his job performance whereas perceived ease of use is the extent to which the user believes that using the system would be free of mental efforts (Davis, 1989).

Figure 2 - Technology Acceptance Model



Source: (Pavlou, 2001)

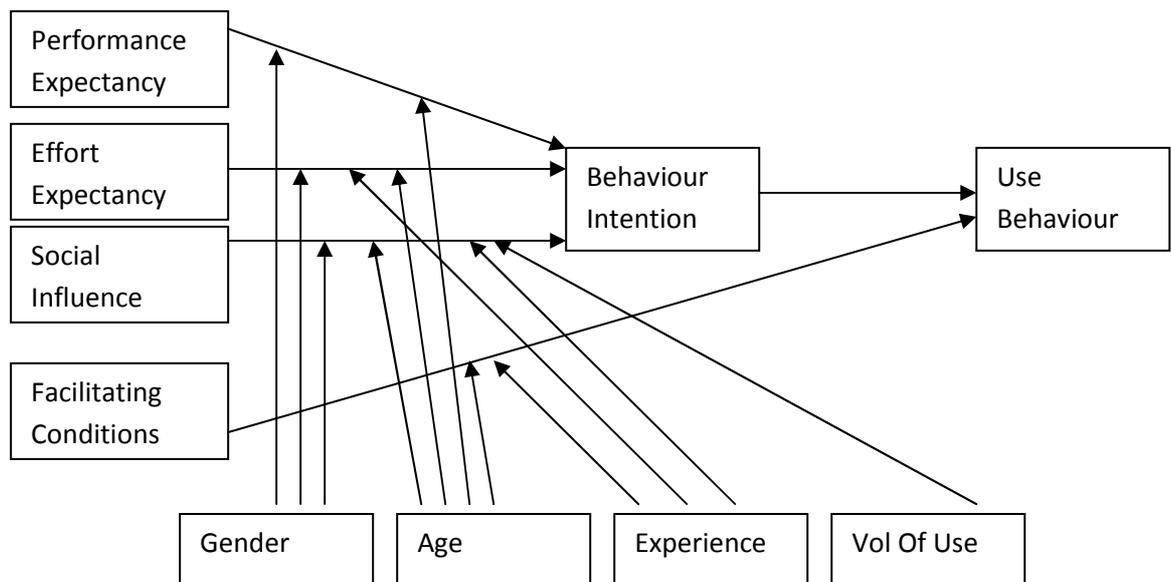
The TAM model has been used for many studies as a theoretical basis for predicting those factors that influence the use or adoption of information technology or new technological innovation (Pavlou, 2001). As depicted in Figure 2, two perceptions are critical to the adoption of new technology, namely *perceived usefulness* (PU) which relates to extrinsic characteristics such as efficiency and effectiveness and *perceived ease of use* (PEOU) which relates to intrinsic characteristics such as ease of use and flexibility. These two combined perceptions influence the adoption of new technologies (Adams et al, 1992).

2.5.2 Unified Theory of Acceptance and Use of Technology (UTAUT) Model

The TAM model was developed to determine information technology acceptance in organizations and in order to have a unified model where individual users could be covered, the Unified Theory of Acceptance and Use of Technology was developed. Venkatesh, Morris, Davis, and Davis (2003) developed the UTAUT model to consolidate previous TAM related studies (Marchewka and Liu, 2007). In this model, performance expectancy and effort expectancy are used to incorporate the constructs

of perceived usefulness and ease of use in the original TAM model. The model attempts to explain how individual differences influence technology use. The relationship between perceived usefulness, ease of use, and intention to use can be moderated by age, gender and experience (Marchewka and Liu, 2007).

Figure 3: UTAUT Model (Source: Venkatesh 2003)



Marchewka and Liu, (2007) for example state that the strength between perceived usefulness and intention to use varies with age and gender such that it is more significant for male and younger workers where as the effect of perceived ease of use on intention is also moderated by gender and age such that it is more significant for female and older workers. These effects decrease with experience. The UTAUT model has been able to account for variances in adoption of technologies more than the TAM model (Marchewka and Liu, 2007).

2.5.3 Rogers Diffusion of Innovations (DOI) Model

Rogers Diffusion of Innovation model (Rogers, 1995; 2003) is one of the most widely used rational theories in studying innovation adoption. This model traces and explains the path of an innovation's acceptance through a given social system, over time. Social influences may impede or facilitate this process although the emphasis is focused on the innovation itself. According to (Rogers, 1995), and other rational

diffusion theorists such as (Moore and Benbasat, 1991; Agarwal and Prasad, 1997), there are certain characteristics of innovations which affect their rate of adoption. According to Rogers, diffusion is the process by which an innovation is communicated through various channels over time among the members of a social system. The four main elements in the diffusion of innovation are:

Innovation: It is an idea, practice, or object that is perceived as new by an individual or other unit of adoption.

Communication Channels: These are the processes by which participants create and share information with one another in order to reach a mutual understanding. A communication channel is the means by which messages get from one individual to another

Time: The time dimension is involved in diffusion in three ways. First, time is involved in the innovation-decision process. The innovation-decision process is the mental process through which an individual (or other decision-making unit) passes from first knowledge of an innovation to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision. The second way in which time is involved in diffusion is in the innovativeness of an individual or other unit of adoption. Innovativeness is the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than other members of a social system. The third way in which time is involved in diffusion is in rate of adoption. The rate of adoption is the relative speed with which an innovation is adopted by members of a social system.

The social system: The fourth main element in the diffusion of new ideas is the social system. A social system is defined as a set of interrelated units that are engaged in joint problem-solving to accomplish a common goal.

Application of Rogers Diffusion of Innovations Model

The characteristics of an innovation, as perceived by the members of a social system, determine its rate of adoption. An innovation that is compatible with the existing idea and also has relative advantage will be rapidly adopted and vice versa. This scenario is also applicable to innovations that can be tried and tested.

Adoption rate of complex innovations on the other hand is slow because users may require new skills. Mass media channels are more effective in creating knowledge of innovations, whereas interpersonal channels are more effective in forming and changing attitudes toward a new idea, and thus in influencing the decision to adopt or reject a new idea. Most individuals evaluate an innovation, not on the basis of scientific research by experts, but through the subjective evaluations of near-peers who have adopted the innovation.

Innovators: These are the first 2.5 percent of the individuals in a system to adopt an innovation. Being an innovator has several prerequisites. Control of substantial financial resources is helpful to absorb the possible loss from an unprofitable innovation.

Early adopters: These are the next 13.5 percent of the individuals in a system to adopt an innovation. Early adopters are a more integrated part of the local system than are innovators.

Early majority: These are the next 34 percent of the individuals in a system to adopt an innovation. The early majority adopt new ideas just before the average member of a system.

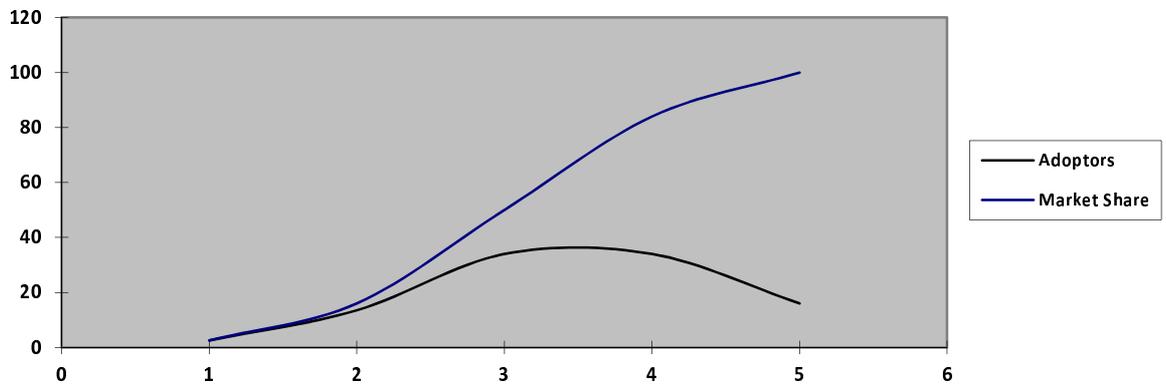
Late majority: These are the next 34 percent of the individuals in a system to adopt an innovation. The late majority adopt new ideas just after the average member of a system. Like the early majority, the late majority make up one-third of the members of a system.

Laggards: These are the last 16 percent of the individuals in a system to adopt an innovation.

The rate of adoption is usually measured as the number of members of the system that adopt the innovation in a given time period. The members or units of a social system may be individuals, informal groups, organizations, and/or subsystems. A final crucial concept in understanding the nature of the diffusion process is the critical mass, which occurs at the point at which enough individuals have adopted an innovation that the innovation's further rate of adoption becomes self-sustaining (the area below the Adopters graph between Innovators and Early Adopters in Figure 4 depicts the critical mass). This is actually the first 16% of the adopters.

Figure 4: Diffusion of Innovation percentages

(Source: Rogers, 1995)

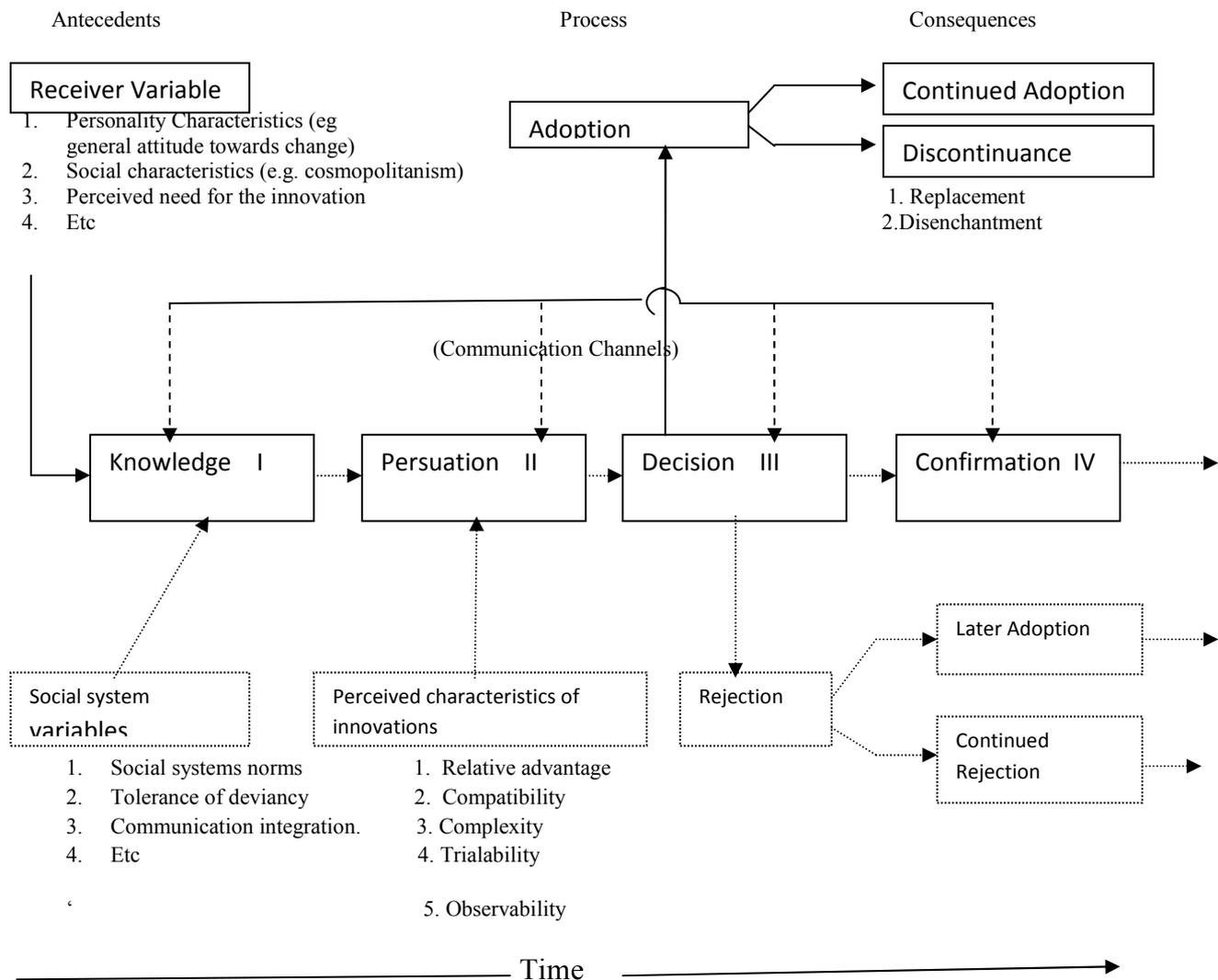


Key: 1=Innovators; 2=Early Adopters; 3=Early Majority; 4=Late Majority; 5=Laggards
2.5% 13.5% 34% 34% 16%

Rogers' makes quite a lot of these attributes in his work and indeed, other studies have sought to extend these further (Moore and Benbasat, 1991; Agarwal and Prasad, 1997).

Conceptual Model

Figure 5. Diffusion of Innovation Model
(Source: Rogers, 1995)



2.5.4 Research Model

Of the three models (TAM, UTAUT and DOI) discussed in the literature review previously, any one of them could be applied in this research. However, the researcher chose to use Rogers Diffusion of Innovations Model (DOI). This is because some of the reasons as to why the research was being done were to determine the *extent* and the *rate of adoption over time* of ERP systems amongst NSE listed companies. Neither TAM nor UTAUT model talks about extent and rate of adoption of technology innovation though these can mathematically be arrived at within the

research framework. The DOI model was found to be more appropriate because it talks of market share and number of adoptions over a given time in terms of Innovators, Early Adopters, Early Majority, Late Majority and Laggards. The model was further adopted because it talks of social systems. This was thought to be a good model for the research because ERP systems are adopted in social systems whereby even a single unit of adoption (company) is a social system in itself. By adopting the DOI model, the research could also validate Rodgers theory in the adoption of ERP systems within the Kenyan context.

Limitation of Rogers Diffusion of Innovations Model

Indeed Rogers says that all innovations are not the same and that there are some elements of the innovation itself that the potential users perceive as important (or not) during their decision to adopt or reject the innovation. It has been argued that Rogers's theory is not the best for innovation diffusion studies for complex information technologies since it does not take into consideration the particularities of these systems (Lyytinen and Damsgaard, 2001). The theory has been judged as poorly equipped to facilitate the understanding of how different groups interact in the production and provision of an innovation as well as lacking attention to acts of reinvention and the consequences of innovation adoption (Kautz and Pries-Heje, 1996; Allen, 2000; Elliot and Loebbecke, 2000; Papazafeiropoulou, 2002b). In contrast, interpretive approaches, such as those concerned with the social construction of technology (Bijker and Law, 1994), emphasise the way that technologies are configured throughout the process of diffusion by various actors, or relevant social groups, such as professional associations. A further, less well-reported perspective of innovation is that of critical theorists. (Suchman and Bishop, 2000) argue that although innovation is often associated with 'the new' it is possible that some innovators actually wish to reinforce existing power structures. Thus, those resisting the innovation can be the 'real' innovators, as they desire something different.

3.0 RESEARCH METHODOLOGY

3.1 Research Design

This was a descriptive study and the researcher considered the survey method to be a suitable research method for the investigation. Previous research has revealed that the survey method appropriate when investigating technology adoption (Venkatesh, et al. 2000) surrounded this study. Thus a census survey of the NSE listed Companies was conducted. The study therefore adopted a cross-sectional design with the respondents being the senior management staff in charge of Information Technology Systems.

3.2 Population and Sampling

The study focused on all the 47 NSE listed companies shown in Appendix A. The NSE listed companies were selected largely because they virtually represent all sectors of the economy and that many of them have taken a leading role in implementing ICT solutions and they are reported to spend huge amounts on these ICT projects. The unit of analysis was the companies, presented through the relevant management staff. The study did a Census of the entire NSE companies. Although census has its limitations including inaccuracies in the analysis, it provides a complete snapshot in time hence the reason it was selected for the study.

3.3 Data Description and Collection

Primary data was collected for the purpose of the study. It was collected using a self-administered questionnaire available in the appendix. The questionnaire was semi-structured, having both open-ended and closed-ended questions. It was administered to the managers at their offices or through their electronic mail. The questionnaire was divided into four parts. The objective of the first part was getting the demographic information on the company and general awareness on ERP systems deemed relevant for the study. The second part and third of the questionnaire was used to examine the adoption factors and barriers to ERP adoption respectively. The 5-scale Likert type scale was adopted for the study.

3.4 Data Analysis

The data collected was edited for accuracy, uniformity, consistency and completeness and arranged to enable coding and tabulation before final analysis (Cooper and Emory, 1995). The data collected from the study was mainly presented through the

use of summarized percentages, proportions and tabulations in all the sections of the questionnaire. Mean scores and standard deviations were evaluated and ranked to give the relative importance of the various variables of the study.

4.0 DATA ANALYSIS RESULTS AND DISCUSSIONS

Introduction

This section provides the data analysis and findings of the study. The data was analysed using frequencies, means, standard deviations and factor analysis. The findings were presented in tables and graphs. Sections A and D were analysed using proportions in percentages, means and standard deviations where as sections B and C were analysed by factors. This was done so as to reduce the variables to the underlying factors.

4.1 Demographic Information

The variables used here were mainly for providing insight information on the various companies listed on the Nairobi Stock Exchange. Forty seven (47) questionnaires were sent out to all the companies listed on the NSE. All the 47 companies sent back their feedback within the specified period. This resulted in a response rate of 100%. All the 47 responses were complete and found fit for use in data analysis.

4.1.1 Respondents and Type of Management

One respondent per company was asked to give a feedback by answering questions in the questionnaire. The respondents were the overall heads of the ICT function within the various NSE listed companies. They ranged from Directors, Managers down to Supervisors. The various respondents' positions in the listed companies were as summarised in table 2.

Table 2: Summary of the respondents

		Position of Respondent in the company			
Position Held by Respondent		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Supervisor	5	10.6	10.6	10.6
	Manager	35	74.5	74.5	85.1
	Director	7	14.9	14.9	100.0
	Total	47	100.0	100.0	

From the study, it was concluded that the ICT functional heads in most of the NSE listed companies are either managers or directors since this group of respondents constituted 89% of the population with supervisors taking the remaining 11%.

Similarly, the compositions' of top management within the various companies were classified as Indigenous, Foreign or both Indigenous & Foreign and the results were as contained in table 3 below. There was not even a single company whose management composition was foreign only. 66% of management compositions were made up of both indigenous and foreign managers.

Table 3: Summary of the Management Composition

Management Composition					
Management Composition		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Indigenous	16	34.0	34.0	34.0
	Both	31	66.0	66.0	100.0
	Total	47	100.0	100.0	

4.1.2 Company Classification, Age and Turnover

The companies listed on the NSE are classified into four categories namely: Agriculture, Commercial & Services, Finance & Investment, and Industrial & Allied by the stock market. Respondents were asked to give the year of incorporation of the companies. The average age of the companies listed on the NSE was found to be 54 years old with a standard deviation of 26 years. The oldest company was 120 years with the youngest being 11 years old. The summaries of company classifications and age were as shown in tables 4a and 5 respectively. Adoption per Business classification was as contained in table 4b.

Adoption of ERP systems was found to be highest within companies classified as Industrial & Allied at 94%. This was followed by Commercial & Services at 73% and Agriculture at 66%. The least adoption was in Financial & Services at 38%.

Table4a: Summary of the Company Classifications

Company Business Classification					
Company Classification		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agriculture	3	6.4	6.4	6.4
	Commercial and Services	11	23.4	23.4	29.8
	Finance and Investment	16	34.0	34.0	63.8
	Industrial and Allied	17	36.2	36.2	100.0
	Total	47	100.0	100.0	

Table4b: Summary of the Company Classifications and ERP Adoptions

Company Type and ERP Adoptions					
Company Classification		Adopted ERP	Not	Adopted Percent	Not Adopted
			Adopted		Percent
		ERP	ERP		
Valid	Agriculture	2	1	67	33
	Commercial and Services	8	3	73	27
	Finance and Investment	6	10	38	42
	Industrial and Allied	16	1	94	6
	Total	32	15	68	32

Table5: Age Statistics for the NSE Listed Companies

Age Statistics in Years

N	Valid	47
	Missing	0
Mean		54
Std. Deviation		26
Minimum		11
Maximum		120
Sum		2527

From the observations it was concluded that majority of the companies listed on the Nairobi Stock Exchange were incorporated in Kenya before the country became independent in 1963. The companies also straddle all sectors of the Kenyan economy such as agriculture, banking, utilities, finance and manufacturing and majority of them (49%) have an annual turnover of more than 5 billion Kenya shillings. The turnover per company is as summarised in table 6.

Table 6: Summary of the Company Annual Turnover

Summary of Annual Turn Over					
What is your Annual Turnover ?		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 1 Billion	6	12.8	12.8	12.8
	Between 1 and 1.9 Billion	6	12.8	12.8	25.5
	Between 2 and 2.9 Billion	3	6.4	6.4	31.9
	Between 3 and 3.9 Billion	6	12.8	12.8	44.7
	Between 4 and 4.9 Billion	3	6.4	6.4	51.1
	5 Billion or more	23	48.9	48.9	100.0
	Total	47	100.0	100.0	

4.1.3 ERP Awareness and Need for Implementation

The respondents were asked if at all they were aware of existence of Enterprise Resource planning software in the market and if at all they saw any need for adopting the same. They were asked to state all the means through which they came to learn of the ERPs existence in the market. The study found out that all but one knew of the existence of ERPs in the market. This represented a 98% awareness of ERP systems existence in the market and it was as tabulated below.

Table 7: Summary of ERP existence awareness

ERP Existence Awareness					
ERP Aware?		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	46	97.9	97.9	97.9
	No	1	2.1	2.1	100.0
	Total	47	100.0	100.0	

From this observation, it was concluded that there is a high degree of awareness of the existence of Enterprise Resource Planning software systems within the NSE listed firms. Out of all the respondents, 72% of them felt that ERP adoption in their firms was necessary where as the remaining 28% felt that they did not need ERP systems in their companies. It may be prudent to find out by doing further research as to why these respondents felt that they did not need to adopt ERP systems within their firms. A possible reason may be due to the nature of their businesses and the structure of ERP systems available in the market. The summary of this observation was as contained in table 8.

Table 8: Summary of ERP systems necessity

ERP Necessity					
IS ERP Necessary?		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	34	72.3	72.3	72.3
	No	13	27.7	27.7	100.0
	Total	47	100.0	100.0	

Further observations made in ERP awareness within the NSE listed companies revealed that most companies have learnt of existence of ERP systems in the market

through ERP vendors followed by friends in other companies at 89% and 49% respectively. The observation summary was as shown in table 9. It was concluded that the uptake by NSE listed companies on ERP adoption was mainly because of ERP vendor marketing, interaction with other ERP users from other companies and due to sister companies that had already adopted the systems.

Table 9: Summary of ERP awareness mediums

Medium of ERP awareness					
Medium of ERP Awareness		Frequency	Respondents %	Percent	Valid Percent
Valid	Friends in other companies	23	49	49	49
	Mass media	9	19	19	19
	Sister company	18	38	38	38
	ERP Vendor	42	89	89	89
	Internet	11	23	23	23
	Other means	0	0	0	0
	Total Respondents	47			

4.2 Determinants of ERP Adoption

The respondents were asked to choose how strongly they agreed or disagreed with given statements as reasons as to why they would consider adopting ERP software in their companies. They gave answers to the questions that had a scale of 1 to 5 and the observations were as presented from tables 10 to 21. The scale of 5 meant that the respondents strongly agreed with the statement. A 4 implied that the respondent was in agreement with the statement where as a 3 was for disagreement with the statement. A 2 meant that the respondent strongly disagreed with the statement where as a 1 meant that the statement was inapplicable. All statements were about factors that influence ERP adoption in companies. Every statement was about one factor that could determine or influence ERP adoption.

The observations made from the study against every statement were as follows:

Variable 1 was meant to find out whether companies could adopt ERP systems as a means of implementing change within an organization. 92% of the respondents either agreed or strongly agreed with the statement while the rest (8%) disagreed or found it inapplicable.

Table 10: Use ERP to Implement Change

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Applicable	2	4.3	4.3	4.3
	Disagree	2	4.3	4.3	8.5
	Agree	22	46.8	46.8	55.3
	Strongly Agree	21	44.7	44.7	100.0
	Total	47	100.0	100.0	

Variable 2 was for finding out if ERP adoption could help companies to attain best practice. 87% of the respondents agreed or strongly agreed whereas 13% either disagreed or found it inapplicable.

Table 11: Use ERP to attain Best Practice

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Applicable	2	4.3	4.3	4.3
	Disagree	4	8.5	8.5	12.8
	Agree	19	40.4	40.4	53.2
	Strongly Agree	22	46.8	46.8	100.0
	Total	47	100.0	100.0	

Variable 3 was to find out from the respondents if ERP adoption could help companies standardize operations within the firms. 87% of the respondents either agreed or strongly agreed whereas 13% either disagreed or found it inapplicable.

Table 12. Standardize operations

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Applicable	2	4.3	4.3	4.3
	Disagree	4	8.5	8.5	12.8
	Agree	20	42.6	42.6	55.3
	Strongly Agree	21	44.7	44.7	100.0
	Total	47	100.0	100.0	

Variable 4 was aimed at finding out if ERP adopters could use the systems in order to reduce internally developed applications. 83% agreed or strongly agreed whereas 17% either disagreed or found it inapplicable.

Table 13. Reduce internally Developed Applications

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Not Applicable	3	6.4	6.4	6.4
Disagree	5	10.6	10.6	17.0
Agree	20	42.6	42.6	59.6
Strongly Agree	19	40.4	40.4	100.0
Total	47	100.0	100.0	

Variable 5 was for finding out if ERPs could be adopted as a means of getting rid of legacy systems. 83% agreed or strongly agreed. 13% disagreed and 4% found it inapplicable.

Table 14. Get Rid of Legacy systems

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Not Applicable	2	4.3	4.3	4.3
Disagree	6	12.8	12.8	17.0
Agree	22	46.8	46.8	63.8
Strongly Agree	17	36.2	36.2	100.0
Total	47	100.0	100.0	

Variable 6 aimed at finding out if ERPs could be adopted because they are cheaper than internally developed systems. 53% agreed or strongly agreed. 45% disagreed or strongly disagreed and 2% found it inapplicable.

Table 15. *ERP are Cheaper than internally developed Applications*

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Not Applicable	1	2.1	2.1	2.1
Strongly Disagree	8	17.0	17.0	19.1
Disagree	13	27.7	27.7	46.8
Agree	16	34.0	34.0	80.9
Strongly Agree	9	19.1	19.1	100.0
Total	47	100.0	100.0	

Variable 7 aimed at finding out if ERPs could be adopted so that IS Function staff could be deployed to other duties within the company. 41% either agreed or strongly agreed. 55% disagreed or strongly disagreed and 4% found it inapplicable.

Table 16. *Free IS Staff for deployment to other duties*

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Not Applicable	2	4.3	4.3	4.3
Strongly Disagree	4	8.5	8.5	12.8
Disagree	22	46.8	46.8	59.6
Agree	13	27.7	27.7	87.2
Strongly Agree	6	12.8	12.8	100.0
Total	47	100.0	100.0	

Variable 8 was for finding out if ERP Vendors or Resellers influence could make organizations adopt ERP systems. 36% either agreed or strongly agreed. 58% disagreed or strongly disagreed and 6% found it inapplicable.

Table 17. ERP Vendor or Reseller Influence

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Applicable	3	6.4	6.4	6.4
	Strongly Disagree	7	14.9	14.9	21.3
	Disagree	20	42.6	42.6	63.8
	Agree	13	27.7	27.7	91.5
	Strongly Agree	4	8.5	8.5	100.0
	Total	47	100.0	100.0	

Variable 9 was used to determine if management policy could affect ERP adoption within the organizations. 91% either agreed or strongly agreed. 7% disagreed or strongly disagreed and 2% found it inapplicable.

Table 18. Management Policy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Applicable	1	2.1	2.1	2.1
	Strongly Disagree	1	2.1	2.1	4.3
	Disagree	2	4.3	4.3	8.5
	Agree	16	34.0	34.0	42.6
	Strongly Agree	27	57.4	57.4	100.0
	Total	47	100.0	100.0	

Variable 10 was used to test the fact that ERPs could be adopted by companies because the systems have been tried and tested. 83% either agreed or strongly agreed. 13% disagreed and 4% found it inapplicable.

Table 19. ERP are Tried and Tested

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Applicable	2	4.3	4.3	4.3
	Disagree	6	12.8	12.8	17.0
	Agree	31	66.0	66.0	83.0
	Strongly Agree	8	17.0	17.0	100.0
	Total	47	100.0	100.0	

Variable 11 was for finding out if availability of skilled manpower could influence adoption of ERPs by the various companies. 66% either agreed or strongly agreed. 32% disagreed or strongly disagreed and 2% found it inapplicable.

Table 19. Availability of skilled Manpower

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Applicable	1	2.1	2.1	2.1
	Strongly Disagree	3	6.4	6.4	8.5
	Disagree	12	25.5	25.5	34.0
	Agree	25	53.2	53.2	87.2
	Strongly Agree	6	12.8	12.8	100.0
	Total	47	100.0	100.0	

Variable 12 was used to find out if ERPs could be adopted as a sign of showing off (self ego) to others. 19% either agreed or strongly agreed. 68% disagreed or strongly disagreed and 13% found it inapplicable.

Table 20: ERP Adoption for Self Ego

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Applicable	6	12.8	12.8	12.8
	Strongly Disagree	23	48.9	48.9	61.7
	Disagree	9	19.1	19.1	80.9
	Agree	7	14.9	14.9	95.7
	Strongly Agree	2	4.3	4.3	100.0
	Total	47	100.0	100.0	

A summary of the above 12 variables was done as shown in table 21

Table 21 Determinants of ERP adoption.

Factors that influence ERP Adoption	N	Mean	Std. Deviation
Management Policy	47	4.43	.853
Implement change on how the company operates	47	4.28	.902
Make the company attain Best Practice within the Industry	47	4.26	.943
Standardize operations within the enterprise	47	4.23	.937
Reduce Applications developed internally	47	4.11	1.047
Get rid of Legacy Systems from the company	47	4.11	.938
ERPS are Tried and Tested by other companies	47	3.91	.830
Availability of Manpower	47	3.68	.862
ERPs are Cheaper compared to in-house development	47	3.51	1.061
Can free IS function Staff to attend to other duties	47	3.36	.965
Convinced by the ERP Vendors and Resellers	47	3.17	1.007
To improve on Self Ego and Esteem	47	2.49	1.040
Valid N (list wise)	47		

It was concluded that within the NSE listed companies, management policy matters most as far as the adoption of ERPs are concerned. Thus if the management sees no need for adoption of an ERP system, such a company will not go for the adoption and vice versa. ERP adoption could be triggered by factors like need for change management, attainment of best practice within the specific industry and standardization of operations. The firms also considered other factors that may make them adopt ERP systems. These included reduction of internally developed applications and getting rid of legacy systems. They also viewed ERPs are tried and tested systems. Availability of manpower for the ERP systems could also influence firms in adopting the systems.

On the contrary, self ego was not considered as an influencing factor towards ERP adoption amongst firms on the NSE. Firms would also not go for an ERP system because a vendor has tried to convince them to do so. Freeing of the IS Function so that the staff would be deployed to other functions could neither be taken as an influencing factor nor a barrier to the adoption of ERP systems.

4.3 Barriers to ERP Adoption

The respondents were asked to choose how strongly they agreed or disagreed with given statements as reasons as to why they would not consider adopting ERP software in their companies. They gave answers to the questions that had a scale of 1 to 5 and the observations were as presented from tables 22 to 31. The scale of 5 meant that the respondents strongly agreed with the statement. A 4 implied that the respondent was in agreement with the statement where as a 3 was for disagreement with the statement. A 2 meant that the respondent strongly disagreed with the statement where as a 1 meant that the statement was inapplicable. All statements were about factors that inhibit ERP adoption in companies. Every statement was about one factor that can bar or inhibit ERP adoption.

The observations made from the study against every statement were as follows:

Variable 13 presumed that an ERP system could not be adopted if a lot of changes were required in the organization. 70% either agreed or strongly agreed. 23% disagreed or strongly disagreed and 7% found it inapplicable.

Table 22.No adoption if ERP Requires a lot of changes

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Not Applicable	3	6.4	6.4	6.4
Strongly Disagree	1	2.1	2.1	8.5
Disagree	10	21.3	21.3	29.8
Agree	18	38.3	38.3	68.1
Strongly Agree	15	31.9	31.9	100.0
Total	47	100.0	100.0	

Variable 14 assumed that an ERP system could not be adopted if a long time was needed for implementation. 62% either agreed or strongly agreed. 34% disagreed or strongly disagreed and 4% found it inapplicable.

Table 23. No Adoption if Long Time is Needed

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Applicable	2	4.3	4.3	4.3
	Strongly Disagree	2	4.3	4.3	8.5
	Disagree	14	29.8	29.8	38.3
	Agree	13	27.7	27.7	66.0
	Strongly Agree	16	34.0	34.0	100.0
	Total	47	100.0	100.0	

Variable 15 assumed that an ERP system could not be adopted if it was found to be expensive. 64% either agreed or strongly agreed. 30% disagreed or strongly disagreed and 6% found it inapplicable.

Table 24. No Adoption if Very Expensive

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Applicable	3	6.4	6.4	6.4
	Strongly Disagree	3	6.4	6.4	12.8
	Disagree	11	23.4	23.4	36.2
	Agree	14	29.8	29.8	66.0
	Strongly Agree	16	34.0	34.0	100.0
	Total	47	100.0	100.0	

Variable 16 presumed that lack of skills would make an ERP system not be adopted. 60% either agreed or strongly agreed. 36% disagreed or strongly disagreed and 4% found it inapplicable.

Table 25. No adoption if there is Lack of Skills

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Applicable	2	4.3	4.3	4.3
	Strongly Disagree	3	6.4	6.4	10.6
	Disagree	14	29.8	29.8	40.4
	Agree	23	48.9	48.9	89.4
	Strongly Agree	5	10.6	10.6	100.0
	Total	47	100.0	100.0	

Variable 17 assumed that lack of project management skills within an organization would make an ERP system not to be adopted. 45% either agreed or strongly agreed. 49% disagreed or strongly disagreed and 6% found it inapplicable.

Table 26: No Adoption is there is Lack of Project Management Skills

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Applicable	3	6.4	6.4	6.4
	Strongly Disagree	3	6.4	6.4	12.8
	Disagree	20	42.6	42.6	55.3
	Agree	18	38.3	38.3	93.6
	Strongly Agree	3	6.4	6.4	100.0
	Total	47	100.0	100.0	

Variable 18 presumed that an ERP system could not be adopted if there was no support from top management. 92% either agreed or strongly agreed. 4% disagreed or strongly disagreed and 4% found it inapplicable.

Table 27: No adoption if there is no support from Top Management

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Not Applicable	2	4.3	4.3	4.3
Strongly Disagree	1	2.1	2.1	6.4
Disagree	1	2.1	2.1	8.5
Agree	18	38.3	38.3	46.8
Strongly Agree	25	53.2	53.2	100.0
Total	47	100.0	100.0	

Variable 19 presupposed that an ERP system could not be adopted if there was poor ICT infrastructure. 92% either agreed or strongly agreed. 4% disagreed or strongly disagreed and 4% found it inapplicable.

Table 28: No Adoption if there is poor ICT Infrastructure

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Not Applicable	2	4.3	4.3	4.3
Disagree	2	4.3	4.3	8.5
Agree	20	42.6	42.6	51.1
Strongly Agree	23	48.9	48.9	100.0
Total	47	100.0	100.0	

Variable 20 assumed that an ERP system could not be adopted if it was complex. 66% either agreed or strongly agreed. 30% disagreed or strongly disagreed and 4% found it inapplicable.

Table 29: No Adoption if ERP is Complex

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Not Applicable	2	4.3	4.3	4.3
Strongly Disagree	3	6.4	6.4	10.6
Disagree	11	23.4	23.4	34.0
Agree	23	48.9	48.9	83.0
Strongly Agree	8	17.0	17.0	100.0
Total	47	100.0	100.0	

Variable 21 assumed that an ERP system would not be adopted if it could not integrate with other systems. 83% either agreed or strongly agreed. 13% disagreed and 4% found it inapplicable.

Table 30: No Adoption if ERP Cannot Integrate

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Not Applicable	2	4.3	4.3	4.3
Disagree	6	12.8	12.8	17.0
Agree	19	40.4	40.4	57.4
Strongly Agree	20	42.6	42.6	100.0
Total	47	100.0	100.0	

A summary of the above 9 variables was done as shown in table 31

Table 31: A summary of barriers to ERP adoption.

Adoption Barriers			
Factors that Inhibit ERP Adoption	N	Mean	Std. Deviation
If there is lack of Top Management support	47	4.34	.962
If there is lack of proper ICT Infrastructure	47	4.32	.911
If the ERP Cannot Integrate with other systems	47	4.17	.963
IF Many Changes are Needed in order to Implement	47	3.87	1.096
If a Long Time is Needed to implement	47	3.83	1.090
If the ERP is Very Expensive	47	3.79	1.178
If the ERP is Complex	47	3.68	.980
If there is Lack of Skills	47	3.55	.928
If there is lack of Project management Skills	47	3.32	.935
Valid N (listwise)	47		

It was observed that lack of management support was the strongest barrier to adoption of ERP systems within the NSE listed companies. Lack of proper ICT infrastructure was the second strongest barrier to the adoption followed by lack of integration of the ERP systems with the existing applications. In general, if a lot of changes were needed before adoption of ERP systems as well as time required being too long, then these factors followed respectively as barriers. If an ERP was found to be too

expensive or too complex then these became barriers as well to its adoption. The same applied to lack of skills. Project management skills were neither seen as barriers nor influencers of ERP adoption.

4.4 ERP Systems Adoption or Rejection

The respondents were asked whether they had adopted any ERP system or not. For those who had adopted the systems, they were asked to give the year of adoption and the approximate cost of acquisition of the system. They were also asked to state if they were happy with the systems or not. Table 32 summarises the results of this part of the study.

68% of the respondents had adopted ERP systems at the time of the study where as 32% had not. Of the 68% who had adopted ERP systems, 97% of them said that they were happy with the ERP systems and all those who had adopted ERPs indicated that they would recommend the ERP systems to other companies for adoption.

Table32: ERP Adoption.

ERP Adoption				
Adopted ERP?	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	32	68.1	68.1	68.1
No	15	31.9	31.9	100.0
Total	47	100.0	100.0	

The ERPS systems adopted within the NSE listed companies were as summarised in table 33. It was found out from the study that of the 32 companies that had adopted ERPs and are listed on the NSE, SAP was dominant at 28% followed by Oracle and Microsoft Dynamics at 15% each. The three ERPs made up 58% of all ERP installations within these companies.

Table33: ERP Installations.

		ERP Installations			
ERP Name		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ADAMS	1	2.1	2.1	2.1
	BAAN	1	2.1	2.1	4.3
	HARVEST IT	1	2.1	2.1	6.4
	I-PRIDE	1	2.1	2.1	8.5
	INCADEA	1	2.1	2.1	10.6
	LAWSON	1	2.1	2.1	12.8
	MICROSOFT DYNAMICS	5	10.6	10.6	23.4
	NOT ADOPTED YET	15	31.9	31.9	55.3
	ORACLE	5	10.6	10.6	66.0
	SAGE ACCPAC	1	2.1	2.1	68.1
	SAP	9	19.1	19.1	87.2
	SCALA	3	6.4	6.4	93.6
	SUN SYSTEMS	3	6.4	6.4	100.0
	Total	47	100.0	100.0	

Table 34 shows the observations on the approximate cost of adopting the ERP systems in table 33 above. Of the 32 ERP adoptions 50% of them cost over 51 million Kenya shillings. This was proof that a lot of money was required for the adoption of ERPs. This implied that ERPs in general were expensive.

Table 34: ERP Adoption Costs.

		Approximate Cost of Installation			
Cost of Installation (Ksh)		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 10 Million	9	19.1	19.1	19.1
	Between 11 and 20 Million	4	8.5	8.5	27.7
	Between 21 and 30 Million	2	4.3	4.3	31.9
	Between 31 and 50 Million	1	2.1	2.1	34.0
	Between 51 and 100 Million	6	12.8	12.8	46.8
	Between 101 and 150 Million	3	6.4	6.4	53.2
	Over 150 Million	7	14.9	14.9	68.1
	Not yet Implemented	15	31.9	31.9	100.0
	Total	47	100.0	100.0	

ERP adoptions done per year of the various ERP systems were as in table 35 below.

Table35: ERP Adoptions per year.

ERPs Adoptions per Year				
Year of Adoption	Frequency	Percent	Market Share Frequency	Cumulative Percent
Valid				
1996	1	2.1	1	2.1
1997	2	4.3	3	6.4
1998	2	4.3	5	10.7
1999	3	6.4	8	17.1
2000	1	2.1	9	19.2
2001	1	2.1	10	21.3
2002	1	2.1	11	23.4
2003	3	6.4	14	29.8
2005	4	8.5	18	38.3
2006	3	6.4	21	44.7
2007	2	4.3	23	49.0
2008	3	6.4	26	55.4
2009	3	6.4	29	61.8
2010	3	6.4	32	68.1
Total	32	68.1		

From the results of the study, the rate of adoption at a four year interval from 1996 to 2010 amongst the NSE listed companies was as tabulated in table 36.

Table 36. Rate of ERP Adoption at a 4 Year Interval

		Adoptions	Percent	Cumulative Adoption (Market Share)	Cumulative Percent
Valid	1996	1	2.1	1	2.1
	1999	6	12.8	7	14.9
	2003	7	14.9	14	29.8
	2007	9	19.1	23	48.9
	2010	9	19.1	32	68.0
	Total	32	68.0	32	

The results from table 36 were presented in the graph in figure 4 below;

Figure 6: Market Share and Rate of ERP Adoption in NSE Listed Companies

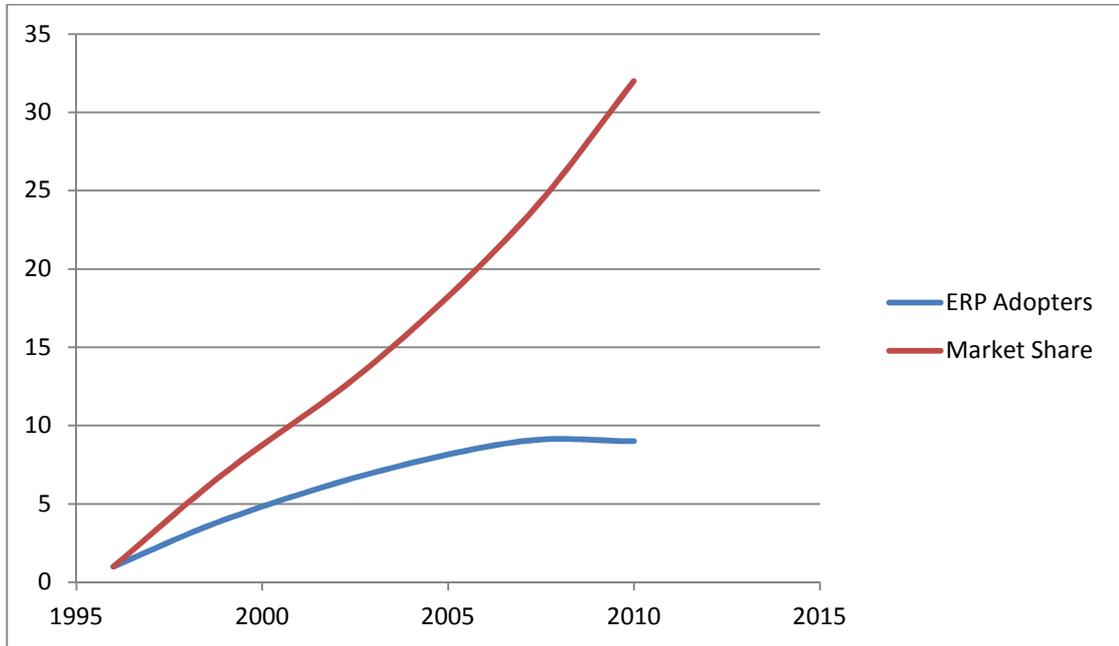


Table 36 has the results of the study from respondents who had adopted ERPs indicating as to whether they were happy with ERP system or not and if they would recommend the ERPs to other companies for adoption. 97% of the adopters were found to be happy with the systems where as 3% were not happy.

Table 36: Happy with ERP Adoption.

Happy with adoption		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	31	66.0	66.0	66.0
	No	1	2.1	2.1	68.1
	Not Applicable	15	31.9	31.9	100.0
	Total	47	100.0	100.0	

Table 37 has the results of the study from respondents who had adopted ERPs indicating as to whether they would recommend adoption of the systems to other

companies. All the 100% of the adopters said that they would recommend the system to other companies.

Table 37: Recommend ERP Adoption to others.

Recommend to others		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	32	68.1	68.1	68.1
	Not Applicable	15	31.9	31.9	100.0
	Total	47	100.0	100.0	

4.5 Discussions

From the research findings as presented in this part of the study, several conclusions were made. These are discussed in light of the objectives of the study.

4.5.1 Objective 1: Extent of adoption of ERP Systems

From the information provided in chapter 4, ERP systems have been adopted in many of the companies listed on the Nairobi Stock exchange. 32 out of the 47 listed companies have adopted ERP systems. This presents 68% of the whole population. A total of 12 different ERPs are in use with SAP being the most dominant. Oracle and Microsoft Dynamics follow at number two as the second dominant. These three ERP systems take up 58% of all adoptions.

The first ERP system adoption amongst these companies was done in 1996 with the most recent adoption being done this year (2010).

4.5.2 Objective 2: Rate of ERP adoption

The rate of adoption of ERP systems at an interval of 4 years confirms Everett Rogers theory of Diffusion of Innovations albeit some difference in percentages. The percentage difference may be because the NSE is not a uniform subsystem because the listed companies operate in different environments and businesses

As per Rogers theory, the status of adoption within the NSE is in the Late Majority state whereby the rest of the Late Majority adopters and the Laggards are expected to adopt ERP systems within the next few years.

The companies just required one Innovator to adopt an ERP system in 1996 and within the next four years 6 more companies had adopted ERP systems. These 6 companies were the Early adopters as per Rogers Framework. Together, the seven companies formed the critical mass that was needed according to Rogers theory to sustain continuous ERP adoption within the NSE listed companies. This growth has been observed in the market as was found out in the study.

46 of the 47, or 98% of the companies listed know of the existence of ERP systems in the market. Most of them came to know of ERP systems through ERP Vendors and Resellers followed by through friends in other companies. Mass media, sister companies as well as the internet were instrumental in creating awareness of ERP existence within the market. Industrial and Allied sector had the highest adoption percentage at 98% where as the Finance and Investment had the lowest adoption rate. This could be because ERP systems were initially meant for manufacturing companies as mentioned in chapter 1.

4.5.3 Objective 3: Determinants of ERP Adoption

From the literature review, ERPs are innovations and innovations are adopted by users mainly because of the relative advantages that the innovation comes along with. Other than the relative advantages, there are other factors that may determine the adoption. These determinants were twelve and from the study it was found out that the policy adopted by the management of a company matters most on ERP adoption.

Companies that may want to change the way they operate may adopt an ERP system to effect the change. This determinant came in second after the management policy. Companies that want to attain best practice within the industry may adopt ERP systems. This factor was third in importance. The study also found out that another important factor was need for standardization of operations within an enterprise and ERP systems can be used to achieve this need. Companies that need to reduce applications that are developed internally can adopt an ERP system to achieve this requirement. ERPs offer an advantage to companies that need to get rid of legacy systems and this was found as one of the major factors as well. In all, out of the twelve factors, these six factors were found to be the key determinants of ERP adoption.

On the contrary, factors such as adoption of ERP systems for self esteem and ego, being convinced by the vendors or resellers of ERP systems are not determinants of ERP adoption.

Adoption of ERP systems so that IS Function staff can be deployed to other duties also is not a determinant.

From the study, it was also found out that ERPs may be cheaper than developing systems internally. They may also be adopted because they have been tested. Availability of skilled manpower may also lead to ERP systems adoption. From the literature review, indeed this study agreed with Rogers theory of innovation whereby innovations are adopted because of the relative advantage that they have to offer to the users.

4.5.4 Objective 4: Barriers to ERP Software adoption

Nine factors had been considered as barriers to ERP adoption. The most significant barrier to ERP adoption was found to be lack of support from top management in the company. This was followed by lack of proper ICT infrastructure as well as lack of ERP integration with existing systems respectively. On the contrary lack of project management skills within an organization cannot be considered as a barrier to ERP adoption.

The other factors in general may be taken as barriers to ERP adoption. They include lack of skills, complexity of the ERP system, the cost of the ERP system, the time required to implement the system and the changes needed in order to implement the ERP system.

5.0 SUMMARY CONCLUSIONS AND RECOMMENDATIONS

The objective of this study was to investigate the adoption of Enterprise Resource Planning Software amongst companies listed on the Nairobi Stock Exchange. This study focussed on ERP as a technology that could be used by companies to increase efficiency and effectiveness of their operations. The specific objectives of this study were to determine the extent and rate of adoption of ERP systems amongst NSE listed companies. To this effect the study also aimed at establishing the critical factors that determine ERP systems adoption and barriers to such ERP systems adoption.

The research was done in relation to Rogers theory of diffusion. The literature review focused mainly on reasons that make organizations adopt or reject ERP systems. A snap-shot of the companies listed on the Nairobi Stock Exchange was taken in a form of a survey so that a theoretical grounding to the major ERP adoption factors could be provided. This study was not a replica of another study but was based on the literature outlined in other earlier sections of the study.

5.1 Conclusions

Adoption of ERP systems amongst Nairobi Stock Exchange listed companies is fairly high at 68%. Majority of these companies that have adopted ERP systems were either classified as Industrial and Allied or Commercial and Services. From the literature, ERP systems were first developed for companies that do manufacturing and selling of goods (Markus and Tanis, 2000). This explains why there is a high adoption in these two categories since most of them manufacture and /or sell goods.

Adoption of ERP systems generally agrees with Rogers's theory of diffusion of innovations. The difference in percentages of adopting companies could be because the NSE listed companies operate in different social systems where as Rodgers assumes that the environment is the same.

From the findings within the NSE listed companies, the research findings concluded that the most significant adoption factor in ERP adoption was management policy followed by the desire for change on how the companies operate. It was also concluded that many companies want to attain best practise within their industries and use this as a major factor in adopting ERP systems. The research further concluded

that many organizations also adopt the systems so that they can standardise their operations. ERP systems adoption was found to reduce internal system development and can also be used to replace legacy systems. On the other hand, adoption of ERP system so that the IS staff could be deployed elsewhere was not significant and so was the notion of adopting ERP systems for bravado.

Barriers observed to have a significant effect on ERP adoption within the NSE listed companies were lack of management support followed by lack of proper ICT infrastructure. Lack of integration of ERP systems with other systems was also observed to be a hindrance to adoption. It was concluded from the research that for a company to succeed in adopting an ERP system, such company must have support from the management without which the adoption may not be a success.

5.2 Recommendations

As a major observation from the study, many organizations on the NSE have adopted ERP systems. Most of these ERP systems so adopted are from SAP, Oracle and Microsoft. From the researchers view, other companies whether listed or not should considered adopting ERPs. It appears like there are many ERP systems out there that suite every type of industry and financial capabilities of each type of organization. This is supported by the fact that there are smaller organizations with lower turnovers that have adopted ERPs just as it was also observed that the larger companies have adopted ERP systems.

In organizations trying to adopt ERP systems, first and foremost, there has to be support for the ERP adoption from the top management as the study has shown. Since these systems are supposed to run in an entire enterprise, there is need for proper ICT infrastructure without which ERP systems may not be adopted. From the NSE study, the researcher proposes that before a company decides to adopt an ERP system, it would be appropriate to understudy a similar company that has adopted an ERP system so that they end up adopting the right ERP for their organization without incurring unnecessary expenses. This is because within the NSE market of 47 companies, there were twelve ERP systems adopted at different costs of adoption.

Limitations of the Study

The scope of the study covered a wide range of business types. These businesses operate in different types of environments. Rogers model assumes that the operating environment is the same for innovation. Similarly, a wide range of ERPs have been adopted by NSE listed companies. The study assumed that all ERPs are the same in terms of innovation. This may not be true as far as Rogers theory is concerned. Rogers theory does not consider complexities of ERP systems and this may have had an effect on the study. Because of confidentiality within organizations, there are chances that some respondents may have hidden such confidential information.

Suggestions for Further Research

Since this was a study testing Rogers Theory of Diffusion of Innovations in a Kenyan context, further comparative studies may be appropriate in other countries. Considering that this study did not focus on one ERP system, the same research may be done with only one type of ERP system. It would also be important to carry out the same research within one type of industry only. This is because the operating environment will be the same. To truly test the diffusion theory, only one type of Industry should be tested using one type of an ERP system. Other methods of study like 'case study' may be used to study the adoption of ERP systems. Similarly analytical statistics may be used to do the same study where several hypotheses may be tested.

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APPENDIX A: Research Population

Nairobi Stock Exchange Companies

(Source: <http://www.nse.co.ke/newsite/inner.asp?cat=companies> 20/08/2010)

Agriculture

1. Rea Vipingo Ltd.
2. Sasini Tea & Coffee Ltd.
3. Kakuzi Ltd.

Commercial and Services

1. Access Kenya Group
2. Marshalls E.A. Ltd.
3. Car & General Ltd.
4. Hutchings Biemer Ltd. **Suspended**
5. Kenya Airways Ltd.
6. CMC Holdings Ltd.
7. Uchumi Supermarkets Ltd. **Suspended**
8. Nation Media Group Ltd.
9. TPS (Serena) Ltd.
10. ScanGroup Ltd.
11. Standard Group Ltd.
12. Safaricom Ltd.

Finance and Investment

1. Barclays Bank of Kenya Ltd.
2. CFC Stanbic Bank Ltd.
3. Housing Finance Ltd.
4. Centum Investment Ltd.
5. Kenya Commercial Bank Ltd.
6. National Bank of Kenya Ltd.
7. Pan Africa Insurance Holdings Co. Ltd
8. Diamond Trust Bank of Kenya Ltd.
9. Jubilee Insurance Co. Ltd
10. Standard Chartered Bank Ltd.
11. NIC Bank Ltd.
12. Equity Bank Ltd.
13. Olympia Capital Holdings Ltd
14. The Co-operative Bank of Kenya Ltd.
15. Kenya Re-Insurance Ltd.

APPENDIX A: Research Population (Continued)

Nairobi Stock Exchange Companies

(Source: <http://www.nse.co.ke/newsite/inner.asp?cat=companies> 20/08/2010)

Industrial and Allied

1. Athi River Mining Ltd.
1. IBOC Kenya Ltd.
2. British American Tobacco Kenya Ltd.
3. Carbacid Investments Ltd. .
4. E.A. Cables Ltd.
5. E.A. Breweries Ltd.
6. Sameer Africa Ltd.
7. Kenya Oil Ltd.
8. Mumias Sugar Company Ltd.
9. Unga Group Ltd.
10. Bamburi Cement Ltd.
11. Crown berger (K) Ltd.
12. E.A Portland Cement Co. Ltd.
13. Kenya Power & Lighting Co. Ltd.
14. Total Kenya Ltd.
15. Eveready East Africa Ltd.
16. Kengen Ltd

APPENDIX B: Letter to the Respondents



UNIVERSITY OF NAIROBI

SCHOOL OF BUSINESS

Telephone: +2542-318262

Telegrams: "Varsity", Nairobi

P.O. Box 30197

Telex: 22095 Varsity

Nairobi, Kenya

=====

Dear Sir/Madam,

RE: An Investigation into ERP Software Adoption in Kenya

I am a postgraduate student undertaking a Master of Business Administration (MBA) degree at the School of Business, University of Nairobi. I am currently carrying out research on Enterprise Resource Planning Software adoption amongst Kenyan companies. This is a requirement to complete my MBA course project at the university.

I intend my approach to this survey to be both consultative and ensure that it is not disruptive to your already tight schedule of activities. I kindly request you to provide the required information by responding to the questions in the questionnaire. The information required is purely for academic purposes and will be treated in the strictest manner. Your name or the name of your company will not be mentioned in this research.

A copy of this research project will be made available to you upon request. I will appreciate your cooperation in this academic exercise. Thanking you in advance,

Yours faithfully,

Temesi Munyendo

Student Number D61/P/7030/04

APPENDIX C: Study Questionnaire

INVESTIGATING ADOPTION OF ERP SOFTWARE AMONGST NSE LISTED COMPANIES

Thank you for taking your time to complete this questionnaire

Completion of this questionnaire is voluntary and all responses will remain confidential

Section A: Demographics and ERP Awareness

1. Your Names: (Please fill in the box below.)

2. What is your company name? Please fill in the box below.

3. What is your position in the company? Please choose one.

a) Supervisor b) Manager c) Director

4. What is your company's Line of Business? Please fill in the box below. (E.g. Agriculture, Manufacturing, Media, Banking, etc).

5. Which year was the company formed? Please fill in the box below.

6. How can you describe the management of your Company? Please choose one.

a) Indegenous b) Foreign

c) Both Indegenous & Foreign

7. What is your company's annual turnover in Kenya shillings? Please choose one.

- a) Less than 1 Billion
- d) Between 3 and 3.9 Billion
- b) Between 1 and 1.9 Billion
- e) Between 4 and 4.9 Billion
- c) Between 2 and 2.9 Billion
- f) 5 Billion or more

8. Has your company or organisation heard of computer-based Enterprise Resource Planning (ERP) Software? Please choose one.

- a) Yes
- b) No

9. How did your company come to learn of the existence of the ERP system in the market? **Please choose all that apply.**

- a) Through friends in other companies
- b) Through mass media (e.g. Radio, TV, Magazines, Newsletters, Newspapers)
- c) Through sister company
- d) Through ERP Vendor or Reseller promotions
- e) Through the internet
- f) Any other means, please specify in the box below

Section B: Reasons for choosing ERP software

10. Does your company feel that it is necessary to adopt an ERP system? Please choose one.

- a) Yes
- b) No

The following table has some of the reasons as to why companies adopt ERP software for their operations. Please use the scale given below to gauge each of the statements as to the reasons as to why an organization can choose to adopt an ERP system by ticking your most suitable box for each statement.

Please choose one box for every statement in the table below.

Not Applicable (NA)=1

Strongly Disagree(SD)=2

Disagree(D)=3

Agree (A)=4

Strongly Agree (SA)=5

	NA	SD	D	A	SA
STATEMENT	1	2	3	4	5
11. Our company can use an ERP system to implement changes in how we operate.	<input type="checkbox"/>				
12. Our company can use an ERP system in order to attain best practice within our industry.	<input type="checkbox"/>				
13. Our company can use an ERP system to standardize operations in the entire organization.	<input type="checkbox"/>				
14. Our company can use an ERP system in order to reduce the number of applications developed internally.	<input type="checkbox"/>				
15. Our company can use an ERP system in order to get rid of old legacy applications within the organization.	<input type="checkbox"/>				
16. Our company finds it cheaper to use an ERP system than developing an application internally.	<input type="checkbox"/>				
17. Adoption of an ERP systems by our company can make the staff in the IT function become free for deployment in other areas.	<input type="checkbox"/>				
18. Our company may be influenced into using a particular ERP system because of being convinced by the ERP seller.	<input type="checkbox"/>				
19. An ERP system may be adopted by our company as a management policy.	<input type="checkbox"/>				
20. Our company may adopt an ERP system only if it has been tried and tested by other companies.	<input type="checkbox"/>				
21. Availability of skilled manpower has an influence on whether our company can adopt an ERP system or not.	<input type="checkbox"/>				
22. Our company may adopt an ERP system for self esteem and as a sign of superiority within our industry.	<input type="checkbox"/>				

Section C: Barriers to ERP software Adoption

Below are some reasons as to why companies are unable to adopt ERP software systems.

Please use the scale given below to gauge each of the statement, by ticking the suitable box:

Not Applicable (NA)=1

Strongly Disagree(SD)=2

Disagree(D)=3

Agree (A)=4

Strongly Agree (SA)=5

	NA	SD	D	A	SA
STATEMENT	1	2	3	4	5
23. A our company may not adopt an ERP system if a lot of changes are envisaged and there are no means of managing such changes within the organization.	<input type="checkbox"/>				
24. Our company will not adopt an ERP system if it such a system requires a long time for implementation.	<input type="checkbox"/>				
25. Our company may prefer not to adopt an ERP system if it is found to be very expensive.	<input type="checkbox"/>				
26. Lack of technical and trained staff may hinder our organization from adopting a particular ERP system.	<input type="checkbox"/>				
27. Lack of project management skills within our organization may hinder our company from adopting a particular ERP system.	<input type="checkbox"/>				
28. Our company will not adopt an ERP system if there is lack of support from top management.	<input type="checkbox"/>				
29. Lack of proper ICT infrastructure may hinder our organization from adopting an ERP system.	<input type="checkbox"/>				
30. Our company will not adopt an ERP system if it is found to be complex.	<input type="checkbox"/>				
31. Our company may not adopt an ERP system if it cannot integrate with other systems.	<input type="checkbox"/>				

Section D: ERP systems adoption or Rejection

32. Does your company use an ERP system? Please choose one.

- a) Yes b) No

33. If Yes, what is the name of the ERP system? Please fill in the box below.

34. Which year was the ERP system implemented? Please fill in the box below.

35. What was the approximate cost of the ERP System in Kenya shillings? Please choose one.

- a) Less than 10 million
 b) Between 11 and 20 million
 c) Between 21 and 30 million
 d) Between 31 and 50 million
 e) Between 51 and 100 million
 f) Between 101 and 150 million
 g) Over 150 million
 h) Not yet implemented

36. Are you happy as an organization with the ERP system? Please choose one.

- a) Yes b) No c) Not Applicable

37. Would you recommend other companies to adopt ERP systems? Please choose one.

- a) Yes b) No c) Not Applicable

Thank you very much for your valuable time.