# ENTREPRISE RESOURCE PLANNING SYSTEMS AND PERFORMANCE OF POWER SECTOR IN KENYA

**BY:**

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## DECLARATION

I, the undersigned, declare that this is my original work and has not been presented to any institution or university other than the University of Nairobi for examination.

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This project has been submitted for examination with my approval as the University supervisor.

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# DEDICATION

I dedicate this project to my dear loving and caring husband, Mr. Reuben Orinda, my brothers and my Dad for their love and support that they accorded me during period of the study.

You are a pillar of strength in my life.

God bless you abundantly.

# ABSTRACT

Enterprise resource planning is a system that effectively integrates all information required by the operation process. Power generation and distribution faces a lot of challenges. These challenges are frequent power interruption caused by power outrage, low plant availability as a results of poor maintenance practices and slow response to plant breakdown, poor and unreliable distribution network, over dependence on hydro power which is subject to vagaries of whether and high operational cost resulting from maintenance of aged plants, inflationary pressure and high demand for social services. The purpose of the study was to establish the extent of ERP use in power sector in Kenya and to find out factors influencing effectiveness of ERP use on operational performance. It was also required to establish the impacts of ERP use on operational performance.

The study adopted case study. Data was collected using closed ended questionnaire developed in likert scale. The study took five months to complete and out of seventy questionnaires distributed, only fifty five respondents returned their response. Data was analyzed using descriptive statistics in line with objective of the study. The study found out that ERP system is predominantly used in supply chain management, customer service, production and distribution. Factors that influence effectiveness of ERP are top management support, training and education, business process management, cultural and structural change, clear understanding of strategic goal, data accuracy and focused performance measurement.

The study also indicated that ERP systems impacts positively in organization performance. Some of the impacts on performance identified by the study are improved order management and replenishment, improved customer responsiveness, improved customers interaction, increased interaction across enterprises, improved suppliers interaction, improved on – time deliveries, lower inventory level, cash management and reduced direct operation cost. It can therefore be concluded that ERP can be used to transform operational capability and improve performance of organization in the country. This system also addresses operational objectives like quality, cost, flexibility and dependability. Therefore ERP proved to be a power house for real organizational operation. It is appropriate to consolidate and integrate organizational operation. Organizations should come up with policy direction to enhance ERP usage.

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| | |
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| ERP | **:** Enterprise Resource Planning |
| KENGEN | **:** Kenya Electricity Generating Company Limited |
| OIPT | : Organizational Information Processing Theory |
| SCADA | : Supervisory Control and Data Acquisition System |
| TOTO | : Task Oriented Transient Organization |
| IT | : Information Technology |

# CHAPTER ONE: INTRODUCTION

## 1.1 Background of the study

The globalization of competition means that apart from ensuring their own successful operation, firms that hope to survive must establish highly responsive supply chains, with upstream, midstream, and downstream partners (Yang, 2009). The Enterprise Resource Planning (ERP) system plays the role of central nervous system in promoting globalization of enterprise operations and shortening product lifecycle. Therefore, the ERP system has become popular. Li (2009) considered ERPs enveloped software that provides various internal information for an enterprise using an efficient means that enables units at different organizational hierarchies to effectively make business or daily operational decisions.

Conceptually, many firms have implemented company-wide systems called Enterprise Resource Planning systems, which are designed to integrate and optimize various business processes, such as order entry and production planning, across the entire firm (Mabert et al., 2001). This investment has also made possible the sharing of large amounts of information along the supply chain, and has enabled real-time collaboration between supply chain partners, providing organizations with forward visibility, thus improving inventory management and distribution (Mbogori, 2010).

Within the warehouses, ERP allows for the transmission and processing of information necessary for synchronous decision making and this can be viewed as an essential enabler of operations competencies (Akkermans et al., 2003; Hsu et al., 2009; Sanders, 2007). Furthermore, many firms deploying ERP systems considered extending system scope mainly to integrate their suppliers, customers or both to the system, to provide additional e-commerce or e-business operations and to increase supply chain functionalities (Olhanger & Selldin, 2003).

When enterprise resource planning systems are fully realized in a business organization, they can be expected to yield many benefits, such as reduction of cycle time, faster transactions, better financial management, the laying of the groundwork for e-commerce, linking the entire organization together seamlessly, providing instantaneous information, and making tacit knowledge explicit (Mabert et al., 2001; Davenport and Brooks, 2004; Shang and Seddon, 2000; Murphy and Simon, 2002; Al-Mashari et al., 2003). ERP can provide the digital nervous system and the backbone in an organization to respond swiftly to customers and suppliers (Cox et al., 2000; Mabert et al., 2001).

As reported in Akkermans et al. (2003), ERP systems are widely believed to support operations in technical areas such as standardization, transparency and globalization. ERP systems are a leading tool for this purpose, and are always expected to be an integral component of operations (Nah et al., 2001; Themistocleous et al., 2004). The potential benefits of an integrated ERP system are such that many organizations are willing to undertake the difficult process of conversion. This study is establish the link between enterprise resource planning systems and operational performance of power sector in Kenya; a survey of KenGen and Kenya power.

### 1.1.1 Enterprise Resource Planning Systems

Enterprise Resource Planning is a system that effectively integrates all information required by the operating process functions including finance, accounting, human resources, production, material management, quality management, allocation and distribution, and sales by organization or process reengineering and information technology. Enterprise resource planning is an integrated information system that integrates enterprise internal function working processes, standardizes internal data processing procedures, and combines the operational data generated by different functions so that the originally widely-spread individual databases can be utilized in a timely fashion to reflect the current status of enterprise internal resource use (Kremzar, 2008).

According to Umble et al, (2003), enterprise resource planning provides a good reference point for enterprise decision-making, and in turn increases enterprise competitive advantages and

improves operating performance. The primary purpose for ERP is to promptly capture the status of enterprise internal resource integration, reduce operational costs, and increase operating performance (Wallace, 2008). However, in a rapidly changing industrial environment, the integration of enterprise internal and external resources becomes increasingly important. In other words, the concept of integration thus extends from the enterprise internal to the enterprise external environment and develops into the extended enterprise resource planning concept, (Wallace, 2008).

### 1.1.2 Operational Performance

Performance refers to the metrics relating to how a particular request is handled, or the act of performing; or doing something successfully; using knowledge as distinguished from merely possessing it. It is the outcome of all of the organization's operations and strategies, (Venkatraman & Ramanujam, 2001). Firm's set of operational routines is made up of the organizational processes and routines formed and shaped by organizational learning mechanisms (Cepeda &Vera, 2007).

Performance measurement systems provide the foundation to develop strategic plans, assess an organization's completion of objectives, and remunerate managers (Alderfer, 2003). Although assessment of performance in the marketing literature is still very important, it is also complicated (Andersen & Segars, 2001). While consensual measurement of performance promotes scholarly investigations and can clarify managerial decisions, marketers have not been able to find clear, current and reliable measures of performance on which marketing merit could be judged (Manogran, 2001).

Nigel, Stuart and Robert, (2010) describe operational performance as the degree to which an operation fulfills the five generic objectives of quality, speed, dependability, flexibility and cost. Some kind of performance measurement is a pre-requisite for judging whether an operation is good, bad or indifferent. Performance measurement is the process of quantifying action, where measurement means the process of quantification and the performance of the operation is

assumed to derive from actions taken by an organization. Without performance measurement, it would be impossible to exert any control over an operation on ongoing basis.

The five performance objectives can be regarded as the dimensions of operational performance that satisfy an organization's customers. The five generic performance objectives, quality, speed, dependability, flexibility and cost, can be broken down into more detailed measures, or they can be aggregated into 'composite' measures, such as 'customer satisfaction', 'overall service level', or 'operations agility'. These composite measures may be further aggregated by using measures such as 'achieve financial objectives', achieve operations objectives' or even 'achieve overall strategic objectives'. The more aggregated performance measures have greater strategic relevance insomuch as they help to draw a picture of the overall performance of the business, although by doing so they necessarily include many influences outside those that operational performance improvement would normally address (Nigel et al., 2010).

The more detailed performance measures are usually monitored more closely and more often, and although they provide a limited view of an operation's performance, they do provide a more descriptive and complete picture of what should be and what is happening within the operation. In practice, most organizations will choose to use performance targets from throughout the range. Some detailed performance measures are defects per unit, level of customer complaints, scrap level, mean time between failures, lateness complaints, customer query time, order lead time, throughput time, time to market, product range, transaction costs, labour productivity and machine efficiency (Nigel et al., 2010).

One of the problems of devising a useful performance management system is trying to achieve some balance between having a few key measures on one hand (straightforward and simple, but may not reflect the full range of organizational objectives), and, on the other hand, having many detailed measures (complex and difficult to manage, but capable of conveying many nuances of performance). Broadly, a compromise is reached by making sure that there is a clear link between the operation's overall strategy, the most important performance indicators that reflect strategic objectives, and the bundle of detailed measures that are used to 'flesh out' each key

performance indicator. Obviously, unless strategy is well defined then it is difficult to target a narrow range of key performance indicators customers (Nigel, et al., 2010).

Operations performance involves recurring activities to establish organizational goals, monitor progress towards the goals, and make adjustments towards achieving those goals more effectively and efficiently (Carter, 1997). The objective of top management in any organization is to maximize their operational efficiency by all possible means in order to maintain their competitive advantage and survive in the market. The measures of operational performance of organizations are productivity, quality, cost effectiveness, timeliness and flexibility. Quality aspect in to processes of making products and services reduces costs throughout the organization. This results in cost efficiency and positive quality perception for products and services offered by the organization. Internal measures of quality are linked to value created for the customer. Flexibility is attained through improved systems which is key to opportunities in the market. The process creates value to customers through efficient service models for different market segments.

### 1.1.3 Enterprise Resource Planning Systems and Operational Performance

Closs and Mollenkopf (2004), defined operations as the process that involves the processes that facilitate order fulfillment and replenishment across the supply chain. Effective order fulfillment requires coordination both within a firm and among supply chain partners. Within the operational process, firm competencies include customer integration, internal integration, and supplier integration. Today's ERP solutions offer even more benefits.

Many vendors have begun to enhance their offerings with extended supply chain applications in an effort to create a seamless, integrated information flow, from suppliers through manufacturing and distribution. Hsu et al. (2009) provide empirical support for the impact of operations capabilities on operations practices. That result is consistent with resource-based and competency-based views of the firm. ERP is a suite of application modules that can link back-office to front-office operations, as well as internal and external supply chains. Since ERP

systems can automate business processes and enable process changes, one would expect them to improve the operations, customer responsiveness and satisfaction (Venkatesh, 2006).

### 1.1.4 Power Sector in Kenya

The national installed capacity in Kenya currently is 1722 MW with a peak demand of 1330 MW. The Kenya Power and KenGen are the major power generation company in Eastern Africa and are the key players in this sector with Kenya Power currently being the only authorized distributor of electric power in Kenya. The major power generation company, whose main product is electric energy, accounts for about 74% of the total capacity in Kenya while the Independent Power Producers (IPPs) and emergency power plant (EPP) account for 26% of the total generation capacity (KenGen, 2012). The power generation company sells power in bulk to Kenya Power in line with the single buyer model.

Kenya Electricity Generating Limited, (KenGen) is the leading electric power generation company in Kenya, producing about 80 percent of electricity consumed in the country. The company utilizes various sources to generate electricity ranging from hydro, geothermal, thermal and wind. Hydro is the leading source, with an installed capacity of 766.88MW, which is 64.9 per cent of the company's installed capacity, (KenGen strategic plan, 2014). Much of the hydro power comes from the hydro-electric power plants along the Tana River commonly known as the 7-Forks which comprises Masinga, Kamburu, Gitaru, Kindaruma and Kiambere power stations. These plants were installed and commissioned at diverse dates with partially automated control systems and were independently controlled until the control system was upgraded with the installation of a Supervisory Control And Data Acquisition System (SCADA) which provides monitoring and control of six of the major hydro power stations from a central dispatch center.

The supervisory system was installed in order to reduce operational costs and response time to plant failure in order to improve on plant availability. Hitherto, all the controls were localized and operational data was collected manually and reliance was partly on human intervention which at times led to serious errors. Data capture and analysis was also a key drawback to quick response to plant failure which led at times to prolonged outage times.

Power generation is a capital intensive venture and investment in power generation in Kenya comprises a large and diverse set of barriers to entry. The sector faces a number of challenges, key among them being frequent power interruptions caused by a power supply deficit that occasions delayed maintenance leading to frequent power outages, low plant availability as a result of poor maintenance practices and slow response to plant breakdowns, a poor and unreliable distribution network, over dependence on hydro power which is subject to the vagaries of weather and high operational costs resulting from operation and maintenance of aging plants, inflationary pressures and a high demand for social services by communities neighboring the plants and a regulated market that restricts the company to only one buyer.

To meet these business challenges, the power generation company needs to operate more efficiently in the current competitive environment so as to satisfy the customer demands and keep away further unbundling of the sector which would usher in more competition. This can be achieved through strengthening of its internal processes such as adopting new and emerging technologies such as plant automation and upgrades.

## 1.2 Statement of the Problem

Firms that use ERP systems hope to gain benefits from integration of data and business processes across different business functions, such as marketing, inventory management, accounting, and human resources. Nonetheless, while enterprise resource planning systems provide promising potential, it is reported that only 10% of firms that use ERP systems have gained substantial benefits (Yusuf et al., 2006). Studies on Enterprise Resource Planning systems have often focused on vendor selection and the implementation processes (Botta-Genoulaz et al., 2005; Ehie and Madsen, 2005; Hakkinen and Hilmola, 2008; Jacobs and Bendoly, 2003; Moon, 2007; Pairat and Jungthirapanich, 2005). Other Studies have investigated the influence of ERP on operational performance. For instance, Avison and Malaurent (2007) conducted a case study on a French owned company's subsidiary in China. They found that cultural differences could dominate technical aspect in the global rollout of ERP systems.

Locally, Mwanyota(2004) in his research on integrating supply chain management and enterprise resource planning systems, a survey of supermarkets in Nairobi found out that the system resulted in high quality, speed, dependability, flexibility and cost efficient results. The results of another study by Nyangosi, Nyan'gau and Magusa (2011) on managing banks amid information and computer technology, paradigms in Kenya, revealed that Kenyan banks are transforming their business from traditional mode of service delivery to technology based delivery systems. Omale and Adeya (2011) did a study on the use of enterprise resource planning in manufacturing to achieve vision 2030. Their findings were that there has been increased production volumes and speed in the manufacturing industry in Kenya through use of enterprise resource planning.

Thus, this study seek to fill in the knowledge gap by providing answers to the question; what are the effects of enterprise resource planning systems on operational performance of power sector in Kenya?

## 1.3 Objectives of the study

i. To establish the extent of ERP use in power sector in Kenya.
ii. To establish the factors influencing the effectiveness of ERP systems use in the power sector in Kenya.
iii. To determine the impact of ERP use on operational performance in power sector in Kenya.

## 1.4 Value of the study

Through this research the users will understand the effect of enterprise resource planning system on operational performance in power sector in Kenya, and also will help power sector heads to set their performance target. The users will appreciate the fact that the system will not replace the work of employees but it will remain as an enhancement to their performance.

The policy makers will use this research to gauge the number of employees required in the company at any given time when an ERP system is in place. It will also assist the new entrants in the power sector to appreciate that the profession cannot be replaced by the system instead it will enhance their performance.

# CHAPTER TWO: LITERATURE REVIEW

## 2.1 Introduction

Literature Review means the work that a researcher consults in order to understand and investigate the research problem. It is an account of what has been published on a topic by accredited scholars and researchers. It is a critical look at the existing research that is significant to the work that the researcher was carrying. It involves examining documents such as books, magazines, journals and dissertations that have a bearing on the study being concluded (Kombo & Tromp, 2006). This chapter reviews literature relating to enterprise resource planning ERP system and operational performance of power sector in Kenya.

## 2.2 Theoretical Review

Evidence-based research that links enterprise resource planning systems characteristics to operational performance measures has alluded to an underlying "systemic approach". However, a well-articulated theoretical rationale for the relationship is lacking. This is particularly true for research that addresses enterprise resource planning systems implementation. In an effort to move the field forward, we begin our development by offering a theoretically anchored rationale for the effects of ERP systems on operational performance.

### 2.2.1 Systemic Approach

The systemic approach is rooted in general systems theory. According to this school of thought, systems (such as enterprise resource planning systems) are characterized by a combination of interdependent parts (e.g. Enterprise resource planning system modules) that result in flows across these parts. Among the flows that link parts of a system, the flow of information is viewed as the most critical (Scott, 2003). Hence, an understanding of information flows is necessary to exploit the strength of each of the parts (i.e., enterprise resource planning modules) and the system as a whole (i.e., the enterprise resource planning system).

### 2.2.2 Organizational Information Processing Theory (OIPT)

Organizational information processing theory (OIPT), a specific contingency approach that also has roots in general system theory, was developed to explain the information processing phenomena (Galbraith, 1973, 1974, 1977; Huber, 1990; Knight & McDaniel, 1979; Tushman and Nadler, 1978). We concur with prior ERP research (Chou & Chang, 2008; Gattiker & Goodhue, 2004, 2005) that OIPT is an appropriate theoretical lens that takes a systemic approach to explore ERP system and its influence on operational performance. The ensuing discussion uses OIPT as the theoretical underpinning of the effects of ERP systems on operational performance.

Organizational Information Processing Theory focuses on the limited ability of organizations to process information. Uncertainty is a central concept in the theory that drives the need for information processing. When uncertainty is low, firms typically use four mechanisms to increase coordination among interdependent organizational tasks hierarchy of authority, rules and programs, planning and goal setting, and narrow span of control. However, when uncertainty is high, firms tend to address it in two ways. One approach is to reduce the need for information that is processed through the use of slack resources, self-contained tasks, or environment management. The other approach is to increase the capacity to process information through the use of information systems (IS) or lateral relations (Galbraith, 1977). Low uncertainty environments are an anomaly in today's world (Galbraith, 2002) and hence our focus will be on the choices that ERP systems afford the firm in high uncertainty environments.

### 2.2.3 Task Oriented Transient Organization Theory

Warfield (1976) creates the concept of a task oriented transient organization (TOTO) to address the system characteristic of complexity. In a TOTO Warfield merges two dimension of complexity that is scope and depth from that position he suggest that satisfactory answers to complex problems must concurrently address depth and breadth. This concept when applied to ERPs points to education and understanding of both the traditional functional business areas depths, along with the business processes and the breath of a functioning organization.

Raymond et al (2012) summarized that ERP systems are designed to address challenges of having a single information system which encompass the logistic function of an entire organization. In the broadest sense ERP systems are information system that must organize and control another complete system of an organization.

## 2.3 Enterprise Resource Planning Systems

An enterprise resource planning (ERP) system is a standardized off the shelf information technology(IT) package providing the first real opportunity for modern organizations to integrate their business processes and functions, Klaus et al(2000).This system is diffusing worldwide among organizations with a desire to replace aging legacy systems, improve inter-and intra-operational efficiency, gain strategic advantage (Ifinedo,2006).

Accordingly, most current discussions of the software in the trade press and information systems (IS) domain tend to focus on their implementation and adoption (Ifinedo, 2006). Malmi et al (2002) undertook exploratory field studies at ten firms. They recognized that ERP systems provide easier and faster access to standardized operational data, enhanced forecasting, emphasized the accounting department as the "nerve center", reduced the need for accountants to handle routine tasks and gave accountants more time for sophisticated analyses.

Noudoostbeni et al (2010) point out that ERP is one of the main business system that help organizations to manage their resources in the effective way. Under the circumstances, ERP system has become the necessary tool in application of information technology (IT). The main function of ERP system is to combine all operational information needed for every process from different departments into one database and information is imported to the accounting department (Kale, 2000). This shows the importance of ERP system in accounting practice. The ERP system may bring great impact on the duties of accountants because it has replaced or consolidated many works of accountants. This may change the nature of their job; therefore they have to face the new environment with a positive attitude.

The impact of new information and communication technologies has been widely cited in the literature as one of the most important factors affecting the future demand for accountants' expertise (Scapens et al., 2003). A key argument developed in the literature is the suggestion that new advances in ICT is likely to result in standardization and co modification of knowledge and expertise, where knowledge turns to a commodity available in markets and can be easily approached by everyone. For example, according to Scarbrough (1996) access to knowledge and expertise, reconfiguring it in novel ways and offering it for sale are becoming specialized functions where consultants, software and hardware suppliers are typically viewed as being proactive in bundling and co modifying knowledge into particular packages.

Enterprise resource planning (ERP) systems are transaction systems that allow information to flow seamlessly across different business units and functions in an organization (Al-Mashari, 2003). The systems may be costly to acquire and their adoption process is often fraught with risks. Despite the difficulties organizations encounter when implementing ERP systems Markus (2000) observe that the System continues to diffuse globally. The system however has changed the various ways in which accountants perform their duties it is therefore very important to analyze or review the duties of accountants with the successful implementations of the ERP system in the organization set up for management planning and decision making.

The primary ERP vendors are referred to as (BOPSE) i.e. BAAN, Oracle, PeopleSoft, SAP and J.D Edwards (Keeling, 1996, Kersnar & May 1999). BAAN was founded in the Netherlands in 1978 and its market share is roughly 5 %( Stein 1997) and in 1998 the profits were roughly $750million (Bylinsky, 1999). It has approximately 3000 clients in 5000 sites worldwide and was thrust into national ERP software when they won the Boeing ERP engagement in 1994. The founders recently left BAAN, in part because of irregularities in financial reporting that led to inflated sale figures (Maremont & Rose 1998).

Systems Application and Products in Data Processing (SAP) is the largest market share for ERP and it is estimated to range from 30% to 60 %( Stein, 1997).SAP is known for spending a large

portion of its revenue (20%-30%) on research and design. Reportedly SAP has over 9000 implementations of R/3on over 6000 companies and over 2500000 users (Stein, 1997).

The *SAP R/3 system* is a business software package designed to integrate all areas of a business and it provides end to end solutions for financials, manufacturing, logistics distribution etc. All business processes are executed in one *SAP* system and sharing common information with everyone. Systems Application and Products in Data Processing (SAP) is an Enterprise Resource Planning *(ERP)* system by SAP AG, company based out of Walldorf in Germany. SAP software suite that is being implemented as part of re-engineering and provides end to end solutions for financial, logistics, distribution, inventories. Present scenario large numbers of companies are using sap software for their day to day business activities. After the hugely successful R/3, *SAP* created more and more niche software like Customer Relationship Management (CRM), SRM, XI (now called Process Integration or PI) and once again living up to the standards of SAP by maintaining tight integration with their core *ECC* software. The newest version of the suite is SAP ECC 6.0. The following are SAP products, SAP R/3 and R/3 Enterprise, my SAP Business Suite, SAP ERP, SAP Industry Solutions, SAP xApps, and SAP Solution Manager. Companies that use SAP could have the following benefits: SAP manages these business management tasks in modules that all work together in one system by sharing information, promotes consistent practice across an entire division, avoids data duplication, automates project monitoring and multi-dimensional and flexible reporting, standardizes of business processes, Makes Planning, scheduling, tracking and management easier leaving more time for you to perform value-added work, it has ability to provide clear cut job roles with authorizations, enables integration with e-commerce and finally saves costs on overheads such as stationery, file storage(www.epicor.com).

## 2.4 Factors Influencing Effectiveness of ERP Systems

Determining factors that are positioned behind an effective use of ERP system has been a key research question in previous research. Effective use of an ERP system is a complex process including a great many factors and conditions which can potentially enhance operational

performance. Critical success factors of ERP implementation projects have been investigated from several diverse points of view (Nah et al., 2003). Many researchers have recognized a range of factors that could be critical to the success of an ERP system implementation. For example, Somers and Nelson (2004) recognized 22 critical success factors including Top management support, Education on new business processes, User training on software, On the hand, Al-Mashari et al. (2003) identified 12 critical ERP factors such as ERP selection, project management, training and education, business process management, cultural and structural change management while Umble et al. (2003) divided the factors into 10 categories including Commitment by top management, Clear understanding of strategic goals, Excellent implementation project management, Great implementation team, Successfully coping with technical issues, Organizational commitment to change, Data accuracy, Extensive education and training, Focused performance measures, and Multi-site issues resolved. Based on Dezdar and Sulaiman's (2009) work, the factors can be grouped into 17 categories which subsequently can be re-organized into three main categories; organizational, project and system. The importance of these factors, have been discussed in Dezdar and Sulaiman (2009).

### 2.4.1 Top Management Support

Top management support, has been emphasized, as a crucial factor in successful ERP implementation by many (Al-Mashari et al., 2003; Umble et al., 2003; Zhang et al., 2005). Ngai et al. (2008 claimed that top management support, plays a significant role in the ERP implementation success because ERP are normally large-scale and require extensive resources. Al-Mashari et al. (2003) suggested that top management support should not stop at the initiation and facilitation stage, but it should continue thorough out the entire ERP implementation process.

According to Zhang et al. (2005), top management support has two major aspects in ERP implementation projects: providing the necessary resources and providing leadership. The responsibilities of top management in ERP implementation include communicating the company strategy to all members of the organization, developing an understanding of the restrictions and

abilities, demonstrating commitment, and establishing rational objectives for the ERP implementation (Umble et al., 2003).

Many studies provided evidences that display how top management support is essential during the entire ERP implementation process and how it remained critical in order to reap the benefits (Bradford and Florin, 2003). Willcocks and Sykes (2000) noted that senior-level sponsorship, championship, support, and participation are one aspect of organizational factor that influences ERP success. Implementing ERP does not only involve changes in software systems usage rather it involves the repositioning of a company and transformation of all business practices. Therefore, top management should publicly, explicitly, and sincerely show their support (financial and non-financial) to emphasize the precedence of the ERP implementation (Somers and Nelson, 2004).

### 2.4.2 Training and Education

As mentioned earlier ERP is a complex system thus adequate training and education must be provided to enable the users to use them effectively and efficiently (Correa and Cruz, 2005; Zhang et al., 2005; Bradley, 2008). Training and education would further enhance the users' level of knowledge and proficiency, thus increasing individual performance and subsequently organizational performance.

Nah et al. (2003) stated that sufficient training can increase the probability of ERP system implementation success, while the lack of appropriate training can hinder the implementation. Adequate training and education may also assist the organization to build positive feelings towards the system. More important it may help ERP users to adjust to the organizational change-taking place with the implementation of the system. In addition, training increases ease of use and reduces user resistance, which, in turn, enhances the likelihood of ERP systems use and success (Bradley, 2008). Implementing an ERP system without adequate training may possibly have drastic consequences (Somers and Nelson, 2004).

### 2.4.3 Communication

For successful implementation of ERP systems, communication across the various functions and levels of a company is needed. Since the communication assists the ERP adopting company to minimize user resistance, it is critical from the initiation to the system acceptance phases (Somers and Nelson, 2004). Esteves-Sousa and Pastor-Collado (2000) stated that both internal communication among ERP project team members and outward communication to the entire company are very essential. Communication among different levels and functions of ERP implementation projects needs a communication plan to guarantee that open communication happens in the whole organization and with customers and suppliers (Kumar et al., 2003). Muscatello and Chen (2008) argued that suitable communication plans should be set up to keep senior management informed on the subject of ERP project impact, challenges, risks, and progress. The communication should be conducted during ERP steering committee meetings and usual status reporting.

Holland and Light (1999) suggested employing communication tools such as newsletters, monthly bulletins or weekly meetings to keep users informed about ERP implementation project progress. Communication is one of most challenging and difficult tasks in any ERP implementation project. Nah et al. (2007) argued that it is important that employees are informed about the scope, objectives, activities and updates in advance to make ERP implementation more efficient. In enterprise system implementations, communication among stakeholders to report project progress and user input and communicating project expectations to all stakeholders are important (Sedera and Dey, 2006). According to Nah and Delgado (2006), communication should start early, be consistent and continuous, and include an overview of the system, the reasons for implementing it, and a vision on how the business will change and how the system will support these.

## 2.5 Operational Performance

Operational performances are processes that take in a set of input resources which are used to transform something into outputs or products and services. Although all operations conform to

this general input transformation output model, they differ in the nature of their specific inputs and outputs. Some are manufacturing operations producing products while others are service operations producing services.

The most important difference between these operations is the nature of their inputs. This has important implications on how the operation needs to be managed. Operations are a requirement to achieving the objectives of quality, cost, flexibility and speed. Cost involves eliminating waste while quality entails supplying fault free products. The imperative of speed involves operations that give short delivery times, fast flows of materials and rapid design of new products. The other operational performance measure is flexibility which requires operations that adjust to different customer tastes (Waters, 2006).

Performance is defined as the degree to which an operation fulfills the five generic objectives of quality, speed, dependability, flexibility and cost (Nigel, Stuart and Robert, 2010). Operation or production constitutes the heart of each company. Delivering goods and services in the quality, timelines and the volume required by the customer is essential for an on-going and strengthened success of a company. In the current environment it is more than ever important to focus on the value creating steps to eliminate cost while increasing delivery quality and reliability (Arthur, 2008).

Ashwini, Dixit and Ashishi (2012) argued that the dynamics of market does not allow any deviation in quality of end products. They noted that focused approaches in evaluating quality management issue within inter and intra organizational supply chain contexts are indispensables. They observed that the concept can be applied to address the problems such as product recall and delay in delivery. Angappa, Kee and Edwin (2008) observed that organization relies more on strategic alliance and partnership to achieve speed and flexibility. They noted that the issue of cost and integration of suppliers and customers have been given due consideration. The researchers indicated that cost is given a great deal of attention in supply chain management,

which focuses on the integration of suppliers and customers to achieves an integrated value chain with the help of information technology system.

Trkman, Slemberger and Jaklic (2005) observed that the notion of supply chain management as used in many research is usually linked with the globalization of producing and penchant for manufacturers to source their input planetary, which necessitates management of profitable ways of regulating worldwide flows of inputs or outputs. They argued that the principal focus of market competition in such situation is not only between goods but between the supply chains delivering the goods. As competition in international market is progressively dependent upon the arrival time of goods as well as their quality, coordination between suppliers and distributors has become an important characteristic of the supply chain. As the customers' satisfaction is a crucial benchmark of the success of the supply chain, effective management of the linking processes is crucial (Trkman.et.al, 2005). Trkman et.al (2005) argued that market uncertainty necessitate supply chain to be easily flexible to changes in the situation of trade.

## 2.6 Benefits of Enterprise Resource Planning Systems on Operational Performance

For years organizations have striven to realize the benefits of ERP, ES and IT investments. Integrated ERP systems affect all aspects of a business (Kalling, 2003; Hong and Kim, 2002). Dhillon (2005) claimed that real benefits reside not within the IT domain but, rather, in the changes in the organizational activities that the IT system has enabled. Several researchers have classified the types of ERP benefits, and have indicated that some approaches may be appropriate techniques for evaluating the performance or benefits of ERP systems. Irani and Love (2001) proposed a framework for meeting the challenges associated with categorizing benefits that is based on the work of Harris (1996).

Mabert et al. (2000) surveyed about 500 business executives, and revealed the following performance outcomes of ERP: quickened response time, increased interaction across the enterprise, improved order management, improved customer interaction, improved on-time

delivery, improved supplier interaction, lowered inventory levels, improved cash management, and reduced direct operating costs. Stratman and Rothe (2002) defined eight theoretical ERP competency constructs. They argued that a firm's ERP competency must be used effectively in order to truly harness the capabilities of an ERP system for competitive advantage. Vemuri and Shailendra (2006) developed a set of initial measurement items for each ERP competency. Shang and Seddon (2000) classified the different types of ERP benefits into five groups as follows: IT infrastructure, operational, managerial, strategic and organizational benefits. Those studies have addressed the classification and content of ERP benefits.

## 2.7 The Empirical Review

Several scholars have enumerated on the ERP system they gave different views depending on their areas of research. Nyagah (2006) in his research in an investigation of critical success factors for successful implementation of enterprise resource planning (ERP) Systems in Kenya highlighted some facts about ERP system that (ERP) systems has emerged as the core of successful information management and the enterprise backbone of organizations and in the past few years many companies in Kenya have invested a lot of capital in information systems such as ERP system to assist from simple transaction processing systems to complex inter organizational systems and most companies in Kenya are making frantic efforts to implement ERP system, these systems are marketed as perfect solution to the organizational problems of information management.

ERP systems can be described as configurable, standard application software which includes integrated business modules for the core processes and functions of an enterprise, that seek to present a holistic view of the business from single information and IT infrastructure (Klaus et al.2000). They are process driven modules built around software representations of complete business processes that are supposed to represent best business practice in the industry (Wilson et al2001). ERP systems are currently being widely implemented in large organizations (Klaus et al.2000) as well as small and medium sized enterprises.

Nangithia (2010) carried out a research on the factors affecting implementation of enterprises resource planning software in the telecommunication industry in Kenya, a case of Telkom Kenya. He defined (ERP) system as a large - scale information system that integrates all business functions into one unified function. Such an integration of different information systems has proved to give organizations substantial benefits that include cost reductions, improved productivity, better managerial decision making, and facilitation of process and structural change.

Mwatua (2010) who did a research on the Strategic response by Kenya Power to challenges of enterprise resource planning system, defined ERP system as the standard software solution designed to provide a single information system for organization wide coordination and integration of key business processes. ERP systems have revolutionized the way organization operate their business by providing online, real time information, integration of company business and operation efficiency.

Kutswa (2011) carried out a research on the Challenges of implementing enterprise resource planning strategy at the Kenya electricity generating company and his findings was that the organizational structure was incompatible with ERP, there was unsupportive organizational culture, the existence of inadequate allocation of resources and he categorized the challenges as institutional, behavioral, internal and external. He further pointed out that the greatest impact on ERP implementation was inadequate allocation of resources especially technological resources. He recommended cost effective initiatives to realize effective training and capacity building such as active involvement of super users in KenGen Areas to conduct hands on refresher trainings aimed at broadening and deepening user abilities in addition he identified incentives and reward systems within ERP implementation by way of recognizing and rewarding outstanding performance to spur ERP usage and motivate staff into active use of ERP.

Karimi(2010) did a research in an investigation of the business value of enterprise resource planning systems by firms in Kenya ,he studied thirty three organizations in Kenya that were

using ERP systems and highlighted that, ERP systems emerged as the core of successful information management and the enterprise backbone of the organizations, it speeds up communication of information throughout the organization, act as the motivator to the organizations looking to implement the systems and that ERP systems are very costly in terms of procurement, installation and user training costs. However he indicated that after implementation and adoption of ERP systems organizations obtain business value when the benefits outweigh the costs incurred. He also found out that the ERP systems in Kenya is slightly more than a decade old but in other parts of the world it has been in existence for long, and finally pointed out that enhancement of performance is the key benefit of ERP system.

Njuguna(2011) in her study of implementing enterprise resource planning system at Kenya Revenue( KRA)sought to determine factors influencing implementation of the ERP system at KRA and she established that computer based information systems was used prior to introduction of ERP system and they choose ERP system because it was cost effective , licenses involved and user-friendly technology. Finally the efficiency of the system had blocked the loop holes that existed in the manual process while some staff found themselves with lesser work.

Kang'ethe (2007) did a research on an evaluation of the successful implementation of enterprise resource planning system at HACO Industries .He focused on evaluation of the impact of organizational variables and technology (IT) variables on the successful implementation of ERP systems. His finding was the organization successfully implemented their ERP and immediately they were able to recognize efficiency and better management of their resources. The critical success of the project was attributed to the team leaders creating an environment where essential project requirements could be addressed in a reasonable and timely fashion.

Nangithia (2010) indicated that ERP is regarded as a foundation for the integration of organization wide information systems. Companies realize that they have to implement ERP in order to remain competitive. Mwatua (2010) stated that a number of organization private and public have implemented ERP system in order to enhance its competitive position and improved

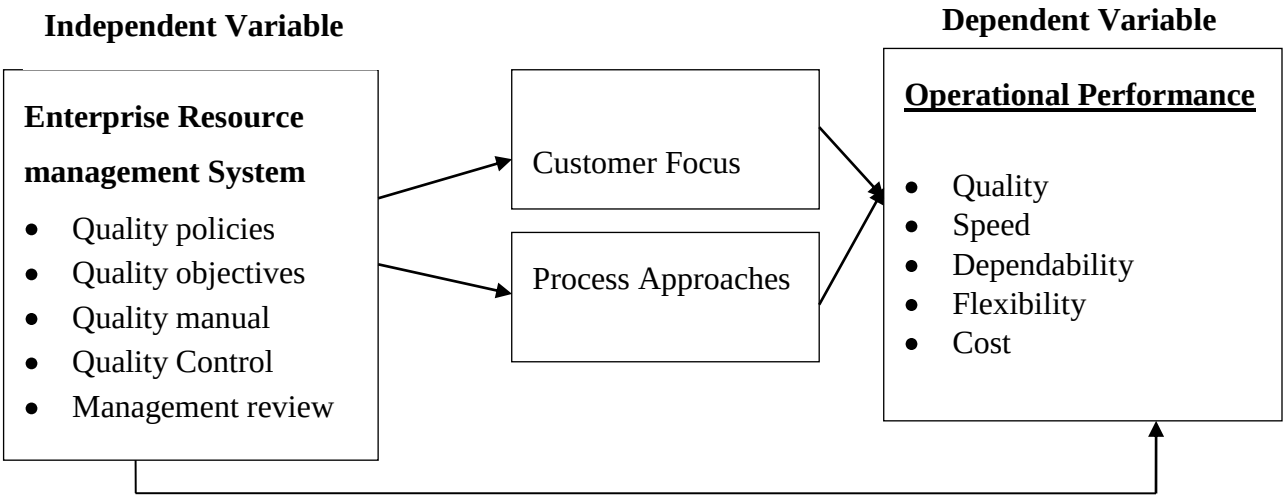
quality of service. Maina (2009) indicated that many institutions has realized the potential advantages of implementing ERP, in the sense of cost savings, quality and quantity of information available,(ERP)systems transforms the way organizations provide information systems.

Munyendo (2011) in his research stated that ERP systems are expensive, huge and complex systems that warrant careful planning and execution for successful adoption. He associated ERP system with Rogers's theory of diffusion of innovations and management support was of paramount in ERP adoption or rejection he also recommended that involvement from top management to the lower level was of great importance to support ERP system from initial stages. Cheboi (2010) viewed (ERP) as an important system in organizations since it links departmental functions and ensures that information is available and shared across the entire organization Mugambi (2011) defined the Integrated Financial Management Information system (IFMIS) as a computerized budgeting, accounting and reporting system used by Kenya Institute of Education to plan and use its financial resources more efficiently and effectively.

## 2.7 Chapter Summary

The literature review has described ERP system in detail as one of the information system technologies that enjoy a widespread diffusion worldwide. As a configurable, standard application software which includes integrated business modules for the core processes and functions of an enterprise that seek to present a holistic view of the business from single information and IT infrastructure. Process driven modules built around software representations of complete business processes that are supposed to represent best business practice in the industry. They are currently being widely implemented in large organizations as well as small and medium sized enterprises.

**Figure 2.1 Conceptual framework**




***Source: Own compilation***

On seeking to establish the Link between Enterprise Resource Planning implementation and Operations Performance of power sector, measures of central tendency will be taken to describe how the data cluster together around a central point such as mean, median or mode while measures of dispersion such as the range and standard deviation will be used to indicate whether the scores in a given condition are similar to each other or whether they are spread out.

# CHAPTER THRE: RESEARCH METHODOLOGY

## 3.1 Introduction

This chapter outlined method used in the study and adopts the following structure: research design, population description, data collection methods, and data analysis methods. The purpose of the study was to establish the effects of ERP system on operational performance.

## 3.2 Research Design

The researcher used a case study. This is a design where data is collected from a few study units. The basic case study entails the detailed and intensive analysis of in depth exploration of issue of a phenomenon. A case can be most representative if it is chosen judgmentally rather than randomly. Bryman (2008) argues that a good research design must be in a position to identify the right methodology which the researcher will apply to collect valid data. Therefore we chose this design because it allows a lot of detail to be collected that would not normally be easily obtained by other research design. The data collected is normally richer and of great depth than can be found through other experimental design. Further, with case study, scientific experiment can be conducted and can help experimenters adapt ideas and produce novel hypothesis which can be used for later testing.

## 3.3 Selection of case

The study was carried out in Kenya Power limited and KenGen stations. Power generation is a capital intensive venture and investment in power generation in Kenya comprises a large and diverse set of barriers to entry. The sector faces a number of challenges, key among them being frequent power interruptions caused by a power supply deficit that occasions delayed maintenance leading to frequent power outages , low plant availability as a result of poor maintenance practices and slow response to plant breakdowns, a poor and unreliable distribution network, over dependence on hydro power which is subject to the vagaries of weather and high operational costs resulting from operation and maintenance of aging plants, inflationary pressures and a high demand for social services by communities neighboring the plants and a

regulated market that restricts the company to only one buyer. Choices of the two companies have specific relevance with Kenya power having monopoly in the power distribution and KenGen has the largest market share in the power generation industry.

## 3.4 Data Collection

The study used both primary and secondary data. A structured close ended questionnaire developed in likert scale was used to receive response from the respondent. Data was collected from the organization before and after the implementation of the ERP system. Sample questionnaire was subjected to pilot test before administration. We chose this method of data collection because it was easy to analyze and to avoid respondent from digressing from the main area of study. The researcher reviewed records of performance targets and achieved targets. The questionnaire was hand delivered to the respondents' offices with a request to fill in the questionnaire in one week's time then it was collected. The target respondents were the finance, technical managers, Information technology personnel and staffs concerned with the implementation of the ERP system. According to Burns and Grove, (1999), a population is defined as all elements (individuals, objects and events) that meet the sample criteria for inclusion in a study. According to Kenya Power strategic plan (2011), the critical departments that deal with ERP are customer service, supply chain management, Information Technology and Technical service department.

## 3.5 Data Analysis

The data was analyzed using descriptive statistics in accordance with the objective of the study. In descriptive analysis, the researcher used frequency distribution, mean, median and percentages. The sample was restricted to staff involved in ERP Implementation. However, before final analysis was performed, data were cleaned to eliminate discrepancies and thereafter, classified on the basis of similarity and then tabulated. Measures of central tendency were taken to describe how the data cluster together around a central point such as mean, median or mode. While measures of dispersion such as the standard deviation was used to indicate whether the scores in a given condition are similar to each other or whether they are spread out.

# CHAPTER FOUR: DATA ANALYSIS, RESULTS AND DISCUSSION

## 4.1 Introduction

The study seeks to establish the extent of ERP use in power system in Kenya, establish the factors influencing effectiveness of ERP system and to determine the impact of ERP use on operational performance in power sector. Seventy questionnaires were distributed to collect the data in order to address the objective of the study. The researcher managed to receive back fifty five questionnaire for the purpose of analysis. This chapter discusses data analysis, results of the analysis and discussions.

## 4.2 Highest level of education

The researcher wanted to know the highest level of education in order to gauge the level of intellectual understanding of the respondents, credibility and reliability of the response. The table below shows data on the highest level of education of the respondents.

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Secondary | 11 | 20.0 | 20.0 | 20.0 |
| | middle level college | 31 | 56.4 | 56.4 | 76.4 |
| | University | 13 | 23.6 | 23.6 | 100.0 |
| | Total | 55 | 100.0 | 100.0 | |

Out of those who filled in questionnaire, 20% were secondary school holders, 56.4% middle level colleges and 23.6% were university graduates. As per the above data, majority of the respondents were middle level and university graduates, this indicate that the respondents were intelligent enough to understand ERP process and operational benefit to the organization. It also raises credibility of respondents and response. The presence of secondary school graduates also

exhibits diversity and inclusivity of questionnaire to capture data from the respondents. This shows that data was representative enough to form a conclusion as shown in pie chart below.

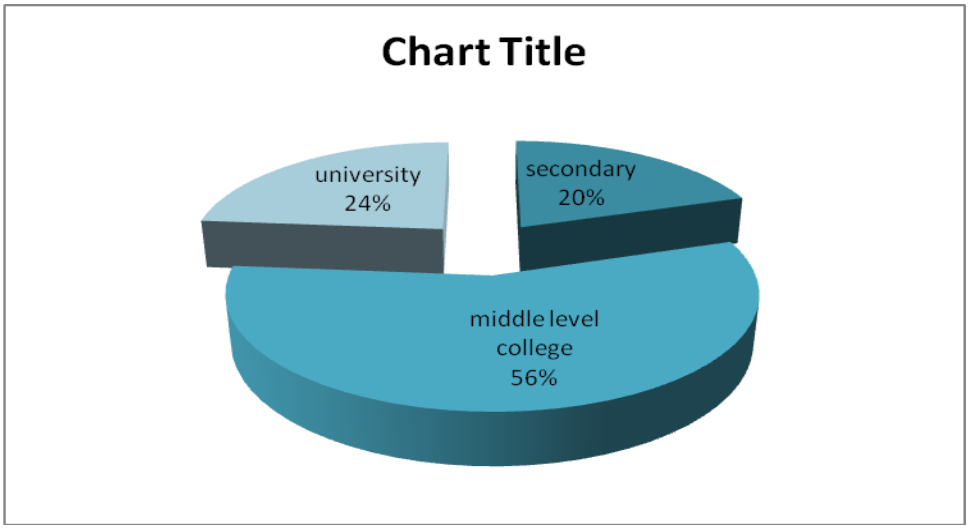



Figure 4.2

## 4.3 Gender

The study seeks to established gender parity of the respondents in order to test fairness and representativeness in terms of gender parity and to cultivate diversity and inclusivity. The table below presents data on gender parity of the respondents.

**Table 4.3 Gender Parity**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Male | 28 | 50.9 | 52.8 | 52.8 |
| | female | 25 | 45.5 | 47.2 | 100.0 |
| | Total | 53 | 96.4 | 100.0 | |
| Missing | System | 2 | 3.6 | | |
| Total | | 55 | 100.0 | | |

This table indicates gender parity of the respondents. Out of response received, 52.8% of the respondents were males and 47.2% of the respondents were female. It is clearly pointing that gender parity was fair and representative of the whole population. This lends credibility to data collected as per bar graph below.

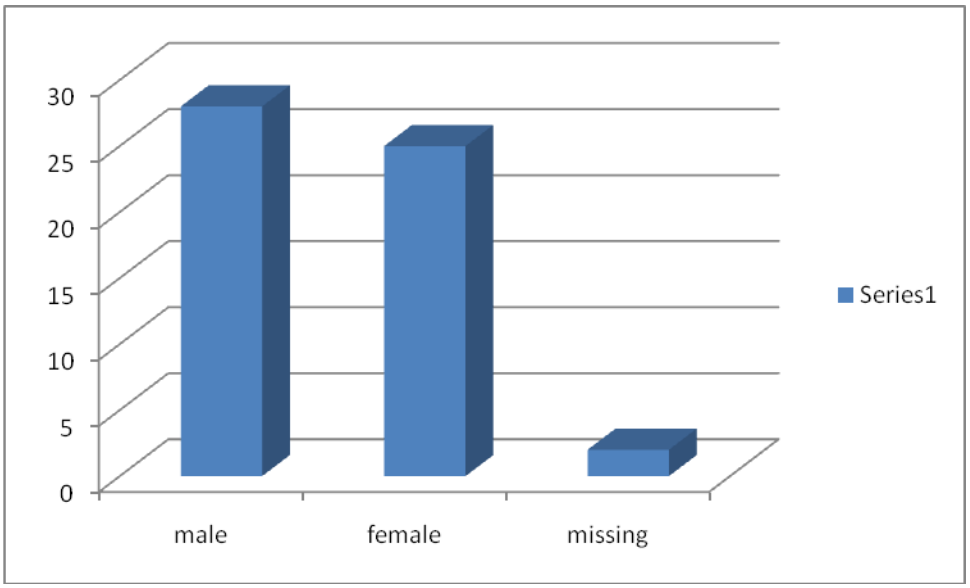



Figure 4.3

## 4.4 Extent of use of ERP system in power sector

### 4.4.1 Procurement

The study seeks to establish the extent of use of ERP system in organizations. The table below presents data on procurement as components of ERP use in power sector.

**Table 4.4 Extent of use of ERP system in power sector in procurement department**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly agree | 35 | 63.6 | 64.8 | 64.8 |
| | Agree | 15 | 27.3 | 27.8 | 92.6 |
| | Neither agree nor disagree | 1 | 1.8 | 1.9 | 94.4 |
| | Disagree | 2 | 3.6 | 3.7 | 98.1 |
| | Strongly disagree | 1 | 1.8 | 1.9 | 100.0 |
| | Total | 54 | 98.2 | 100.0 | |
| Missing | System | 1 | 1.8 | | |
| Total | | 55 | 100.0 | | |

64.8% of the respondent strongly agrees that ERP systems are used in procurement and supply chain while 27.8% agree, 1.9% neither agree nor disagree, 3.7% disagree and 1.9% strongly disagree. From the table above, majority of the respondents unanimously agree that ERP system are used in procurement and supply chain process in power sector in Kenya.

### 4.4.2 Production.

The researcher wanted to know if production form part of ERP use in power sector. The table below indicates data of production as one of the components of ERP use in power sector in Kenya.

**Table 4.5 Extent of use of ERP system in power sector in procurement department**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly agree | 21 | 38.2 | 38.9 | 38.9 |
| | Agree | 24 | 43.6 | 44.4 | 83.3 |
| | Neither agree nor disagree | 7 | 12.7 | 13.0 | 96.3 |
| | Disagree | 2 | 3.6 | 3.7 | 100.0 |
| | Total | 54 | 98.2 | 100.0 | |
| Missing | System | 1 | 1.8 | | |
| Total | | 55 | 100.0 | | |

38.9% of the respondents strongly agree that production in one of the areas used by the ERP system, 44.4% agrees, 13.0% neither agrees nor disagree and 3.7% disagrees as shown in the bar chart below. From the above summary, ERP is predominantly used in production in power sector in Kenya.

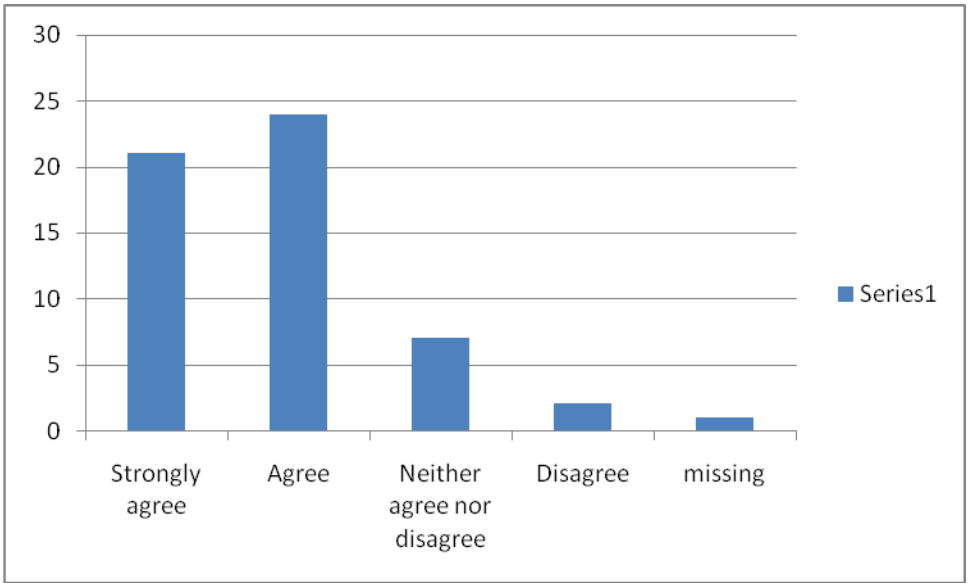



Figure 4.4

### 4.4.3 Customer service

The study seeks to establish if customer service is a component of ERP use in power sector in Kenya. The table below presents data on customer service as a component of ERP use in power sector in Kenya.

**Table 4.6 Extent of use of ERP system in power sector in Customer service department**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly agree | 22 | 40.0 | 40.7 | 40.7 |
| | Agree | 26 | 47.3 | 48.1 | 88.9 |
| | Neither agree nor disagree | 5 | 9.1 | 9.3 | 98.1 |
| | Disagree | 1 | 1.8 | 1.9 | 100.0 |
| | Total | 54 | 98.2 | 100.0 | |
| Missing | System | 1 | 1.8 | | |
| Total | | 55 | 100.0 | | |

40.7% strongly agree that customer service is one of the areas used by ERP system.48.1% agrees, 9.3% neither agree nor disagree and 1.9% disagrees. It is evident that ERP is used to address the issue of customer service in power sector in Kenya.

### 4.4.4 Distribution

The study seeks to find out if distribution form part of ERP use in power sector in Kenya. The table below indicates data on distribution as extent of ERP use in power sector.

**Table 4.7 Extent of use of ERP system in power sector in Distribution department**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly agree | 24 | 43.6 | 44.4 | 44.4 |
| | Agree | 24 | 43.6 | 44.4 | 88.9 |
| | Neither agree nor disagree | 4 | 7.3 | 7.4 | 96.3 |
| | Disagree | 2 | 3.6 | 3.7 | 100.0 |
| | Total | 54 | 98.2 | 100.0 | |
| Missing | System | 1 | 1.8 | | |
| Total | | 55 | 100.0 | | |

Majority of the respondents 44.4% strongly agree that ERP system is used in distribution. 44.4% agrees, 7.4% neither agree nor disagree and 3.7% disagrees. From the above data, it clearly noted that ERP system is used in distribution chain in power sector.

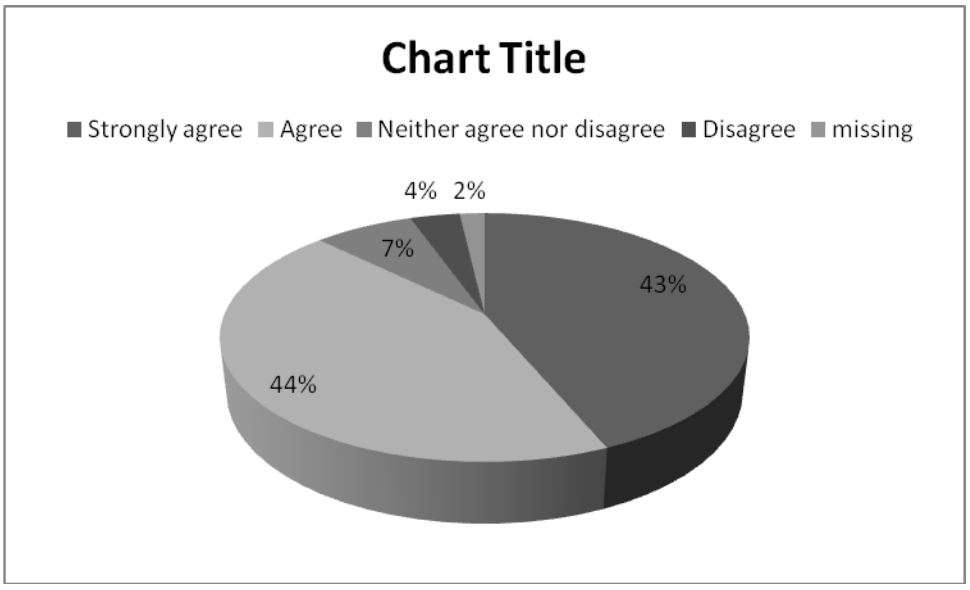



Figure 4.5

### 4.5 ERP system addresses operational objectives.

#### 4.5.1 Quality.

The researcher wanted to know whether ERP system address quality as operational objective. The table below provides data on quality as a components addressed by ERP system.

**Table 4.8 Quality as an operational objective**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly agree | 24 | 43.6 | 44.4 | 44.4 |
| | Agree | 26 | 47.3 | 48.1 | 92.6 |
| | Neither agree nor disagree | 1 | 1.8 | 1.9 | 94.4 |
| | Disagree | 3 | 5.5 | 5.6 | 100.0 |
| | Total | 54 | 98.2 | 100.0 | |
| Missing | System | 1 | 1.8 | | |
| Total | | 55 | 100.0 | | |

44.4% of the respondent strongly agrees that ERP system addresses quality issues as operational objective. 48.1% agree, 1.9% neither agree nor disagree and 5.6% disagrees. From the above results, majority of respondents pointed out that ERP system address issues of quality as operational objective. This confirmed issues addressed by Mwatua (2010) which argued that ERP system are implemented in order to enhance its competitive position and improve quality of service.

#### 4.5.2 Cost

The study seeks to find out whether ERP address cost as operational objective. The table below provides data on cost as operational objectives.

**Table 4.9 Cost as an operational objective**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly agree | 23 | 41.8 | 42.6 | 42.6 |
| | Agree | 26 | 47.3 | 48.1 | 90.7 |
| | Neither agree nor disagree | 3 | 5.5 | 5.6 | 96.3 |
| | Disagree | 2 | 3.6 | 3.7 | 100.0 |
| | Total | 54 | 98.2 | 100.0 | |
| Missing | System | 1 | 1.8 | | |
| Total | | 55 | 100.0 | | |

42.6% of the respondents strongly agree that ERP system address cost as operational objectives. 48.1% agrees, 5.6% neither agree nor disagree and 3.7% disagree. From the above data, it is clearly noted that ERP Addresses cost as operational objective as indicated in the pie chart below.

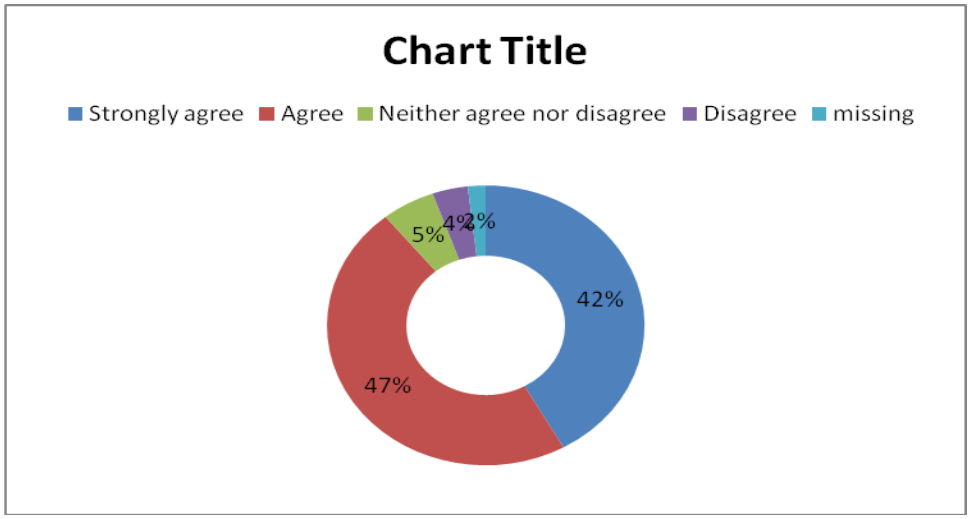



Figure 4.6

### 4.5.3 Flexibility

The researcher seeks to know whether ERP address flexibility as operational objective. The table below presents data on flexibility as operational objectives.

**Table 4.10 Flexibility as an operational objective**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly agree | 18 | 32.7 | 33.3 | 33.3 |
| | Agree | 27 | 49.1 | 50.0 | 83.3 |
| | Neither agree nor disagree | 7 | 12.7 | 13.0 | 96.3 |
| | Disagree | 2 | 3.6 | 3.7 | 100.0 |
| | Total | 54 | 98.2 | 100.0 | |
| Missing | System | 1 | 1.8 | | |
| Total | | 55 | 100.0 | | |

Majority of the respondents, 33.3% strongly agree that flexibility is one of the operational performances addressed by ERP system. 50.0% agrees, 13.0% neither agree nor disagree and 3.7% disagree. From the above data, majority of the respondents argued that ERP system facilitate flexibility as operational objective.

### 4.5.4 Dependability

The study seeks to find out whether ERP system addresses dependability as a component of operational objectives. The table below shows data on dependability as components of operational objectives.

**Table 4.11 Dependability as an operational objective**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly agree | 18 | 32.7 | 33.3 | 33.3 |
| | Agree | 20 | 36.4 | 37.0 | 70.4 |
| | Neither agree nor disagree | 11 | 20.0 | 20.4 | 90.7 |
| | Disagree | 5 | 9.1 | 9.3 | 100.0 |
| | Total | 54 | 98.2 | 100.0 | |
| Missing | System | 1 | 1.8 | | |
| Total | | 55 | 100.0 | | |

33.3% of the respondents strongly agree that ERP system addresses dependability as operational objectives. 37.0% agree, 20.4% neither agree nor disagree and 9.3% disagrees as shown in the bar chart below. From the above data, it is evident that ERP addresses issue of dependability as operational objective as shown in the bar graph bellow.

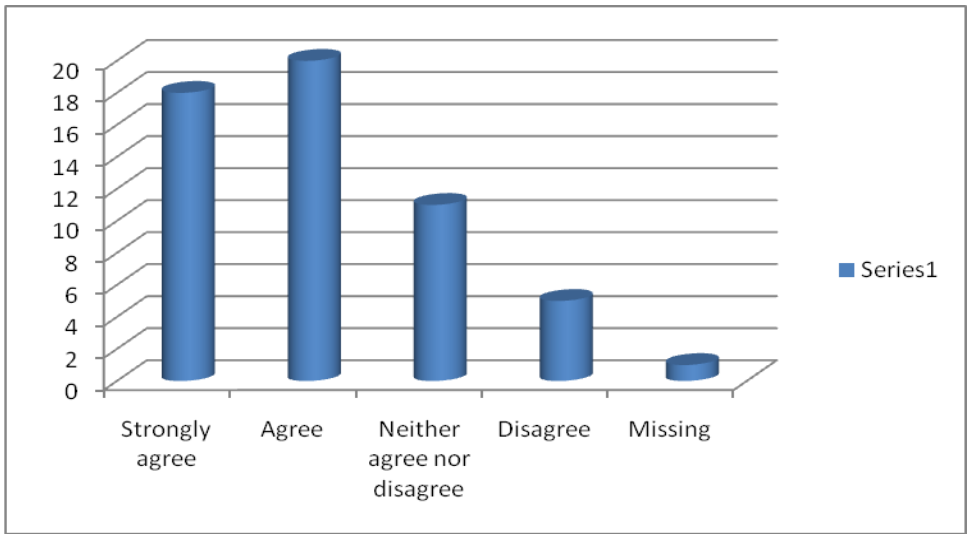



Figure 4.7

## 4.6 Factors influencing effective use of ERP system

### 4.6.1 Top management support

The study seeks to find out factors influencing effective use of ERP system. The table below presents data on top management support as one of the factors influencing effective use of ERP system in power sector in Kenya.

**Table 4.12 Top management support as a factor influencing ERP use**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly agree | 21 | 38.2 | 38.9 | 38.9 |
| | Agree | 29 | 52.7 | 53.7 | 92.6 |
| | Neither agree nor disagree | 4 | 7.3 | 7.4 | 100.0 |
| | Total | 54 | 98.2 | 100.0 | |
| Missing | System | 1 | 1.8 | | |
| Total | | 55 | 100.0 | | |

38.9% strongly agrees that top management support influence effectiveness of ERP use. 53.7% agrees, 7.4% neither agree nor disagree. From the above data, top management support influences effectiveness of ERP system in organization as per the bar graph bellow. The result supports findings by Zhang et.al (2005). Zhang et.al (2005) pointed out that top management support provide necessary resource and providing leadership to the organization.

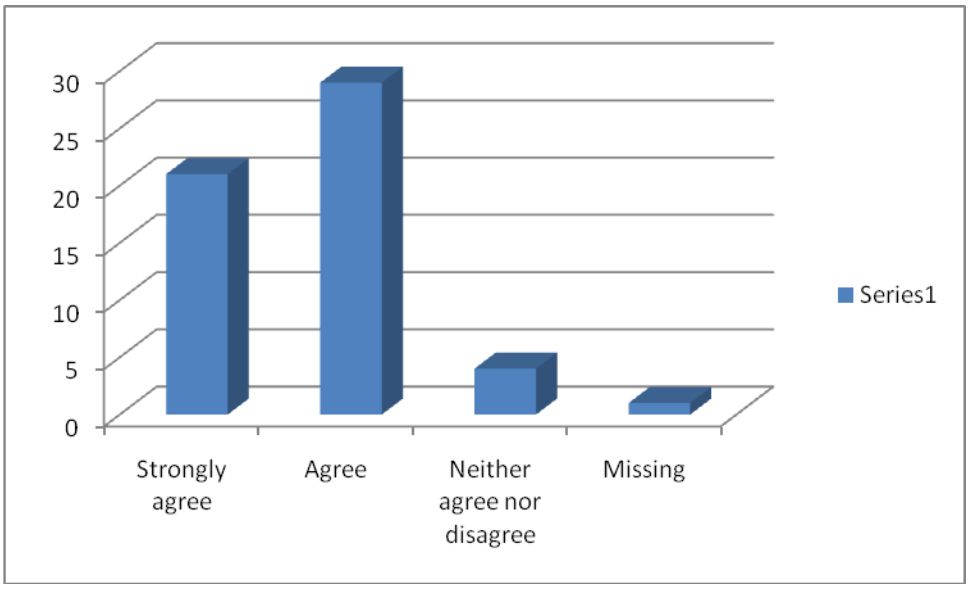



Figure 4.8

### 4.6.2 Training and education

The researcher seeks to establish if training and education influences effective use of ERP system in power sector in Kenya. The table below indicates data on training and education as a factor influencing effective use of ERP system in power sector.

**Table 4.13 Training and education as a factor influencing ERP use**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly agree | 19 | 34.5 | 35.8 | 35.8 |
| | Agree | 25 | 45.5 | 47.2 | 83.0 |
| | Neither agree nor disagree | 9 | 16.4 | 17.0 | 100.0 |
| | Total | 53 | 96.4 | 100.0 | |
| Missing | System | 2 | 3.6 | | |
| Total | | 55 | 100.0 | | |

Majority of the respondents 35.8% strongly agrees that training and education influence effectiveness of ERP system. 47.2% agrees, 17.0% neither agree nor disagree. It is clearly shown from the above data that training and education influence effective use of ERP system. This in line with Nah et.al (2003) which reported that training and education assist organization to build positive feeling towards system helps user to adjust to organizational change and increases ease of use and reduce user resistance which enhance ERP success.

### 4.6.3 Communication

The study seeks to find out if communication is one of the factors influencing effective use of ERP system in power sector in Kenya. The table below presents data on communication as factor influencing effective use of ERP system in power sector in Kenya.

**Table 4.14 Communication as a factor influencing ERP use**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly agree | 17 | 30.9 | 31.5 | 31.5 |
| | Agree | 29 | 52.7 | 53.7 | 85.2 |
| | Neither agree nor disagree | 6 | 10.9 | 11.1 | 96.3 |
| | Disagree | 2 | 3.6 | 3.7 | 100.0 |
| | Total | 54 | 98.2 | 100.0 | |
| Missing | System | 1 | 1.8 | | |
| Total | | 55 | 100.0 | | |

31.5% of the respondents strongly agree that communication influence effectiveness of ERP system. 53.7% agree 11.1% neither agree nor disagree and 3.7% disagree. From the data presented above, communication influences effective use of ERP system in organization as shown in bar chart below. This confirms assertion by Karimi (2010). He argued that ERP

systems emerged as the core successful information management and enterprise developments, it speeds up communications of information throughout organization.

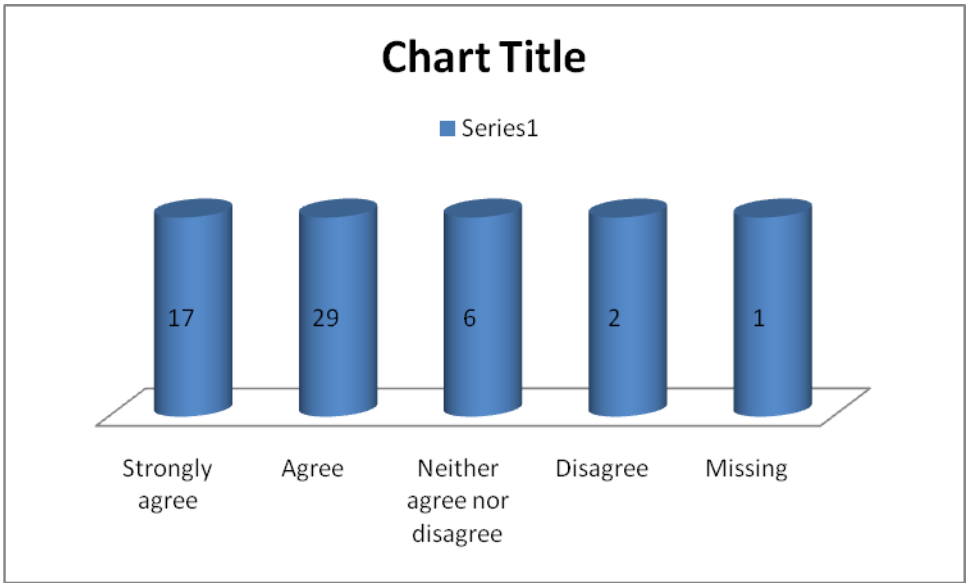



Figure 4.9

### 4.6.4 Business processes management

The researcher seeks to find out if business process influences effective use of ERP system in power sector. The table below indicates data on business management process as factor influencing effective use of ERP system.

**Table 4.15 Business processes management as a factor influencing ERP use**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly agree | 14 | 25.5 | 25.9 | 25.9 |
| | Agree | 22 | 40.0 | 40.7 | 66.7 |
| | Neither agree nor disagree | 15 | 27.3 | 27.8 | 94.4 |
| | Disagree | 3 | 5.5 | 5.6 | 100.0 |
| | Total | 54 | 98.2 | 100.0 | |
| Missing | System | 1 | 1.8 | | |
| Total | | 55 | 100.0 | | |

25.9% of the respondents strongly agree that business process management influence effective use of ERP system. 40.7% agrees, 27.8% neither agree nor disagree and 5.6% disagree. Majority of the respondents agrees that business process management influences effective use of ERP system in organization.

### 4.6.5 Culture and structural change

The researcher seeks to know whether culture and structural change influences effective use of ERP system in power sector. The table below presents data on culture and structural change as factor influencing effective use of ERP system.

**Table 4.16 Culture and structural change as a factor influencing ERP use**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly agree | 6 | 10.9 | 11.1 | 11.1 |
| | Agree | 23 | 41.8 | 42.6 | 53.7 |
| | Neither agree nor disagree | 21 | 38.2 | 38.9 | 92.6 |
| | Disagree | 4 | 7.3 | 7.4 | 100.0 |
| | Total | 54 | 98.2 | 100.0 | |
| Missing | System | 1 | 1.8 | | |
| Total | | 55 | 100.0 | | |

11.1% of the respondents strongly agree that cultural and structural change influence effectiveness of ERP use. 42.6% agrees, 38.9% neither agree nor disagree and 7.4% disagree. From the above data, majority of respondents agrees that cultural and structural change influences effectiveness of ERP use in organization as shown in pie chart below.

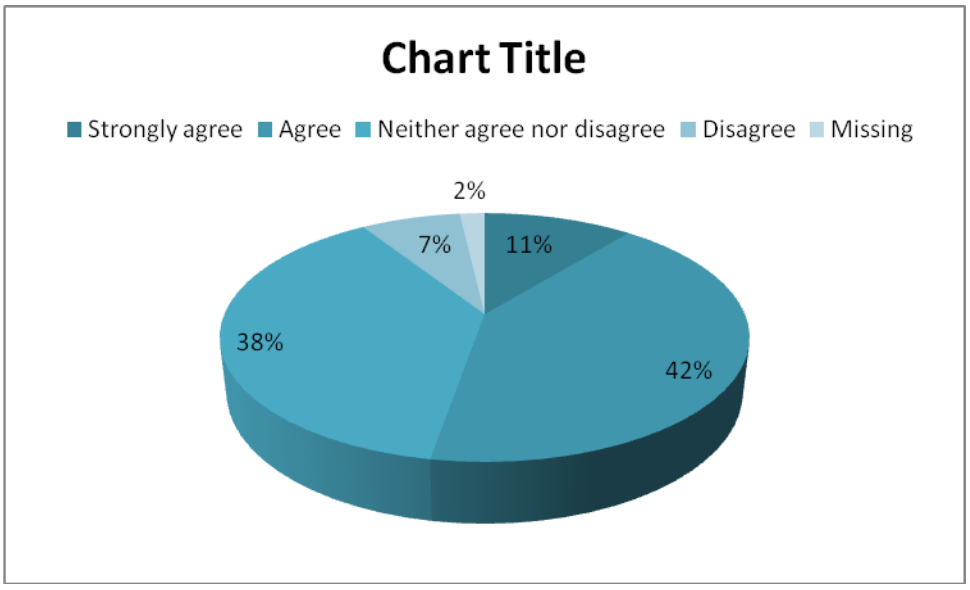



Figure 4.10

### 4.6.6 Clear understanding of strategic goal

The study seeks to find out if clear understanding of strategic goal influences effective use of ERP system in power sector. The table below presents data on clear understanding of strategic goal as one of the factors influencing effectiveness of ERP system.

**Table 4.17 Clear understanding of strategic goal as a factor influencing ERP use**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly agree | 12 | 21.8 | 22.2 | 22.2 |
| | Agree | 25 | 45.5 | 46.3 | 68.5 |
| | Neither agree nor disagree | 15 | 27.3 | 27.8 | 96.3 |
| | Disagree | 2 | 3.6 | 3.7 | 100.0 |
| | Total | 54 | 98.2 | 100.0 | |
| Missing | System | 1 | 1.8 | | |
| Total | | 55 | 100.0 | | |

22.2% of the respondents strongly agree that clear understanding of strategic goal influences effectiveness of ERP use in organization. 46.3% agree, 27.8% neither agree nor disagree and the remaining 3.7% disagree. The data on the above table shows that clear understanding of strategic goal influences effectiveness of ERP use as shown in bar graph below. This means, an organization should come up with a policy on clear understanding of strategic goal in order to meets its strategic objectives.

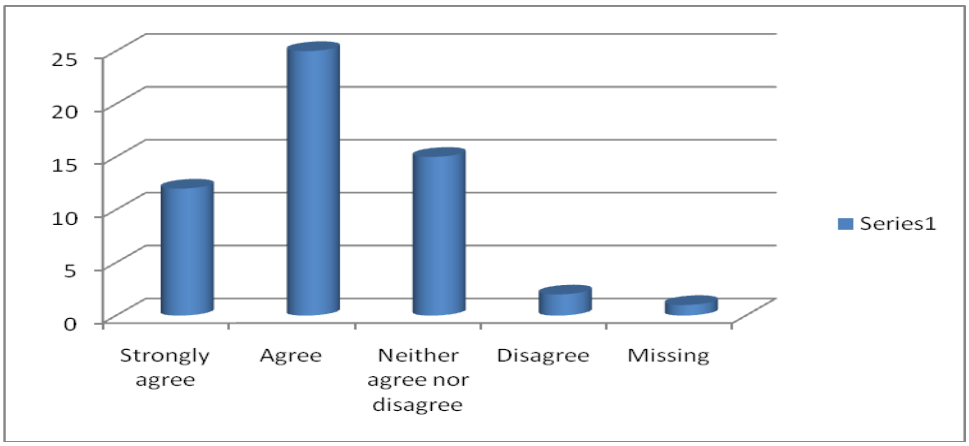



Figure 4.11

### 4.6.7 Data accuracy.

The researcher wanted to know whether data accuracy influences effectiveness of ERP use in power sector. The table below indicates data on data accuracy as a factor influencing effectiveness of ERP use.

**Table 4.18 Data accuracy.as a factor influencing ERP use**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly agree | 9 | 16.4 | 16.7 | 16.7 |
| | Agree | 22 | 40.0 | 40.7 | 57.4 |
| | Neither agree nor disagree | 19 | 34.5 | 35.2 | 92.6 |
| | Disagree | 4 | 7.3 | 7.4 | 100.0 |
| | Total | 54 | 98.2 | 100.0 | |
| Missing | System | 1 | 1.8 | | |
| Total | | 55 | 100.0 | | |

16.7% of the respondents strongly agree that data accuracy influences effectiveness of ERP use. 40.7% agree, 35.2% neither agree nor disagree and 7.4% disagree. Majority of the respondents pointed out that data accuracy influences effectiveness of ERP use in organization as shown in pie chart below.

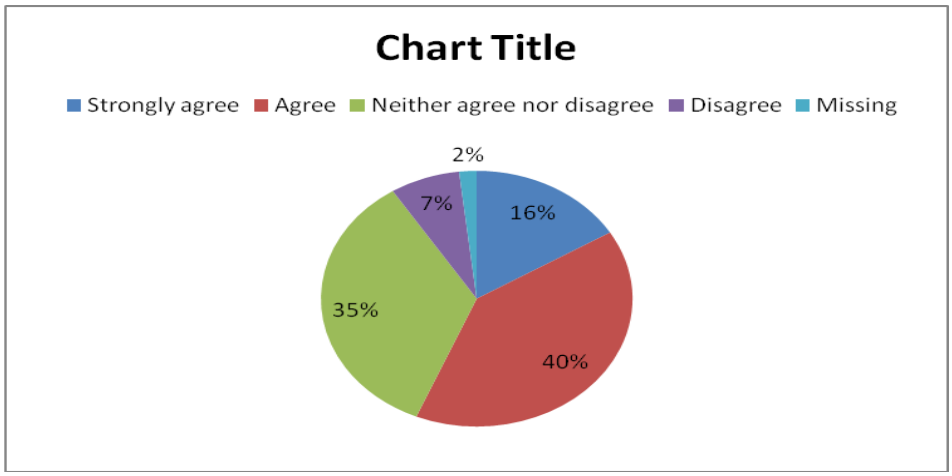



Figure 4.12

### 4.6.8 Focused performance measurement

The study seeks to find out whether focused performance management influences effectiveness of ERP system in power sector. The table below presents data on focused performance management as a factor influencing effectiveness of ERP system.

**Table 4.19 Focused performance measurement as a factor influencing ERP use**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly agree | 11 | 20.0 | 20.4 | 20.4 |
| | Agree | 25 | 45.5 | 46.3 | 66.7 |
| | Neither agree nor disagree | 14 | 25.5 | 25.9 | 92.6 |
| | Disagree | 2 | 3.6 | 3.7 | 96.3 |
| | Strongly disagree | 2 | 3.6 | 3.7 | 100.0 |
| | Total | 54 | 98.2 | 100.0 | |
| Missing | System | 1 | 1.8 | | |
| Total | | 55 | 100.0 | | |

20.4% of the respondents strongly agree that focused performance measurement influences effective use of ERP system. 46.3% agree, 25.9% neither agree nor disagree 3.7% disagree

and3.7% strongly disagree. From the above analysis, majority of the respondents reported that focused performance measurement influences effectiveness of ERP in organization.

## 4.7 Impact of ERP use on operation performance

### 4.7.1 Improved order management and replenishment.

The study seeks to find out the impacts of ERP use on operational performance. The table below indicates data on improved order management as one of the impacts of ERP use on operational performance.

**Table 4.20 Improved order management and replenishment as an impact of ERP use on operational performance**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly disagree | 7 | 12.7 | 13.2 | 13.2 |
| | Disagree | 2 | 3.6 | 3.8 | 17.0 |
| | Neutral | 3 | 5.5 | 5.7 | 22.6 |
| | Agree | 35 | 63.6 | 66.0 | 88.7 |
| | Strongly Agree | 6 | 10.9 | 11.3 | 100.0 |
| | Total | 53 | 96.4 | 100.0 | |
| Missing | System | 2 | 3.6 | | |
| Total | | 55 | 100.0 | | |

11.3% of the respondents strongly agree that ERP use lead improved order management and replenishment while 66.0%% agree, 5.7% neither agree nor disagree, 3.8% disagree and finally 13.2% strongly disagree. From the above analysis, majority of respondents agrees that one of the impacts on ERP use on operational performance is improved order management and replenishment. This is clearly shown the bar chart below.

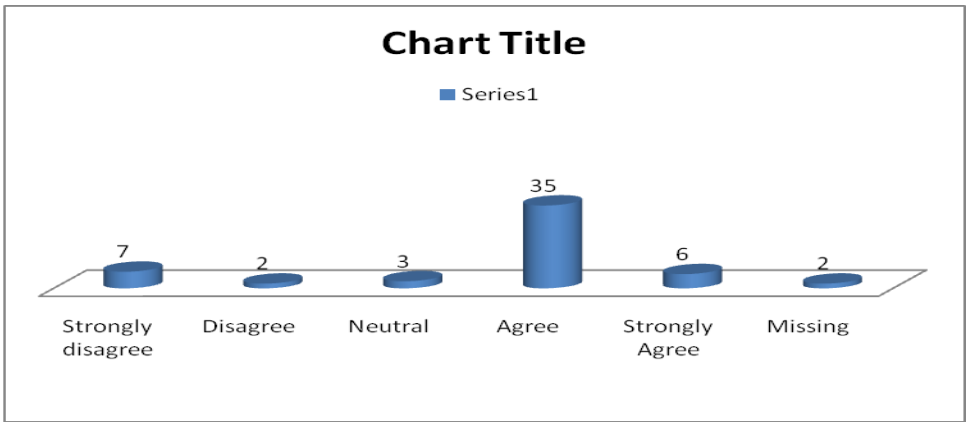



Figure 4.13

### 4.7.2 Improved customer responsiveness.

The researcher seeks to find out whether improved customer responsiveness is one of the impacts of ERP use in power system in Kenya. The table below provides data on improved customer responsiveness as impact of ERP system.

**Table 4.21 Improved customer responsiveness as an impact of ERP use on operational performance**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly disagree | 6 | 10.9 | 11.3 | 11.3 |
| | Disagree | 2 | 3.6 | 3.8 | 15.1 |
| | Neutral | 9 | 16.4 | 17.0 | 32.1 |
| | Agree | 31 | 56.4 | 58.5 | 90.6 |
| | Strongly Agree | 5 | 9.1 | 9.4 | 100.0 |
| | Total | 53 | 96.4 | 100.0 | |
| Missing | System | 2 | 3.6 | | |
| Total | | 55 | 100.0 | | |

9.4% of the respondents strongly agree that ERP system improved customer responsiveness while 58.5% agree, 17.0% neither agree nor disagree, 3.8% disagree and 11.3% strongly disagree. Majority of the respondents agree that one of the impacts of ERP use is improved

customers responsiveness. This indicates that ERP system improves effectiveness of customer response in organization.

### 4.7.3 Improved customer interaction.

The study seeks to find out whether improved customer interaction is a components of the impacts of ERP use on operational performance. The table below presents data on improved customers' interaction as a component of impacts of ERP use on operation performance.

**Table 4.22 Improved customer interaction as an impact of ERP use on operational performance**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly disagree | 5 | 9.1 | 9.4 | 9.4 |
| | Disagree | 3 | 5.5 | 5.7 | 15.1 |
| | Neutral | 7 | 12.7 | 13.2 | 28.3 |
| | Agree | 33 | 60.0 | 62.3 | 90.6 |
| | Strongly Agree | 5 | 9.1 | 9.4 | 100.0 |
| | Total | 53 | 96.4 | 100.0 | |
| Missing | System | 2 | 3.6 | | |
| Total | | 55 | 100.0 | | |

9.4% of the respondents strongly agree that ERP system improved customer interaction. 62.3% agree, 13.2% neither agree nor disagree, 5.7% disagree, and 9.4 strongly disagree. Majority of respondents approves improved customers interaction as an impact of ERP use on operational performance.

### 4.7.4 Increased interaction across the enterprises.

The study seeks to find out whether increased interaction across enterprises is an impact of ERP use on operational performance. The table below indicates data on increased interaction as an impact of ERP use on operational performance.

**Table 4.23 Increased interactions across the enterprises as an impact of ERP use on operational performance**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly disagree | 6 | 10.9 | 11.3 | 11.3 |
| | Disagree | 3 | 5.5 | 5.7 | 17.0 |
| | Neutral | 7 | 12.7 | 13.2 | 30.2 |
| | Agree | 25 | 45.5 | 47.2 | 77.4 |
| | Strongly Agree | 12 | 21.8 | 22.6 | 100.0 |
| | Total | 53 | 96.4 | 100.0 | |
| Missing | System | 2 | 3.6 | | |
| Total | | 55 | 100.0 | | |

22.6% of the respondents strongly agree that ERP system increased interaction across enterprises while 47.2% agree, 13.2% neither agree nor disagree 5.7% disagree and 11.3% strongly disagree. From the analysis above, it is confirmed that increased interaction across enterprise is one of the impact realized by organization while using ERP system as shown in bar graph bellow.

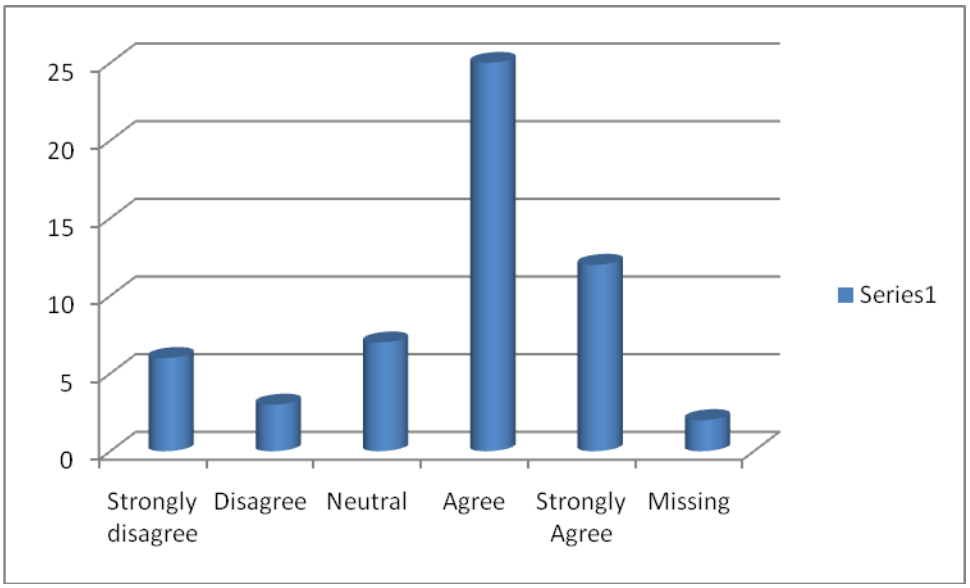



Figure 4.14

### 4.7.5 Improved suppliers' interaction.

The study seeks to find out whether ERP use impacts on improved suppliers interaction. The table below presents data on improved suppliers' interactions as an impact of ERP use.

**Table 4.24 Improved suppliers' interaction.as an impact of ERP use on operational performance**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly disagree | 8 | 14.5 | 15.1 | 15.1 |
| | Disagree | 3 | 5.5 | 5.7 | 20.8 |
| | Neutral | 7 | 12.7 | 13.2 | 34.0 |
| | Agree | 21 | 38.2 | 39.6 | 73.6 |
| | Strongly Agree | 14 | 25.5 | 26.4 | 100.0 |
| | Total | 53 | 96.4 | 100.0 | |
| Missing | System | 2 | 3.6 | | |
| Total | | 55 | 100.0 | | |

26.4% of the respondents strongly agree that ERP system improved suppliers' interaction. 39.6% agree, 13.2% neither agree nor disagree, 5.7% disagree and 15.1% strongly disagree. Majority of the respondents agrees that one of the impacts of ERP use on operational performance is improved suppliers interaction.

### 4.7.6 Improved on - time delivery

The study seeks to establish whether ERP use leads to improve on – time delivery. The table below presents data on improved on time – delivery as impact of ERP use in power sector.

**Table 4.25 Improved on time delivery as an impact of ERP use on operational performance**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly disagree | 7 | 12.7 | 13.2 | 13.2 |
| | Disagree | 5 | 9.1 | 9.4 | 22.6 |
| | Neutral | 8 | 14.5 | 15.1 | 37.7 |
| | Agree | 18 | 32.7 | 34.0 | 71.7 |
| | Strongly Agree | 15 | 27.3 | 28.3 | 100.0 |
| | Total | 53 | 96.4 | 100.0 | |
| Missing | System | 2 | 3.6 | | |
| Total | | 55 | 100.0 | | |

28.3% of the respondents strongly agree that ERP system improved on – time deliveries. 34.0% agree, 15.1% neither agree nor disagree, 9.4% disagree and 13.2% strongly disagree. From the table above, majority of respondents indicated that improved on – time delivery is one of the impacts of ERP use on operational performance.

### 4.7.7 Lower inventory level

The researcher seeks to establish whether ERP use leads to lowering inventory level in power sector in Kenya. The table below shows data on lower inventory level as an impact of ERP use on operational performance.

**Table 4.26 Lower inventory level as an impact of ERP use on operational performance**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly disagree | 4 | 7.3 | 7.5 | 7.5 |
| | Disagree | 3 | 5.5 | 5.7 | 13.2 |
| | Neutral | 8 | 14.5 | 15.1 | 28.3 |
| | Agree | 26 | 47.3 | 49.1 | 77.4 |
| | Strongly Agree | 12 | 21.8 | 22.6 | 100.0 |
| | Total | 53 | 96.4 | 100.0 | |
| Missing | System | 2 | 3.6 | | |
| Total | | 55 | 100.0 | | |

22.6% of the respondents strongly agree that ERP system lower inventory level. 49.1% agree, 15.1% neither agree nor disagree, 5.7% disagree and 7.5% strongly disagree. Majority of respondents agrees that lower level inventory in one of the impacts of ERP use on operation performance.

### 4.7.8 Improved cash management

The study seeks to establish whether use of ERP system on operational performance leads to improved cash management. The table below indicates data on improved cash management as impact of ERP use.

**Table 4.27 Improved cash management as an impact of ERP use on operational performance**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly disagree | 8 | 14.5 | 15.1 | 15.1 |
| | Disagree | 2 | 3.6 | 3.8 | 18.9 |
| | Neutral | 11 | 20.0 | 20.8 | 39.6 |
| | Agree | 18 | 32.7 | 34.0 | 73.6 |
| | Strongly Agree | 14 | 25.5 | 26.4 | 100.0 |
| | Total | 53 | 96.4 | 100.0 | |
| Missing | System | 2 | 3.6 | | |
| Total | | 55 | 100.0 | | |

26.4% of the respondents strongly agree that ERP system improve cash management. 34.0% agree, 20.8% neither agree nor disagree, 3.8% disagree and 15.1% strongly disagree as shown in the bar graph bellow. Majority of respondents agrees that improved cash management is one of the impacts of ERP use in operational performance as shown in the figure bellow.

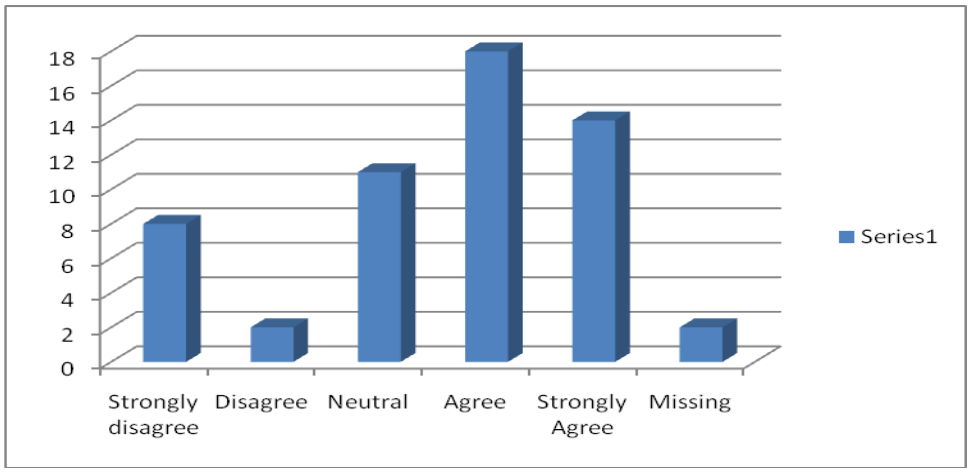



Figure 4.15

### 4.7.9 Reduce direct operation cost

The researcher wanted to establish whether use of ERP on operational performance impacts on reduced direct cost of operation. The table below indicates data on reduced direct cost on operation as impact of ERP use on operational performance.

**Table 4.28 Reduce direct operation cost as an impact of ERP use on operational performance**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Strongly disagree | 6 | 10.9 | 11.3 | 11.3 |
| | Disagree | 4 | 7.3 | 7.5 | 18.9 |
| | Neutral | 11 | 20.0 | 20.8 | 39.6 |
| | Agree | 22 | 40.0 | 41.5 | 81.1 |
| | Strongly Agree | 10 | 18.2 | 18.9 | 100.0 |
| | Total | 53 | 96.4 | 100.0 | |
| Missing | System | 2 | 3.6 | | |
| Total | | 55 | 100.0 | | |

18.9% of the respondents strongly agree that ERP system reduce direct cost of operation. 41.5% agree, 20.8% neither agree nor disagree, 7.5% disagree and 11.3% strongly disagree. From the analysis above, majority of respondents pointed out that reduced direct operation cost is one of the impacts of ERP use on operation performance in organization as shown below.

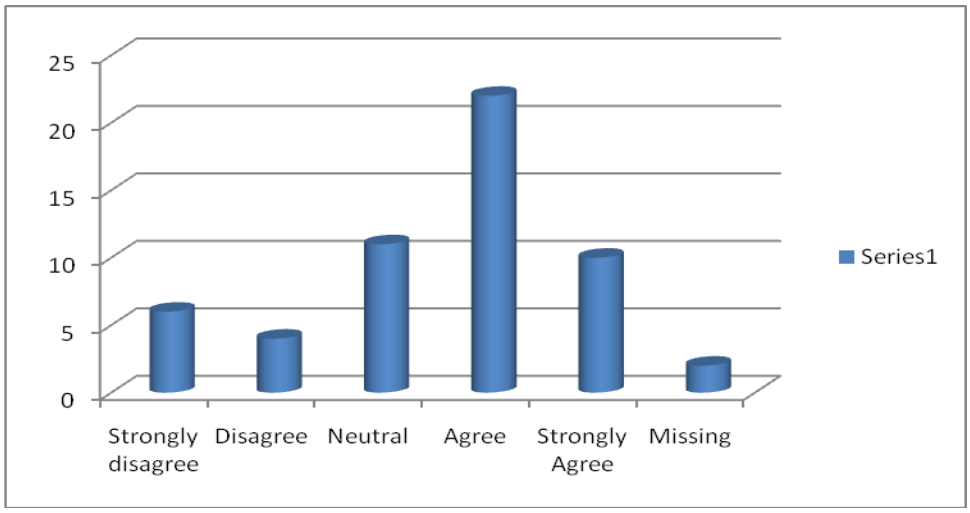



Figure 4.16

## 4.8 Descriptive statistics

### 4.8.1 Descriptive statistic on extent of ERP use

The researcher seeks to establish the department where the use of ERP system is most prevalence. The table below indicates areas where ERP system is mostly used in organization.

**Table 4.29 Descriptive statistic on extent of ERP use**

| | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| Procurement | 54 | 1.00 | 5.00 | 1.5000 | .86330 |
| Production | 54 | 1.00 | 4.00 | 1.8148 | .80269 |
| Customers service | 54 | 1.00 | 4.00 | 1.7222 | .71154 |
| Distribution. | 54 | 1.00 | 4.00 | 1.7037 | .76798 |
| Valid N (list wise) | 54 | | | | |

From the table above ERP system is mostly used in procurement and supply chain with a mean variance of 1.50 followed by distribution 1.70 mean variance, customer service 1.72 mean variance and finally production with mean variance of 1.81. This confirms empirical studies which indicate that ERP is most prevalence in areas of procurement and supply chain management, production, customer service, and distribution.

### 4.8.2 Descriptive statistic on operational objective

The study seeks to establish the mostly addressed operational objective by ERP system. The table below shows data on descriptive statistics on operational objectives.

**Table 4.30 Descriptive statistic on operational objective**

| | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| Quality | 54 | 1.00 | 4.00 | 1.6852 | .77275 |
| Cost | 54 | 1.00 | 4.00 | 1.7037 | .74301 |
| Flexibility | 54 | 1.00 | 4.00 | 1.8704 | .77815 |
| Dependability | 54 | 1.00 | 4.00 | 2.0556 | .95989 |
| Valid N (list wise) | 54 | | | | |

From the above table, ERP system mostly address quality as operational objective with mean variance of 1.68 followed by cost 1.70, flexibility 1.87 and finally dependability 2.05 mean variance. The data from the above descriptive analysis confirm that ERP system is used to achieve operational objective of quality, cost, flexibility and dependability.

### 4.8.3 Descriptive Statistics on factors that influence effective use of ERP system.

The researcher seeks to establish factors that mostly influence effectiveness of ERP use. The table below indicates data on descriptive statistics on factors influencing effective use of ERP system.

**Table 4.31 Descriptive Statistics on factors that influence effective use of ERP system**

| | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| Top management support | 54 | 1.00 | 3.00 | 1.6852 | .60887 |
| Training and education | 53 | 1.00 | 3.00 | 1.8113 | .70864 |
| Communication | 54 | 1.00 | 4.00 | 1.8704 | .75351 |
| Business processes management | 54 | 1.00 | 4.00 | 2.1296 | .86975 |
| Culture and structure change | 54 | 1.00 | 4.00 | 2.4259 | .79151 |
| Clear understanding of strategic goal | 54 | 1.00 | 4.00 | 2.1296 | .80203 |
| Data accuracy | 54 | 1.00 | 4.00 | 2.3333 | .84675 |
| Focused performance measurement | 54 | 1.00 | 5.00 | 2.2407 | .95038 |
| Valid N (list wise) | 53 | | | | |

Top management support influence effective use of ERP system with a mean variance of 1.68 followed by training and education with mean variance of 1.81. Communication 1.87, business process management 2.12, culture and structural change 2.42, clear understanding of strategic goal 2.12, data accuracy 2.33 and focused performance measurement 2.24 mean variance. From the above descriptive analysis, top management, communications, training and education, business process management, cultural and structural change, clear understanding of strategic goal and focused performance measurement are some of factors influencing effectiveness of ERP system.

### 4.8.4 Descriptive Statistics on impact of ERP use in operation performance.

The researcher seeks to establish the processes that are mostly influence by ERP use on operational performance. The table shows data on descriptive statistics on the impacts of ERP use on operation performance.

**Table 4.32 Descriptive Statistics on impact of ERP use in operation performance.**

| | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| Improved order management and replenishment. | 53 | 1.00 | 5.00 | 3.5849 | 1.16741 |
| Improved customer responsiveness. | 53 | 1.00 | 5.00 | 3.5094 | 1.10284 |
| Improved customer interaction. | 53 | 1.00 | 5.00 | 3.5660 | 1.06535 |
| Increased interaction across the enterprises. | 53 | 1.00 | 5.00 | 3.6415 | 1.22623 |
| Improved suppliers' interaction. | 53 | 1.00 | 5.00 | 3.5660 | 1.35177 |
| Improved on - time delivery | 53 | 1.00 | 5.00 | 3.5472 | 1.35258 |
| Lower inventory level | 53 | 1.00 | 5.00 | 3.7358 | 1.11201 |
| Improved cash management | 53 | 1.00 | 5.00 | 3.5283 | 1.33883 |
| Reduce direct operation cost | 53 | 1.00 | 5.00 | 3.4906 | 1.21881 |
| Valid N (list wise) | 53 | | | | |

Improved order management and replenishment has a mean variance of 3.58, improved customer responsiveness 3.50, improved customers interaction 3.56, increased interaction across the enterprises has a mean variance of 3.64 and improved suppliers interaction has a mean variance of 3.56. improved on – time delivery 3.54 mean variance, lower inventory level 3.73 mean

variance, improved cash management 3.52 and reduce direct cost of operation has a mean variance of 3.49. from descriptive analysis shown above, it is confirmed that improved order managements and replenishment, improved customers interaction, increased interactions across enterprises, improved suppliers interactions, improved on – time delivery, lower inventory level, improved cash management and reduced direct cost of operation are some of the impacts of ERP use in operation performance.

# CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATION

## 5.1 Introduction

This chapter highlights key findings in data analysis and conclusion based on findings and recommendation thereof. The objective of the study was to establish extent of ERP use in power sector in Kenya and factors influencing effectiveness of ERP system. Further the study was to determine the impact of ERP use on operation performance in power sector. The chapter will deal with summary, conclusion and recommendation of the study.

## 5.2 Summary

The objective of the study was to establish the extent of ERP use in power sector in Kenya, establish factors influencing effectiveness of ERP use on performance and to determine impact of ERP system on operational performance. The study was based on existing power generation and distribution companies. Fifty five respondents were received through close ended questionnaire developed in likert scale. Data was analyzed through descriptive statistics in keeping with objective of the study.

The study found out that ERP systems are used in power sector mostly in supply chain management, production, customer service and distribution. ERP address quality, flexibility, cost and dependability as operational objective. It is also evident that several factors influence effectiveness of ERP system. These factors include top management support, training and education, business process management, cultural and structural change, clear understanding of strategic goal, data accuracy and focused performance measurement.

ERP system impacts on operational performance of organization. The impact on power sector has been identified to be improved order management and replenishment, improved customers responsiveness, improved customer interaction, increased interaction across the enterprises,

improved suppliers interaction, improved on – time deliveries, lower inventory level, improved cash management, and reduce direct operation cost.

### 5.3 Conclusion

Based on the findings above, it can be concluded that ERP system in power sector in Kenya are used in areas like supply chain management, production, customer service and distribution. ERP address some of the operational objective. Majority of the respondents indicated that ERP address quality, cost, flexibility and dependability as operational objective of the firm. On factors influencing effectiveness of ERP system, majority of respondents agree that top management support, training and education, communication, business process, cultural and structural change, clear understanding of strategic goal, data accuracy and focused performance measurement influence effectiveness of ERP.

ERP has a lot of impact on organization system and operation. Most of respondents concluded that ERP impact on order management and replenishment, customer responsiveness, customers' interaction, interaction across enterprises, suppliers' interaction, on – time delivery, lower inventory level, cash management and reduced direct operation cost.

### 5.4 Limitation of the study.

There was a lot challenges experienced while undertaking this study. Time constrain was a challenge, while we were required to meet performance target in our organization, we were also required to complete the study on time. In as much as shared time allocation was eminent, this did not compromise quality of the study. Out of seventy questionnaires distributed, only fifty five was returned. Most of the respondents were constrained with a lot of responsibility and engagement that could not provide space to attend to questionnaire. Nevertheless sample size received was enough to conclude the exercise.

## 5.5 Recommendation

From the study, ERP system proved to be a power house for real organizational reform in the industry. In order to consolidate and integrate organizational operation, we would like to recommend full operational integration of ERP system. To improve performance of ERP system, further research on challenges should be carried out. Once the challenges are known, organization could come up with mitigating measures to address challenges.

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## APPENDIX I: RESEARCH QUESTIONNAIRE

Please answer the following questions by crossing (x) or tick (√) to the relevant column. This questionnaire is for academic purposes only. The responses will remain anonymous and that the information provided will be treated with strict confidentiality. Please indicate the extent to which you agree or disagree with the statement as it relates to how the system in your station works.

1. Name (Optional) _____

2. Highest level of education

| | | | |
|---|---|---|---|
| Primary | ☐ | Secondary | ☐ |
| Middle level College | ☐ | University | ☐ |

3. Gender

| | | | |
|---|---|---|---|
| Male | ☐ | Female | ☐ |

4. To what extent do you agree or disagree that the following are the extent of ERP use in power sector in Kenya.

| **Extent of ERP use** | **Strongly agree** | **Agree** | **Neither agree nor disagree** | **disagree** | **Strongly disagree** |
|---|---|---|---|---|---|
| Supply chain management | | | | | |
| Production | | | | | |
| Customers service | | | | | |
| Distribution. | | | | | |

5. To what extent do you agree or disagree that ERP system used in your organization address the following operational objectives.

| ERP system and operational performance | Strongly agree | Agree | Neither agree nor disagree | disagree | Strongly disagree |
|---|---|---|---|---|---|
| Quality | | | | | |
| Cost | | | | | |
| Flexibility | | | | | |
| Dependability | | | | | |

6. To what extent do you agree or disagree that the following are factors influencing the effectiveness of ERP use in power sector in Kenya?

| Factors influencing effectiveness use of ERP systems | Strongly agree | Agree | Neither agree nor disagree | disagree | Strongly disagree |
|---|---|---|---|---|---|
| Top management support | | | | | |
| Training & education | | | | | |
| Communication | | | | | |
| Business processes management | | | | | |
| Cultural and structural change | | | | | |
| Clear understanding of strategic goal | | | | | |
| Data accuracy | | | | | |
| Focused performance measurement | | | | | |

7. To what extent do you agree or disagree that the following are the impact of ERP use on operation performance in power sector in Kenya.

| **Impact of ERP use** | **Strongly Disagree** | **Disagree** | **Neutral** | **Agree** | **Strongly Agree** |
|---|---|---|---|---|---|
| Improved order management and replenishment. | | | | | |
| Improved customer responsiveness. | | | | | |
| Improved customer interaction. | | | | | |
| Increased interaction across the enterprises. | | | | | |
| Improved suppliers' interaction. | | | | | |
| Improved on - time delivery | | | | | |
| Lower inventory level | | | | | |
| Improved cash management | | | | | |
| Reduce direct operation cost. | | | | | |

## APPENDIX II: COMPANIES IN THE POWER SECTOR IN KENYA

### Power producers

1. KenGen
2. Tsavo Power
3. Ibeafrica
4. Or power 4 inc
5. Pan paper
6. Rabai power
7. Mumias sugar
8. Oserian Development Company
9. Lake Turkana
10. Bidco
11. Thika power
12. Triumph
13. Gulf power limited
14. Regen terem
15. Kinangop
16. Cumins power generation
17. James Finlay
18. Sotik Tea Company
19. Sotik Highlands Tea Estate
20. Pan African Paper Mills
21. Unilever Tea Kenya Ltd
22. Kenya petroleum refineries

### 2. Power installation and distribution

1. Kenya Power Company
2. Rural electrification authority