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SCHOOL OF COMPUTING & INFORMATICS

Critical factors for successful implementation of e-procurement in the Kenyan public sector

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A project report submitted in partial fulfillment of the requirements for the award of Masters of Science in Information Technology Management of the University of Nairobi

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DECLARATION

This project is my own original work and, to the best of my knowledge, this research work has not been submitted for any other award in any University.

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This project report has been submitted in partial fulfillment of the requirements for the Master of Science Degree in Information Technology Management of the University of Nairobi with my approval as the University supervisor.

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ABSTRACT

E-procurement is the usage of information and communication technology in performing all procurement process stages through the internet. It is aimed at ensuring that procurement transactions are transparent and efficient with a high degree of accountability. However, unlike the private organizations, the Kenyan public sector has not been successful in implementing electronic procurement. Corruption also persists in Kenyan public sector procurement despite e-procurement. This research was aimed at identifying critical factors which can ensure that electronic procurement is successfully implemented in the Kenyan public sector. The study adopted the exploratory research approach and had a population sample of 12 parastatals and 2 government ministries with 140 respondents. 110 questionnaires were filled and returned – a 79% response which was adequate for analysing and interpreting data. Analysis of data was conducted through frequencies, percentages and mean scores while multiple regression analysis obtained using SPSS was applied in hypothesis testing regarding the critical success factors' influence on successful electronic procurement implementation in Kenyan public organizations. The R square values were .828 for managerial factors, .878 for system factors and .930 for stakeholder factors. The three models reach statistical significance Sig = .000 with p less than .0005 implying that these results are statistically significant. In order of contribution to the dependent variable (implementation level), the beta values are .472 for managerial factors making them the strongest contributor followed by .375 for stakeholder factors and .230 for system factors. The research recommends Kenyan public organizations' top management should support e-procurement implementation and provide adequate resources for successful e-procurement implementation. There should also be proper data encryption, training programs for supply chain personnel and proper IT infrastructure set up. Kenyan public organizations should have a perfect connection with their business partners and suppliers and have an appropriate e-procurement implementation strategy with proper mechanisms for measuring, evaluating and controlling e-procurement implementation. Organizational systems should be engineered to be highly compatible to current e-procurement systems while adequate resources should be availed by the Kenyan government and top management in Kenyan public organizations for effective e-procurement implementation.

Key words

Critical success factors, information technology, electronic procurement, successful implementation, public sector.

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ACRONYMS AND ABBREVIATIONS

E-procurement	Electronic procurement
ICT	Information and Communications Technology
IT	Information Technology
SPSS	Statistical Package for the Social Sciences

CHAPTER ONE: INTRODUCTION

Electronic procurement is a supply chain management component which comprise of software used in e-procurement purchasing consortia, auctions and market exchanges (Davila et al., 2003). According to Presutti (2003), electronic procurement involves the use of all technologies facilitating buying through the internet. It comprises of different e-procurement processes which include e-tendering, e-collaboration, enterprise resource planning, e-MRO (repair, maintenance and operating materials, e-reverse auctions, e-informing and e-sourcing (Presutti, 2003).

According to Hawking et al. (2004), e-procurement comprise of third party internet sourcing, electronic ordering and tender submission, buyers-seller electronic mails and in contract management, conducting research into the markets of suppliers as well as financial and inventory systems integration. Koorn, Smith and Mueller (2001) on the other hand introduced three major e-procurement groups: online intermediaries, seller and buyer systems. From the above definitions, e-procurement can generally be defined as carrying out procurement procedures through the internet.

Edmiston (2003) identified various key electronic procurement advantages. This include lower costs of supply, lower tender costs, savings on lead time, less paper work and bureaucracy, standardized documentation with an increase in transparency in e-procurement processes, more compliance with procurement regulations and laws, less errors and easier information access.

As pointed out by Azadegan (2008), faster evolution in technology has resulted in new technology implementation like e-procurement a common practice. However, not all sectors adopt these technologies. Such differences in adoption are influenced by national cultures. For instance in a study conducted by Batenburg (2007), firms from nations with a lower uncertainty avoidance like the United Kingdom and Germany were among the first in adopting e-procurement while nations less reluctant to change like France and Spain have lower adoption rates.

Successful e-procurement implementation depends on various factors. The term critical success factors have been used in many business activities especially in electronic commerce. In the context of this research, critical success factors are the underlying guiding principles in ensuring e-procurement implementation is successful. Since electronic procurement is

presently a major essential activity in the arena of e-business, firms of all sizes and types need a guide on how to proceed with this technology (Mohammadi, 2013).

A study performed by Batenburg (2007) on the adoption of e-procurement by European organizations identified that indeed e-procurement success rates differed between various countries. Nations with a lesser avoidance of uncertainty like the United Kingdom and Germany were among the first to implement e-procurement while nations less reluctant to change like France and Spain have lower rates in adopting e-procurement. In another research performed by Greunen, Herselman and Nierkerk (2010) on regulated e-procurement adoption in the East Cape provincial administration, it was established that limited understanding on supply chain operations, reduced supply chain benefits within the government environment.

In Kenya, organizations especially in the private sector such as the Nation group have successfully embraced the e-procurement technology through their N-soko digital platform that enables customers to buy products and properties online. However, the Kenyan public sector is riddled with corruption and successful e-procurement implementation has not been achieved (Gitahi, 2011). As shown by Gitahi (2011), while organizations in the Kenyan private sector have been successful in embracing e-procurement usage such as the nation media group's n-soko which facilitates online product purchases, organizations in the Kenyan public sector have not been successful in implementing e-procurement. In another study performed by Awino (2011) on the management of supply chains in big private manufacturing companies, it was found out that the private sector in Kenya have been more successful in e-procurement implementation than the Kenyan public sector.

1.1 Research problem background

The present 21st century age of information has had many governments face challenges in transforming technology. As argued by Kaliannan, Awang and Raman (2009), improved delivery of services is a major aim for many governments in both developing and developed nations. This has created the need of reinventing government systems for more cost effective and efficient services via information and communication technologies to their stakeholders (McLean and Tawfik, 2003).

E-government involves government organizations using information technology in transforming their relationships with other government arms, businesses and citizens (Harris, 2000). It serves various roles such as simplifying government service delivery as well as

improving interaction with businesses and industries. Similarly, many governments of developing nations aim at implementing the technology of e-procurement in facilitating transparent and efficient procurement processes.

As shown by Bof and Previyali (2010), e-procurement is a collective term for the various technologies used in automating internal and external activities in ordering and sourcing services and goods. Ronchi et al. (2010) outlined four traditional principles of procurement in government public spending that are not applicable to corporates: the low bidder is likely to win, there is need for separation of the user and vendor in order to avoid favouritism, fixed contract terms and prices are most suitable for government and open access is very important in all situations. However, as pointed out by Moon (2004), public procurement management is perceived negatively and criticised as neither effective nor efficient. Such negative criticism and perception have forced governments to try innovative ways for making the management of procurement to be done in a better and more efficient way. Many public sector administration problems can be solved using information technology. E-procurement is one innovative alternative in achieving a better, cheaper system for procurement.

According to Johnson, Leenders and McCue (2003), unlike public procurement managers, private companies are involved more in major firm activities. Only financial basis are used in making major procurement decisions in private organizations unlike public procurement (Lee, 2008). Other considerations other than financial such as transparency, competition and equity inhibit their abilities to operate strategically (Matthews, 2005).

As stated by Mitchell (2000), e-procurement introduction influences the skills and roles needed in the purchasing institution and will change the relationships with suppliers and vendors. For instance, as suggested by one study performed by Osmonbekov et al. (2002), in a B2B setting, the purchasing scope may decrease, encompassing lesser levels of hierarchical and comprise lesser areas functional in e-procurement application.) Electronic procurement centralizes the buying function and empowers employees in managing purchases while following the policies and rules of the organization (Kulp et al., 2006).

Electronic government procurement involves online use of ICT in public procurement management in processing, evaluating and reporting procurement procedures. Government procurement makes up 18.42% of the global gross domestic product (Adebiyi, 2010). Government procurement is utilized by public organizations and other procurement actors in performing all tasks involved in the government procurement cycle. It involves seeking

consultation, works, goods and services which is more efficient with procurement management.

E-government projects usually have a 70% failure chances (Vaidya et al., 2004). Similarly, e-government procurement can easily fail. New information technology system adoption affects several processes and thus the need to redesign them in line with the new system. Hence it is very essential in a firm's actual e-procurement solution selection and the catalogue required for support. As shown by Angeles and Nath (2005), a cost-benefit analysis helps an organization in identifying and justifying items comprising the total ownership cost, software package functionalities, costs of installation, support and service, technical architecture and other costs associated with post acquisition.

Vaidya, Sajeev and Callender (2006) asserted that for initiatives in developing electronic procurement in the economy of information across the public sector, more discussions and agreements on critical success factors and assessments of achieving success should be carried out. While some organizations are highly successful in implementing e-procurement technologies, others do not succeed. Greunen, Herselman, and Niekerk (2010) on the other hand established that there has been no achievement of the benefits of supply chain management due to limited understanding on the concept of supply chain management in government environments. The basis on which this research was carried out was to identify the critical factors necessary to enhance successful e-procurement implementation in the Kenyan public organizations.

1.2 Problem statement

For institutions and organizations to remain competitive, there is need for them to embrace information and communication technology. A major section of information system enabled innovations that have a high likelihood of yielding significant benefits to organizations is electronic procurement.

The major aim of government procurement is simple: purchasing the best product or service at the best price (Croom and Brandon-Jones, 2004). For this to happen successfully, the process would have to be transparent, objective and open. However as shown by Korir, Afande & Maina (2015); Gitahi (2011); Greunen, Herselman, and Niekerk (2010); Vaidya, Sajeev and Callender (2006) while the private sector has been successful in implementing electronic procurement, the Kenyan public sector has not been successful in implementing

electronic procurement. E-procurement has also not been able to decrease the corruption problem in Kenyan public procurement procedures (Korir, Afande & Maina (2015); Mose, Njihia & Magutu, 2013). Corruption in the public sector causes problems in procurement procedures like poor professionalism of the bureaucracy, absence of professionalism, poor auditing and political control and many more.

E-procurement if successfully implemented can be used to overcome these shortcomings related to procurement especially in developing nations by enhancing good governance through control and monitoring of government employees and reduce the potential of corrupt procurement behaviours. Information and communications technology especially e-procurement if properly implemented would increase efficiency and decrease public procurement corruption (Bertot, Jaeger& Grimes, 2010).

1.3 Research objectives

This research aimed at identifying the critical factors for successful implementation of electronic procurement in the Kenyan public sector.

Research questions which formed the research study guide were:

1. How do organizational managerial factors of top management support, resources, the e-procurement implementation strategy, measurement and control and process engineering influence successful e-procurement implementation in the Kenyan public sector?
2. How do organizational system factors of information security, IT infrastructure and system integration influence successful e-procurement implementation in the Kenyan public sector?
3. How do organizational stakeholder factors of supplier support and employee training and skills influence successful e-procurement implementation in the Kenyan public sector?

1.4 Significance of the research

The current business environment is competitive and necessities organizations and institutions to adopt ICT. Electronic procurement is a major area where innovations facilitated by information systems can significantly benefit organizations in supply chain activities (Edmiston, 2003).

The research study findings will help policy makers to device policies and strategies that will enhance successful electronic procurement implementation in the Kenyan public sector. It will help the Kenyan public sector identify how they can successfully implement e-procurement since it analyses and shows the critical factors which can ensure that electronic procurement is successfully implemented in Kenyan public organizations.

According to Engstrom et al. (2008), successful implementation e-procurement results to more adequate purchasing and better quality. Successful implementation of electronic procurement will help in reducing the problem of corruption in the Kenyan public sector by enhancing efficiency and transparency in public procurement activities. It will also improve the management of government procurement processes enhancing fair bidder selection, lowering transaction costs with increased efficiency, control, monitoring and transparency (Edmiston, 2003). This research will also be useful to researchers in e-procurement. It forms a basis and point of reference for research in e-procurement related areas.

<div align="center">**CHAPTER TWO: LITERATURE REVIEW**</div>

This section will evaluate the various models that have been developed for successful implementation, identify critical factors for successful electronic procurement implementation from past research, show the research gap and show the conceptual framework.

2.1 Models for successful implementation

Successful implementation is the most important component of leveraging information technology to facilitate change in organizations. Different models have been developed to facilitate successful deployment of information systems.

2.1.1 DeLone and McLean model

DeLone and McLean reviewed researches during the 1981-1987 period and based on the review, they developed a taxonomy for successful deployment of information systems. In 1992, they identified 6 variables / components of successful deployment of information systems. These are individual and organizational impact, use, user satisfaction, system quality as well as information quality. In 2003 they updated the model and added service quality as another major important dimension as well as the use intention as an alternative measurement since it is important to measure attitude as well. They then joined organizational and individual impact to a single dimension: net benefits (DeLone & McLean, 2003).

The quality of a system indirectly affects the ability of the system in delivering its benefits. Information quality on the other hand is the ability of the system in storing, delivering or producing information hence affecting the intention and satisfaction of its user which influence the ability of the system in delivering user and organizational benefits. The quality of service an information system can deliver also affects the intention and satisfaction of its users which also impact on the system benefits (DeLone & McLean, 2003).

The model has undergone suitable modifications in accordance to the requirements of various information systems. Wang et al. (2007) successfully applied the model in assessing the success and efficiency of e-learning systems in accordance to organizational employees. From the perspective of electronic commerce, the major users are providers and customers (DeLone & McLean, 2003).

This model was used in establishing the critical success factors which this research tested. System and information quality were used to establish information security, IT infrastructure

<div align="center">16</div>

and system integration while use and user satisfaction were used to establish top management support, resources, strategy, measurement and control, process engineering, supplier support and employee training and skills which have an individual and organizational impact.
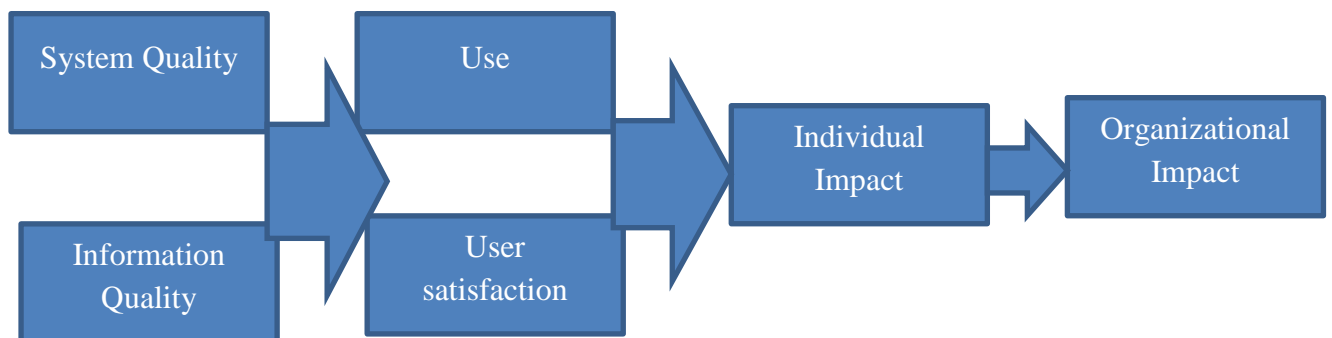
Figure 1: DeLone & McLean 2003 model (DeLone & McLean, 2003).

2.1.2 Computer usage model

Another model for information technology to be successfully implemented in enhancing organizational operations is the computer usage model. It is based on several theories: the technology acceptance model, theory of planned behaviour, social cognitive theory and the theory of reasoned action. This model extends the model of technology acceptance adding self-efficacy, organizational support and experience as factors affecting computer technology usage, perceived usefulness, perceived use ease and anxiety when using computers (Igbaria, & Iivari, 1995).
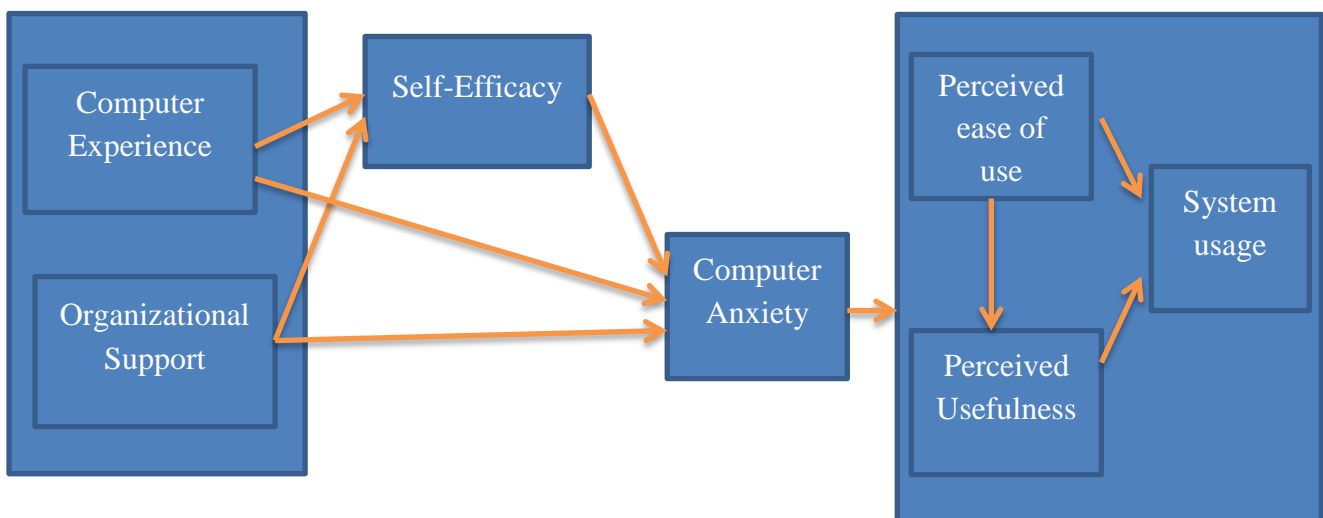
Figure 2: The computer usage model (Igbaria, & Iivari, 1995).

According to Igbaria and Iivari (1995), anxiety is a general distress of emotions experienced by an individual. Based on a survey involving top Finland companies with high net sales, they argue that anxiety and emotional arousal affects self-efficacy which implies that users

who are less anxious tend to feel more effective. Self-efficacy beliefs determine behaviour and hence affect the usage of a computer and motivation. They observed that self-efficacy in relation to computers determine the decision of an individual to use computers (Igbaria and Iivari, 1995). The model was used to develop supplier support and employee training and skills variables in this research.

2.1.3 Personal computing acceptance model

The personal computing acceptance model posits that perceived ease of use and perceived usefulness determine the acceptance of personal computing in small organizations. Igbaria, Guimarae and Davis (1995) argue that these two factors directly affect personal computing acceptance internal and external organizational factors. It posits that internal and external factors of organizations indirectly affect the acceptance of personal computing since they influence perceived usefulness and use ease. A survey of small organizations in New Zealand demonstrated that the perceived ease of use greatly explains system usage and perceived usefulness while perceived usefulness strongly affects the use of a system (Igbaria, Guimarae & Davis, 1995). This model was also used to develop the critical success factors of supplier support and employee training and skills in this research.
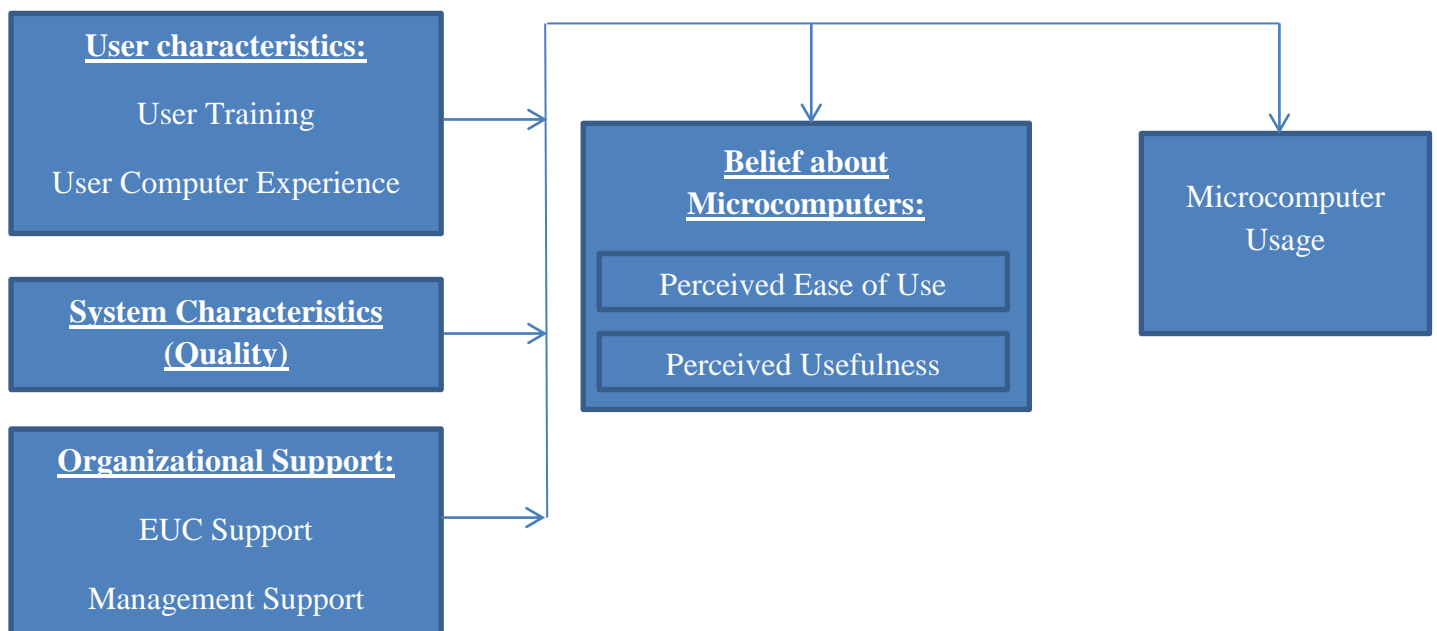
Figure 3: The personal computing model (Igbaria, Guimarae & Davis, 1995).

2.1.4 Critical success factors theory

Another model for succesful information technology systems implementation is the critical success factors theory by Grunet and Ellegaard (1992). According to Grunet and Ellegaard

(1992), there are four aspects of the term key success factors. One, as a basic component of a management information system, as a description of major resources and skills needed for success in a particular market, as a unique company characteristic and as a heuristic tool used by managers in sharpening their thinking. They adopt the second view that is as a description of key resources and skills needed for success in a particular market.

Grunet and Ellegaard (1992) argue that the immediate success determinants in any given market is the costs in relation to competitors and the perceived customer value in the products of a business. According to Grunet and Ellegaard (1992), major success factors are different in terms of changeability that is the extent to which competitors can emulate them and on whether they are compensatory or conjuctive.

Grunet and Ellegaard (1992) developed the deductive and inductive modes of investigating critical success factors. The deductive mode begins by the researcher developing hypothesis on major and key success factors, selecting a market based on the major critical success factors after which an assessment should be made on the actual key success factors.

Figure 4: Deductive mode of investigating critical success factors (Grunet and Ellegaard, 1992).

Unlike in the deductive mode, use of the inductive mode commences with the researcher assessing perceived market key success factors and then assessing actual market key success, developing hypotheses on major and key critical success factors and then investigating the next market.
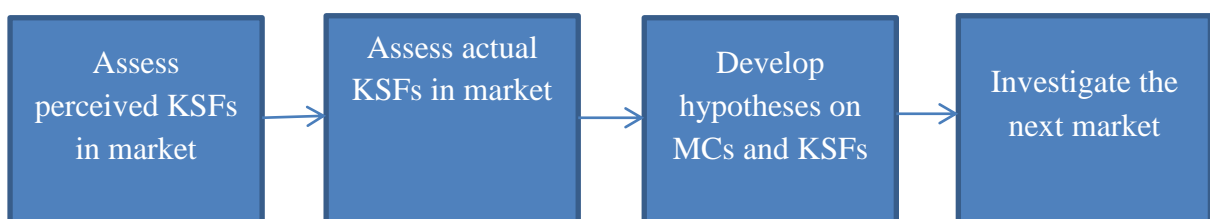
Figure 5: Inductive mode of investigating critical success factors (Grunet and Ellegaard, 1992).

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The researcher used the critical success factors theory model to investigate the critical factors for successful electronic procurement implementation in the Kenyan public sector. Grunet and Ellegaard (1992) argue that there are four aspects of the term key success factors. One, as a basic component of a management information system, as a description of major resources and skills needed for success in a particular market, as a unique company characteristic and as a heuristic tool used by managers in sharpening their thinking. As a key success factor being a basic component of a management information system, the researcher developed the critical success factors of IT infrastructure, system integration and information security. From resources and skills for facilitating success in a specific market, the researcher developed the critical success factors of resources, e-procurement strategy and employee training and skills with reference to past research in e-commerce. As a unique company characteristic, the researcher developed the critical success factors of process engineering, strategy and top management support. As a heuristic tool used by managers in sharpening their thinking, the researcher developed the critical success factors of mechanisms for measuring and controlling e-procurement implementation process and supplier support.

The researcher applied the deductive mode of investigating in assessing the critical factors essential for succesful electronic procurement implementation in the Kenyan public organizations. The researcher first develofqeped hypothesis on key critical success factors, selected the Kenyan public sector to research on after which an assessment was made on the actual critical success factors.

2.2 Successful e-procurement implementation critical success factors

There are ten major critical factors needed for electronic procurement implementation to succeed. These factors can be categorized as: Managerial factors which are: top management support, resources, strategy, measurement and control and process engineering; System factors which are information security, IT infrastructure and system integration and Stakeholder factors which are: supplier support and employee training and skills (Mohammadi, 2013; Carayannis, 2005; Teo, et al., 2008; Huber et al., 2004).

2.2.1   Managerial factors

Critical managerial factors for successful electronic procurement implementation are top management support, resources for e-procurement implementation, strategy, measurement and control and process engineering.

2.2.1.1 Top management support

Teo, et al. (2008) identified top management support as one main critical factor for implementation of electronic procurement to succeed. This means involving top level managers in implementing e-procurement. Many firms rely on the commitment and motivation of the top management which are vital in developing and implementing e-procurement (Mohammadi, 2013). Without support from the top level management, the implementation of a new information system or technology would be hard. The top management are involved in formulating the organizational vision and mission.

Project outcome success mainly relies on the commitment of the top management. For instance, the political will and push of the top managers in the Indian states of Andhra and Chhattisgarh were an essential factor in successful electronic procurement implementation (Panda & Sahu, 2012). Top management have a significant role to play in milestone set up, resource commitment and mandating e-procurement usage. There is need for bureaucratic shakeup and need for facilitating coordination between departments in the electronic procurement implementation.

2.2.1.2 Resources

Resources are another critical factor for successful electronic procurement implementation. This is especially so with financial resources which are essential for implementing e-procurement. The financial resources allocated to implement e-procurement should relate to the market share and size of the firm (Huber et al., 2004). Resources are very essential in getting proper professional advice and help from consultants and experts as well as in suitable ICT acquisition which would enable and enhance successful implementation of e-procurement.

2.2.1.3 E-procurement implementation strategy

The strategy for e-procurement implementation is another factor essential in facilitating electronic procurement systems success. For successful e-procurement implementation, there should be a proper implementation strategy aligned accordingly with the general strategy of the organization (Mohammadi, 2013). E-procurement implementation planning should be done by the organization on the way ahead on symbiotic relationships and opportunities. Main benefits are most likely to be realised to the government from aggregating departmental demands. This would facilitate cost optimization resulting from bulk procurement. This would help the government in leveraging purchasing capabilities with respective suppliers. However, aggregation of demand remains a big concern as a result of perceived authority

loss, vested departmental interests as well as efforts needed in its achievement (Panda & Sahu, 2012).

2.2.1.4 Process engineering

As argued by Mohammadi (2013), process engineering is essential in order to resolve the relevant barriers and challenges present in organizational structures to e-procurement compatibility and processes which include reporting relations and hierarchy. Manual procedures implementation in systems of e-procurement often causes inefficient and unmanageable system flow. It is therefore essential for organizations to embrace a new look at all procurement processes and functions. Inefficient processes and those that don't add value should be eliminated while optimizing mandatory processes for e-usage. Business processes re-engineering was also identified by Panda & Sahu (2012) as essential for electronic procurement implementation success in India.

2.2.1.5 Measurement and control of the implementation process

Measurement and control is also very important for successful electronic procurement implementation. They involve using e-procurement effects to facilitate the performance of an organization. Measuring the process of implementing e-procurement would help in controlling and enabling an organization to obtain feedback on the process of implementation (Huber et al., 2004).

According to Panda & Sahu (2012), successful initiation and subsequently the progress of an e-procurement project necessitates strong cases favouring procurement process migration to the internet. The resistance of officers and stakeholders involved in procurement processes can only be broken through the construction of a strong case which necessitates business drivers' identification, system benefits versus project implementation cost. Proving system efficacy through pilot projects would prevent counter arguments and reduce fears by potential challengers (Panda & Sahu, 2012). E-procurement system objectives should be spelt out clearly to help in yielding the intended outcomes. Accomplishments should also be measured in order to facilitate appropriate corrections.

2.2.2 System factors

2.2.2.1Information security

Information security is also another critical factor for successful electronic procurement implementation. It has to do with ensuring suppliers security of their information. It is important for the integrity of communications and relationships to be considered by an

organization in order for the organization to build online trust (Huber et al., 2004). If the security, confidentiality and reliability of financial data such as the amount of bid are not safeguarded, the system of e-procurement may actually facilitate corruption unlike its major aim (Panda & Sahu, 2012). It is therefore important for the system and information contained in it be protected through proper information security hardware such as systems for intrusion detection, antiviruses, central logging, and detective and preventive software solutions. Appropriate security controls selection and employment have major effects on organizational assets and activities. Information security involves technical, management and operational safeguards and countermeasures for information systems necessary in protecting the availability, integrity and confidentiality of the system with its information.

2.2.2.2 IT infrastructure
According to Carayannis (2005), there should be high availability of IT devices and systems necessary for using e-procurement in organizations. IT Infrastructure is vital for e-procurement success in running organizational business activities.

2.2.2.3 System integration
Another important critical factor for successful electronic procurement implementation is system integration. For successful e-procurement implementation, it is important for technological resource integration with the e-procurement system. Such technological resources include data warehouse management, software selection and configuration and internet facilities (Carayannis, 2005). As shown by Panda & Sahu (2012), the system should also be in compliance with administrative and legal frameworks which are in the country. The system development should be done around open source standards and technologies. The optimization of hardware such as load balancers, active failover, and proper server sizing and setup disaster recovery should be planned and implemented. Interface design should be done in such a way that it is easily usable, intuitive and has proper upward and downward navigations. Information access should be done with limited mouse clicks and system interface should be optimized for enabling faster access even in slow internet speeds. Information should be shareable in real time across all systems in an accurate and reliable manner. Stakeholder data access should also be controlled in the e-procurement system.

2.2.3 Stakeholder factors

2.2.3.1 Employee training and skills
The training and skills of employees also determines the e-procurement system success. Skills can be enhanced to employees through training programs. Training programs would

make employees more familiar with e-procurement concepts (Mohammadi, 2013). The stakeholders of the previous manual system should be trained in order to facilitate technology absorption. New system change over and stakeholder adoption depend on user training (Panda & Sahu, 2012). The organizational environment should also be supportive to address problems effectively.

2.2.3.2 Supplier support

In order for e-procurement to be successfully implemented, it is very essential for an organization to have a perfect connection with its business partners and suppliers. The commitment and support of suppliers is very important since without their support, implementing e-procurement would be very difficult (Teo, et al., 2008). Stakeholders such as vendors and internal departmental users should be trained and supported in order to enhance effective implementation and use of e-procurement systems (Panda & Sahu, 2012). Getting feedback from stakeholders is necessary in order to successfully roll out the system. It is therefore important to set up a call centre or help desk system, contextual help or some kind of online help in the online e-procurement portal. The suppliers are the most important stakeholders in ensuring e-procurement system success. They should therefore be involved in all stages of the system implementation. It should be easy for suppliers to use the system.

2.3 Literature Critique and Research Gap

Despite a lot of research in the area of critical success factors identification in e-procurement as demonstrated above, little study has been performed in the Kenyan public sector. On the other hand past research in this field has had a limited scope since they were conducted in different national cultures. Many developing nations on the other hand lag behind in technology (Mose, Njihia and Magutu, 2013). It was therefore prudent to identify the critical factors influencing successful electronic procurement implementation in the Kenyan public sector.

2.4 CONCEPTUAL FRAMEWORK

The conceptual framework elaborates the relation between the study's dependent and the independent variables. E-procurement implementation success is the dependent variable. The researcher considers it a dependent variable because e-procurement system success relies on the outcomes of many factors. A number of singular factors individually acting have a collective effect on e-procurement system implementation success. The research study's independent variables consist of e-procurement systems success factors.

There are ten main critical factors necessary for successful e-procurement implementation. These factors can be categorized as: Managerial factors which are: top management support, resources, the e-procurement strategy, measurement and control and process engineering; System factors which are information security, IT infrastructure and system integration and Stakeholder factors which are: supplier support and employee training and skills (Mohammadi, 2013; Carayannis, 2005; Teo, et al., 2008; Huber et al., 2004). These factors are the independent variables which collectively lead to e-procurement implementation success.

Independent variables

```
┌─────────────────────────────┐
│   Managerial factors        │
│                             │
│   Top management support    │
│                             │
│   Resources                 │
│                             │
│   E-procurement strategy    │
│                             │
│   Measurement and control   │
│                             │
│   Process engineering       │
└─────────────────────────────┘
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Influence

Dependent variable

```
┌─────────────────────────────┐
│   System factors            │
│                             │
│   Information security      │
│                             │
│   IT infrastructure         │
│                             │
│   System integration        │
│                             │
│                             │
└─────────────────────────────┘
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Influence

Successful
E-procurement
implementation

```
┌─────────────────────────────┐
│   Stakeholder factors       │
│                             │
│   Supplier support          │
│                             │
│   Employee training and skills │
│                             │
│                             │
└─────────────────────────────┘
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Influence

Figure 6: Conceptual framework

CHAPTER 3: METHODOLOGY OF RESEARCH

3.1 Introduction

This section shows the research philosophy and design, population sample and the method of sampling used, how the data was collected and analysed as well as the research variables operationalization.

3.2 Philosophy of Research

The philosophy of research for this study was pragmatism. Pragmatism is a philosophy which holds that a proposition or ideology is true if it satisfactorily works practically. This research analysed whether the major critical factors identified in the past for successful electronic procurement implementation are applicable to the Kenyan public sector.

3.3 Research Hypothesis

1. The managerial factors of top management support, resources, the e-procurement strategy, measurement and control and process engineering do not influence successful e-procurement implementation in the Kenyan public sector.
2. The system factors of information security, IT infrastructure and system integration do not influence successful e-procurement implementation in the Kenyan public sector.
3. The stakeholder factors of supplier support and employee training and skills do not influence successful e-procurement implementation in the Kenyan public sector.

3.4 Design of research

The exploratory research approach involves seeking new insight into phenomena and identifying patterns (Kothari, 2004). The research involved a cross sectional survey of Kenyan public sector organizations. The exploratory approach was used by the researcher in establishing the critical factors for successful electronic procurement implementation in the Kenyan public sector. The researcher selected the exploratory approach because it was helpful in enabling him study the research elements without it being necessary to manipulate them since they were in their natural environment. The respondents were encouraged to give answers to questions to the best of their knowledge without guesswork.

3.5 Population Sample

The research study population consisted of all the government parastatals and government ministries. There are 20 government ministries and a total of 119 government parastatals (Embassy of Kenya in Japan, 2016; Muriuki, 2015). There are 7 categories under which these ministries and parastatals operate as demonstrated in appendix 2. The actual sample consisted of 12 parastatals and 2 government ministries.

3.6 Sampling

The 20 government ministries and 119 government parastatals represent the research population study. A stratified sampling method by Cooper and Schindler (2006) was used to establish the size of the sample. Kenyan public sector population is considered heterogeneous using a simple random sample would not have been representative. The representation of each segment of the Kenyan public sector was ensured through stratified random sampling.

As argued by Cooper and Schindler (2006), all samples should possess a non-zero selection probability of 0.101. Using the 0.101 nonzero selection probability, the sample size was:

0.101=Sample size / 119; 0.101=Sample size / 20

This gave a sample size of 12 parastatals and 2 government ministries. The research therefore involved 12 government parastatals and 2 government ministries which were selected by the researcher based on purposive sampling as described by Palys (2008) to represent the diverse public sector. The researcher selected procurement intensive organizations from each category in order to proportionally survey the public sector as demonstrated in appendix 2.

The organizations selected were: Bomas of Kenya board, national cereals and produce board, postal corporation of Kenya, exports processing zones authority, Kenya Utalii College council, Kenya meat commission, Kenya pipeline company, Kenyatta national hospital board, Kenya ports authority, Kenya railways corporation board, Kenya forest services, National development fund for persons with disabilities, ministry of information and communications technology and the ministry of energy and petroleum in order to represent the different sectors of the Kenyan public sector. The sample was also selected in segments of the public sector which are procurement intensive.

3.7 Collection of Data

Data was directly collected from managers of supply chains or equivalent personnel using close ended questionnaires. Questionnaires had several advantages. One, a lot of information was collected from many respondents in a relatively short time. Secondly, the research involved many respondents with minimal effect on its reliability and validity. Questionnaire results were quantified easily and quickly by the researcher using SPSS software package and were more objectively and scientifically analysed unlike in other research forms. On the other hand, it was easier to compare and contrast this research with other researches since the data was quantified.

The questionnaires had three parts as shown in appendix 1. The questionnaires were administered using a drop and pick method. Out of 140 questionnaires distributed to 140 respondents, 110 questionnaires were filled and returned which is a 79% response rate.

The e-procurement system adoption level was determined by assessing the level of automation of major procurement activities in procurement units. On a five Likert scale, the respondents indicated the level which their organizations had adopted e-procurement. Respondents also indicated the extent to which they agree that the various factors contributed to e-procurement implementation success in the Kenyan public sector using a similar five Likert scale as shown in appendix 1.

3.8 Analysis of Data

A quantitative data analysis was performed on the collected data in the study. In order to determine the extent the Kenyan public sector had adopted e-procurement, an analysis was conducted using frequencies and percentages obtained from Statistical packages for social sciences. Multiple regression was conducted in order to analyse the influence of the critical success factors on successful e-procurement implementation in the Kenyan public sector thus testing the hypothesis. Further analysis was conducted using mean scores, frequencies and percentages in determining the extent to which the various critical success factors determine successful e-procurement implementation.

3.9   Research variables operationalization

Table 1 shows how the research was undertaken in testing the research hypothesis. It shows how the dependent variable of e-procurement implementation relies on the independent variables which comprise of the critical success factors necessary for successful electronic procurement implementation.

Construct	Explanation	Operational Definition	Data collection method	Method of Analysis
Managerial Factors • Top management support • Resources • Strategy • Measurement and control • Process engineering	-Managerial factors are among the independent variables which collectively determine the level of success in e-procurement implementation which is the dependent variable.	• The involvement of the top management in formulating the future mission, vision and future of the organization and top management allocation of adequate resources is essential for successful e-procurement.	-Survey using questionnaires	-Quantitative using mean scores, percentages and multiple regression analysis.
System Factors • Information security • IT infrastructure • System integration	-System factors are among the independent variables which collectively determine the level of success in e-procurement implementation which is the dependent variable.	• Suppliers need to be assured of the security of their information and have efficient system access for successful e-procurement.	-Survey using questionnaires	-Quantitative using mean scores, percentages and multiple regression analysis.
Stakeholder Factors • Supplier support • Employee training and skills	-Stakeholder factors are among the independent variables which collectively determine the level of success in e-procurement implementation which is the dependent variable.	• The training and skills of employees also determines the level of e-procurement system success. Skills can be enhanced to employees through training program. • Successful e-	-Survey using questionnaires	-Quantitative using mean scores, percentages and multiple regression analysis.

		procurement implementation requires organizations to have perfect connections with their business partners and suppliers.		

Table 1: Operationalization of the research variables

CHAPTER FOUR: DATA ANALYSIS, RESULTS AND DISCUSSIONS

4.1 Introduction

This study involved analysing critical success factors required for e-procurement to be implemented successfully in the Kenyan public sector. The research study objectives were: to find out how organizational managerial factors of top management support, resources, strategy, measurement and control and process engineering; organizational system factors of information security, IT infrastructure and system integration and organizational stakeholder factors of supplier support and employee training and skills influence successful e-procurement implementation in the Kenyan public sector. The population sample consisted of 12 parastatals and 2 government ministries within Nairobi and its environs. Tables and figures were used in summarizing the collective respondent views and reactions through frequencies and percentages. Further analysis was performed using multiple regressions obtained from Statistical packages for social sciences in assessing the influence of the various critical factors on successful e-procurement implementation.

4.2 Response Rate

The research study sample size was 140 respondents out of which 110 questionnaires were filled and returned – a 79% response rate. According to Mugenda. O and Mugenda. A (2003), a 70% and over response rate is excellent, a 60% rate is good while a 50% rate is satisfactory for data analysis and interpretation. This implies the study's response rate was excellent and therefore adequate for data analysis and interpretation.

Table 2: Response rate

Respondents	Frequency	Percentage (%)
Responded	110	79
Not responded	30	21
Total	**140**	**100**

Table 2: Response rate. Source: Survey data (2016)

4.3 Duration of years in the organization

The study revealed that 110 respondents had worked in the public entities for 1-20 years. Table 3 show categories of years in which respondents had worked in those entities. Most respondents had worked for 11-15 years represented by 39.1% (n=43) while the least had worked for 1-5 years represented by 9.9% (n=11). 29% (n=32) had worked between 6-10 years while 22% (n=24) had worked 16-20 years. This means that most of the organizations had implemented and used e-procurement for a substantial period.

Table 3: Duration of years in the organizations

Duration of work		
Number of years	**Frequency**	**Percentage**
1-5	11	9.9
6-10	32	29
11-15	43	39.1
16-20	24	22
Total	**110**	**100**

Table 3: Duration of work. Source: Survey Data (2016)

4.4 Materials procured by organizations

The researcher found it of paramount importance to find out the materials procured in the public organizations. Based on this research study's findings, most parastatals and government entities procured almost the same goods and services. They included lubes, petroleum gas, petroleum products, computer hardware, software and maintenance, office furniture, cleaning materials, foodstuffs, airtime, and supply of motor vehicles, printers and photocopiers.

4.5 E-procurement implementation by organization

59.1% of the respondents asserted that their public organizations had implemented e-procurement to a great extent at (n=65). Several reasons were given for this. They included: increased ethical behaviour among procurement staff, establishment of marketing and customer service, proper management of logistics and facilities as well as financial resources. According to the study findings, those who thought that e-procurement was implemented in their organizations to a moderate extent were 37.3% (n=41). They asserted that the human resource had been developed well; ICT was well utilized in the systems, research and business development in terms of quality goods and better services. 2.7% (n=3) of the respondents were of the view that their organizations had implemented e-procurement to a very great extent while 0.9% (n=1) to a small extent.

Table 4: E-procurement implementation

E-procurement implementation

e-procurement implementation	Frequency	Valid Percent
small extent	1	0.9
moderate extent	41	37.3
great extent	65	59.1
very great extent	3	2.7
Total	**110**	**100.0**

Table 4: E-procurement implementation. Source: Survey Data (2016)

4.6 Top management support to e-procurement implementation

The researcher sought to identify the significance of the involvement of the top management in formulating the organizational vision, mission and future and the top management allocation of adequate resources influence on e-procurement implementation.

4.6.1 Involvement of top management in formulation of the organizational vision, mission and future

The study's first objective was to determine how managerial factors which are: top management support, resources, the e-procurement strategy, measurement and control and process engineering influence successful e-procurement implementation. The researcher found it important to find out the involvement of top management in formulating the mission, vision and future of the organization contribution to successful e-procurement implementation. According to the study's findings as shown in table 5, it was revealed that majority 53.6% (n=59) of the respondents were of the view that the involvement of top management in formulation of the mission, vision and future of the organization contributes to a great extent successful e-procurement implementation while minority 46.4% (n=51) viewed it at a moderate extent on the same. No respondent had views at very small extent, small extent and very great extent. Majority of the respondents felt that the involvement of top management in formulation of the mission, vision and future of the organization contributes to successful e-procurement implementation to a great extent due to the fact that the employees under the organizations' management purchased over the internet satisfactorily getting high quality products in a prompt way.

Table 5: Top management involvement in e-procurement implementation

Top management involvement in e-procurement implementation	Frequency	Percentage (%)
Very small extent	0	0

Small extent	0	0
Moderate extent	51	46.4
Great extent	59	53.6
Very great extent	0	0
Total	**100**	**100**

Table 5: Involvement of top management in e-procurement implementation. Source: Survey Data (2016)

4.6.2 Top management allocation of adequate resources to e-procurement implementation

The researcher also found it important to measure out the extent to which allocation of adequate resources by the top management led to successful e-procurement implementation. Majority 35.5% (n=39) of the respondents viewed that the allocation of resources by the top management led to successful e-procurement implementation in a great way and 10% (n=11) very greatly. This was due to less paperwork and bureaucracy, standardised documentation and processes and there was more clear and transparent processes done. Furthermore, the research showed that the availability of human resource contributed to adoption of e-procurement by all staff and stakeholders such as executives which contributed to e-procurement implementation. On the other hand, 22.7% of respondents (n=25) perceived allocation of resources by the top management led to successful e-procurement implementation moderately, 20% (n=22) to a very small extent, 11.8% (n=13) to a small extent. Those respondents gave their reasons that included easier information access, low cost of supply and lower tender cost and saving on time.

Table 6: Allocation of adequate resources for successful e-procurement implementation

Adequate resources for successful e-procurement implementation	Frequency	Valid Percent
very small extent	22	20.0
small extent	13	11.8
moderate extent	25	22.7
great extent	39	35.5
very great extent	11	10.0
Total	**110**	**100.0**

Table 6: Allocation of adequate resources for successful e-procurement implementation. Source: Survey Data (2016)

4.7 Storage and encryption of data

Data encryption is an information storage security feature which is gaining favour amongst organizations which use storage area networks. From the results as shown in table 7, 44.5% (n=49) of the respondents were of the view that storage and encryption of data contributed to successful e-procurement implementation to a great extent. 40% (n=44) of the respondents were of the view that storage and encryption of data contributes to successful e-procurement implementation to a moderate extent while 12.7% (n=14) were of the view that storage and encryption of data contributes to successful e-procurement implementation to a small extent. 2.7% (n=3) were of the view that storage and encryption of data contributed to successful e-procurement implementation to a very small extent. Those who were of the view that storage and encryption of data contributed to successful e-procurement implementation to a very small extent said that a lot of data was not stored or encrypted hence success in e-procurement implementation was not assured. Respondents who said that storage and encryption of data contributed to successful e-procurement implementation to a small extent said more useful and important data were safe from being tampered with and could be used at a later date when needed. More respondents said that storage and encryption of data contributed to successful e-procurement implementation to a great extent since the quality information was not tampered with and e-procurement management was enhanced.

Table 7: Storage and encryption of data

Storage and encryption of data	Frequency	Percentage
very small extent	3	2.7
small extent	14	12.7
moderate extent	44	40.0
great extent	49	44.5
Total	**110**	**100.0**

Table 7: Storage and encryption of data. Source: Survey Data (2016)
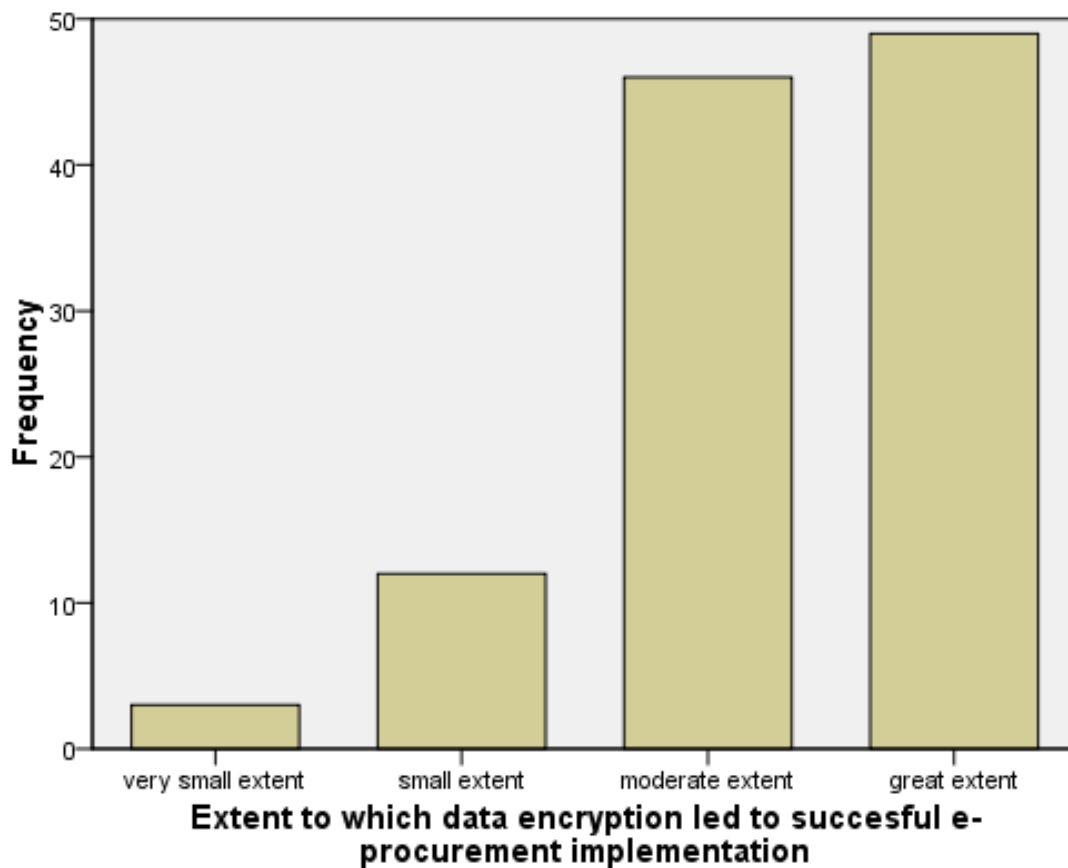
Figure 7: Bar graph on the effect of information security on e-procurement implementation. Source: Survey Data (2016)

4.8 Employee training and skills

The researcher also aimed at identifying the extent to which the level of employee awareness on technology use and the availability of training programs for employees contribute to successful e-procurement implementation.

4.8.1 Level of employee awareness on technology use

Majority of the respondents 52.7% (n=58) were of the opinion that the level of employee awareness on technology use contributes to a great extent successful e-procurement implementation. Competency was felt in the working environment by the top management whereby ICT experts were readily available just in case the servers had problems and ICT was well used by the employees. 46.4% (n=51) perceived that awareness on technology use led to successful e-procurement implementation to a moderate extent. This was because of sufficient in-house computer competency training which ensured that procurement staff could interact well with the companies' computerized systems. Another respondent 0.9% (n=1) had the opinion that the level of employee awareness on technology use led to a small extent successful e-procurement implementation and commented that some of the employees were

not aware of the technologies used in e-procurement implementation and they did not have adequate trainings and skills to implement the same.

Table 8: Level of employee awareness on technology use effect on successful e-procurement implementation

Employee training and skills		
Awareness on technology use	Frequency	Valid Percent
small extent	1	0.9
moderate extent	51	46.4
great extent	58	52.7
Total	**110**	**100.0**

Table 8: Level of employee awareness on technology use effect on successful e-procurement implementation. Source: Survey Data (2016).

4.8.2 Availability of training programmes for employees

The extent at which availability of training programmes for employees contributed to successful e-procurement implementation was moderate according to 40% (n=44) respondents and 38.2% (n=42) to a great extent as can be observed in table 9. This meant that there were so many strategic benefits which included:-better procurement, purchase and supply prices control as well as inventory policy emanating from centralized purchasing function adoption, better coordination between purchasers and users and better supply sources control. There was also easier management of suppliers (decreasing supply base hence increasing leverage over suppliers). Other respondents said availability of training programmes for employees contributed to successful e-procurement implementation to a very small extent 11.8% (n=13), 9.1% (n=10) to a very great extent and 0.9% (n=1) to a small extent. They were of the opinion that training programmes for employees did not do much in improving e-procurement implementation which led to negative attitude to procurement among senior leaders, unwillingness to incur training and other costs and difficulty in integrating procurement process systems with existing IT infrastructure.

Table 9: Availability of training programmes for employees contribution to e-procurement implementation

Training programmes	Frequency	Valid Percent
Very small extent	13	11.8
Small extent	1	0.9
Moderate extent	44	40.0
Great extent	42	38.2
Very great extent	10	9.1
Total	**110**	**100.0**

Table 9: Availability of training programmes for employees contribution to e-procurement implementation
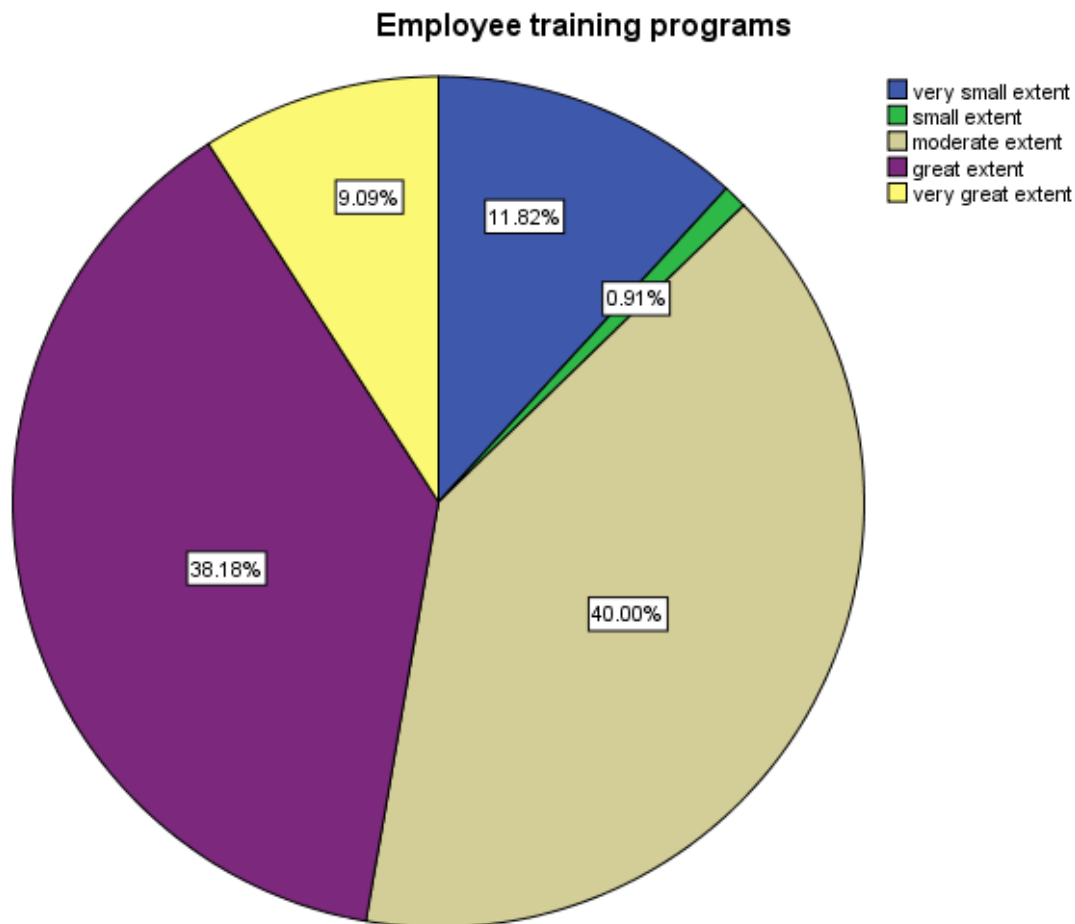
Figure 8: Pie chart showing availability of training programmes for employee's contribution to e-procurement implementation. Source: Survey Data (2016)

4.9 IT infrastructure for e-procurement implementation

The study further investigated IT infrastructure. Most of the respondents 46.4% (n=51) were of the view that the availability of IT infrastructure contributed to successful e-procurement implementation greatly while 27.3% (n=30) were of the view that it contributed moderately. 15.4% (n=17) of the respondents were of the view that the availability of IT infrastructure contributed to successful e-procurement implementation to a very great extent. This was due to several factors that included e-procurement software making loads of tasks easier while internet market exchanges through central virtual market makes goods and services were rendered faster, pre-procurement (e-sourcing), e-informing, ERP (enterprise resource planning) and post-procurement (delivery). Some respondents however said that IT infrastructure contributed to a small extent to successful e-procurement implementation 10.9% (n=12) due to the fact that IT infrastructure was not enough to support and lead to successful e-procurement implementation. They said that inadequate IT infrastructure could

lead to failure in systems of supply chain management and ERP in addressing non – production related procurement and indifference to the problem on part of IT infrastructure.

Table 10: IT infrastructure for e-procurement

IT infrastructure for e-procurement	Frequency	Percentage (%)
Small extent	12	10.9
Moderate extent	30	27.3
Great extent	51	46.4
Very great extent	17	15.4
Total	**110**	**100**

Table 10: IT infrastructure for e-procurement. Source: Survey Data (2016)
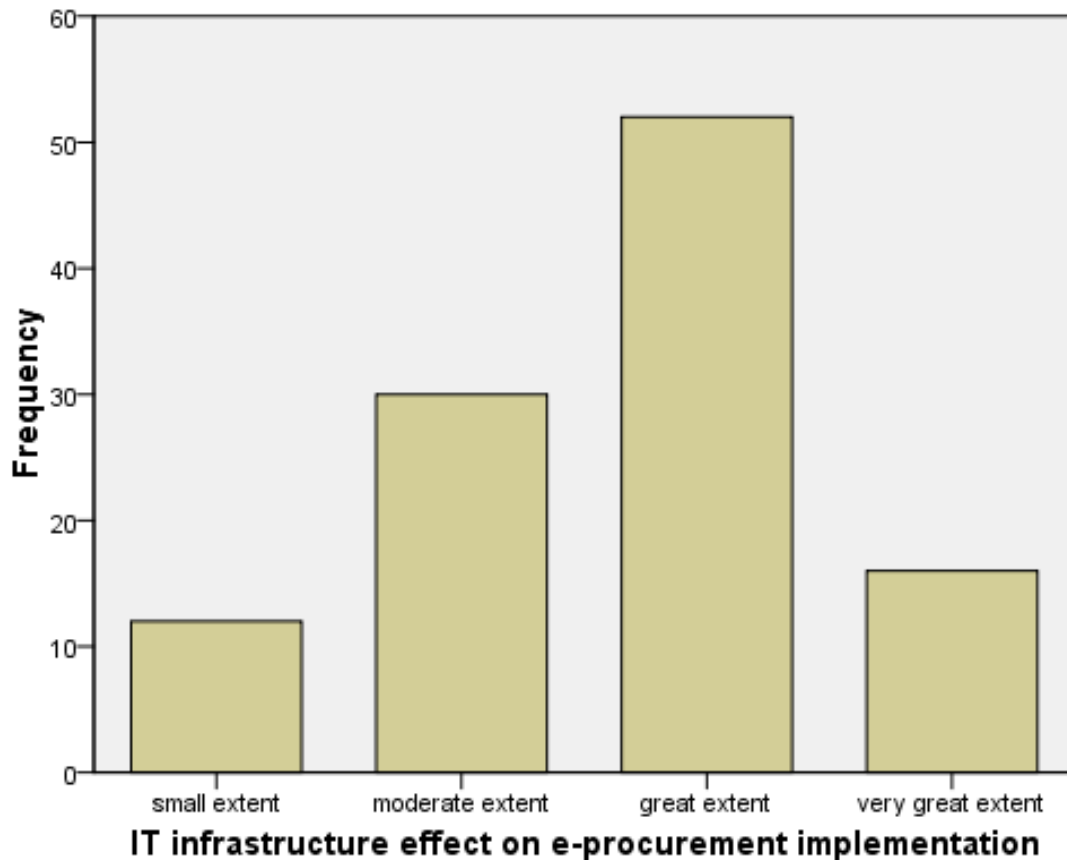
Figure 9: Bar graph showing IT infrastructure effect on e-procurement. Source: Survey Data (2016)

4.10 Degree to which policy makers contribute to smooth process re-engineering

The respondents also indicated the effect of the degree which policy makers contribute to smooth process re-engineering towards e-procurement implementation. Majority of the respondents 27.3% (n=30) were of the opinion that the degree to which policy makers contributed to smooth process re-engineering led to successful e-procurement implementation

greatly, 26.4% (n=29) moderately and 13.6% (n=15) very greatly. This was so because there was legal harmonization, employment of digital signatures, availability of managerial and technical competencies and process re-engineering. However, 18.2% (n=20) of the respondents had the opinion that the degree to which policy makers contribute to smooth process re-engineering only enhances successful e-procurement implementation to a small extent and 14.5% (n=16) to a very small extent. This was because they believed policy makers did not contribute so much to smooth process re-engineering towards successful e-procurement implementation. This was brought by leadership being poor in delivering e-procurement vision, consistency promotion in procurement policies, practices, documentation and systems across agencies and sectors was not enough for smooth re-engineering process, leadership and coordination was not provided in promoting cooperation within agencies and across all sectors of the economy.

Table 11: Degree to which policy makers contribute to smooth process re-engineering towards successful e-procurement implementation

Process re-engineering	Frequency	Percentage (%)
Very small extent	16	14.5
Small extent	20	18.2
Moderate extent	29	26.4
Great extent	30	27.3
Very great extent	15	13.6
Total	**110**	**100**

Table 11: Degree to which policy makers contribute to smooth process re-engineering towards successful e-procurement implementation. Source: Survey Data (2016)

4.11 Supplier support

The researcher also evaluated how the views of suppliers towards e-procurement usage and previous supplier experience in using e-procurement systems affected e-procurement implementation.

4.11.1 Extent to which suppliers' views contributes to successful e-procurement implementation

The extent to which suppliers' views contributes to successful e-procurement implementation was to a great extent according to 38.2% (n=42) respondents, 25.5% (n=28) moderately, 19.1% (n=21) very greatly, 9.1% (n=10) to a very small extent and 8.1% (n=9) to a small extent. This was so because of several reasons. First the chain of supply was reduced and it increased in visibility, procurement cycles became shorter with decreased transaction and

administrative costs as well as improved decision making with better efficiency and effectiveness. They also asserted that trading communities were able to reach expansion levels for successful e-procurement process with no limitation of choices to only one number of prequalified suppliers. This enhanced the quality of products and services. Those who viewed that the views of suppliers contributed to successful e-procurement implementation to a very small extent sighted leadership being poor in delivering e-procurement vision.

Table 12: Suppliers' views effect on e-procurement implementation

Suppliers' views	Frequency	Percentage (%)
Very small extent	10	9.1
Small extent	9	8.1
Moderate extent	28	25.5
Great extent	42	38.2
Very great extent	21	19.1
Total	**110**	**100**

Table 12: Suppliers' views effect on e-procurement implementation. Source: Survey Data (2016).

4.11.2 Extent to which suppliers' previous experience contributes to successful e-procurement implementation

Table 13: Suppliers' previous experience effect on e-procurement implementation

Suppliers' previous experience	Frequency	Percentage (%)
Very small extent	13	11.8
Small extent	7	6.4
Moderate extent	26	23.6
Great extent	45	40.9
Very great extent	19	17
Total	**110**	**100**

Table 13: Suppliers' previous experience effect on e-procurement implementation. Source: Survey Data (2016).

The research also aimed at finding out the extent to which suppliers' previous experience contributed to successful e-procurement implementation. 40.9% (n=45) of the respondents thought that it contributed greatly, 23.6% (n=26) moderately and 17.3% (n=19) very greatly. This is as observed in table 13. The respondents said their experience contributed to shortened procurement cycle, supply chain reduction and decreased transaction and administrative costs. Furthermore, they said that there was better supply chain and customer demand visibility, enhanced efficiency and effectiveness with better decision making. Other respondents 11.8% (n=13) asserted that suppliers' previous experience contributed to

successful e-procurement implementation to a small extent and 6.4% (n=7) to a very small extent. This was due to the problem of trading communities not being able to reach expansion levels for successful e-procurement process and choice limitation to only one number of prequalified suppliers which enhanced quality.
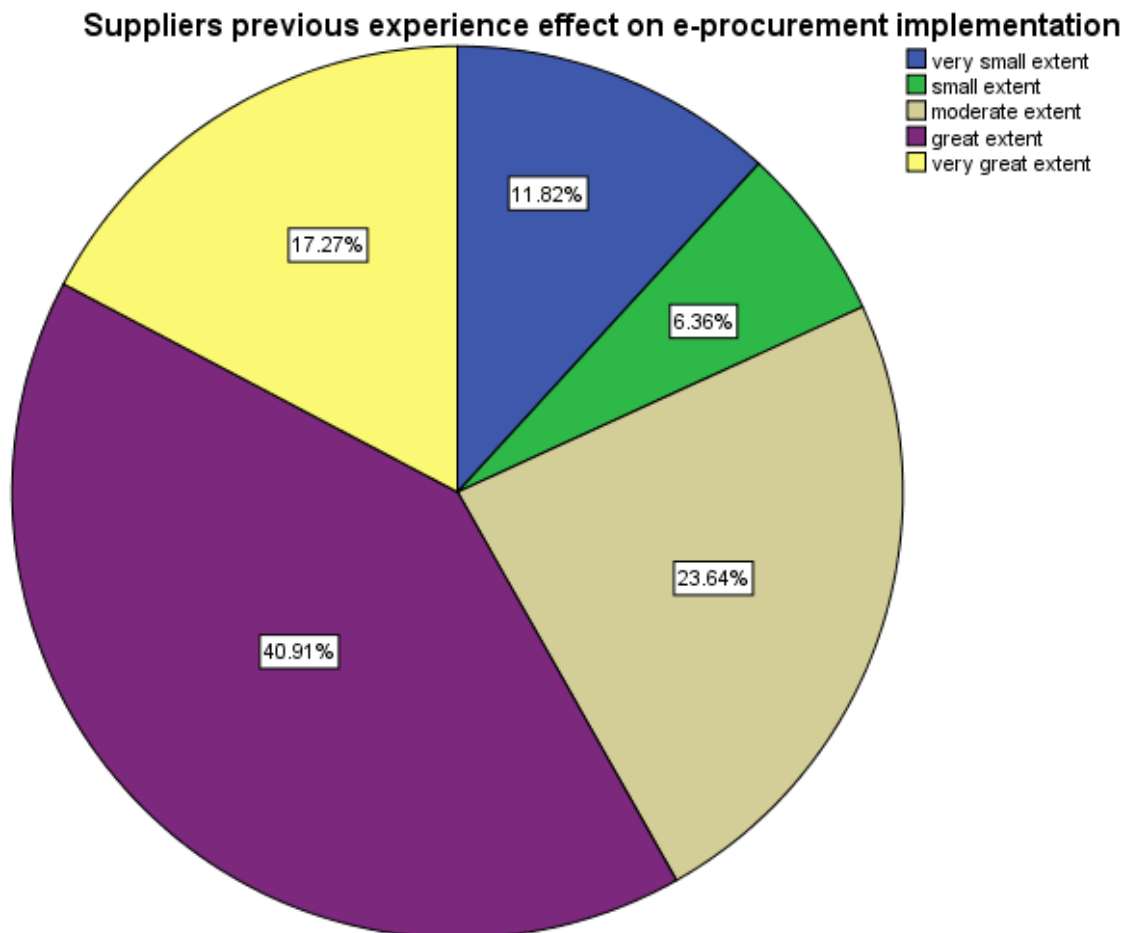
Figure 10: Pie chart showing suppliers' previous experience effect on e-procurement implementation. Source: Survey Data (2016).

4.12 Contribution of e-procurement implementation strategies to successful implementation

The researcher established that e-procurement strategies contributed to successful e-procurement implementation. Majority of respondents 56.4% (n=62) had the opinion that e-procurement strategies contributed to successful e-procurement implementation to a great extent citing cost optimization being felt due to bulk procurement. They were of the opinion that the government should leverage its purchasing power with perspective suppliers. Other respondents 33.6% (n=37) perceived that e-procurement strategies contributed to successful e-procurement implementation to a moderate extent. They said that departmental interests and efforts are required in the implementing e-procurement. A number of respondents 10% (n=11) were of the view that e-procurement strategies contributed to successful e-

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procurement implementation to a very great extent. They said that availability of proper e-procurement strategies helped a lot in ensuring successful e-procurement implementation and this helped in streamlining catalogue management process, supported electronic invoicing and payment processing and also streamlined user training.

Table 14: Contribution of e-procurement implementation strategies to successful implementation

Strategies to successful e-procurement implementation	Frequency	Percentage (%)
Very small extent	0	0
Small extent	0	0
Moderate extent	37	33.6
Great extent	62	56.4
Very great extent	11	10
Total	**110**	**100**

Table 14: Effect of e-procurement strategies effect on successful e-procurement implementation. Source: Survey Data (2016)

4.13 Mechanisms for measuring, controlling and evaluating e-procurement implementation

The researcher also wanted to determine the extent to which availability of proper mechanisms for measuring, controlling and evaluating e-procurement implementation contributed to successful implementation. Most respondents felt that the availability of mechanisms for measuring, controlling and evaluating e-procurement implementation contributed to successful implementation to a moderate extent: 31.8% (n=35) and 30.9% (n=34) to a great extent as shown in table 15. The two recorded the highest number of respondents and this was evidenced through collection of factual hence objective information on their performance for example price compliance, standards of quality and order lead times. A minority of the respondents - 15.5% (n=17) expressed that the availability of mechanisms for measuring, controlling and evaluating e-procurement contributed to successful implementation to a very small extent, 11.8% (n=13) greatly and 10% (n=11) to a small extent. They gave their reasons as improvement in paying terms with suppliers, improvement in accounting processes, procurement policy promotion and practice of system documentation across agencies.

Table 15: Mechanisms for measuring, controlling and evaluating e-procurement implementation

Mechanisms for measuring, controlling and evaluating e-procurement implementation	Frequency	Percentage (%)
Very small extent	17	15.5
Small extent	11	10
Moderate extent	35	31.8
Great extent	34	30.9
Very great extent	13	11.8
Total	**110**	**100**

Table 15: Mechanisms for measuring, controlling and evaluating contribution to e-procurement implementation. Source: Survey Data (2016)

4.14 Compatibility of current systems with e-procurement system

Table 16: Compatibility of current systems with e-procurement system contribution to successful e-procurement implementation

Compatibility of current systems with e-procurement system contribution to successful e-procurement implementation	Frequency	Percentage (%)
Moderate extent	34	30.9
Great extent	59	53.6
Very great extent	17	15.5
Total	**110**	**100**

Table 16: Compatibility of current systems with e-procurement system contribution to successful e-procurement implementation. Source: Survey Data (2016)

The researcher also required respondents to determine the extent compatibility of current systems with e-procurement contributed to successful e-procurement implementation. As from the results from table 16, a majority of the respondents - 53.6% (n=59) were of the view that compatibility of current systems with e-procurement contributed to successful e-procurement implementation to a great extent and 30.9% (n=34) to a moderate extent. They argued that mandatory processes optimized e-procurement usage but non-value adding and inefficient processes should be eliminated. They also argued that incompatible systems sometimes led to inefficient and unmanageable system flow. Minority 15.5% (n=17) of the respondents said that compatibility of current systems led to successful e-procurement implementation to a very great extent. This was evidenced by efficiency in reporting relations and hierarchy, reduced purchasing cycles, time and costs, enhancement of brand whereby it

becomes more rapid and faster response to market needs.

4.15 Resources contribution to successful e-procurement implementation

The researcher also identified the availability of resources and the ease of mobilization of those resources contribution to successful e-procurement implementation.

4.15.1 Availability of resources contribution to successful e-procurement implementation

The research study identified the extent to which availability of resources contributed to successful e-procurement implementation. As shown in table 17, majority 45.5% (n=50) of the respondents thought that the availability of resources contributed to successful e-procurement implementation greatly and 26.4% (n=29) moderately. This was because there were enhanced interfaces with internal systems, improved and streamlined user training and due to availability of resources, there was better procurement management based on category and portfolio management concepts. 20.9% (n=23) of respondents viewed that the availability of resources contributed to successful e-procurement implementation to a very great extent and this was due to proactive management and measurement of procurement performance.

Minority of respondents 7.3% (n=8) were of the view that the availability of resources contributed to successful e-procurement implementation to a very small extent. This was because efforts were needed to motivate end users to adopt new technologies and internal process re-engineering leading with cross company cultural differences.

Table 17: Availability of resources contribution to successful e-procurement implementation

Availability of resources	Frequency	Percentage (%)
Small extent	8	7.3
Moderate extent	29	26.4
Great extent	50	45.5
Very great extent	23	20.9
Total	**110**	**100**

Table 17: Availability of resources contribution to successful e-procurement implementation. Source: Survey Data (2016)

4.15.2 Mobilization of resources contribution to successful e-procurement implementation

The research also identified the extent to which mobilization of resources contributed to successful e-procurement implementation. The results as stipulated in table 18, a major portion of the respondents 50.9% (56) felt that the mobilization of resources contributed to successful e-procurement implementation greatly and 28.2% (31) very greatly. They said that resource mobilization streamlined catalogue management processes and supported development of procurement standards management while reducing development costs. Minority of the respondents 20.9% (n=23) were of the view that mobilization of resources contributed to successful e-procurement implementation to a moderate extent.

Table 18: Mobilization of resources contribution to successful e-procurement implementation

Mobilization of resources	Frequency	Percentage (%)
Moderate extent	23	20.9
Great extent	56	50.9
Very great extent	31	28.2
Total	**110**	**100**

Table 18: Mobilization of resources contribution to successful e-procurement implementation. Source: Survey Data (2016)

4.16 Descriptive Statistics on e-Procurement

Descriptive statistics facilitated evaluation of the critical factors yielding the results in Table 19 below.

Table 19: Descriptive Statistics on e-procurement

Descriptive Statistics								
	N	Min	Max	Mean	Std. Dev	Skewness		Kurtosis	
	Stat	Stat	Stat	Stat	Stat	Stat	Std. Error	Stat	Std. Error
Implementation level	110	2	5	3.64	.554	-.232	.230	-.470	.457
Top management role in organization's vision and mission	110	3	4	3.54	.501	-.148	.230	-2.015	.457
Top management role in resource allocation	110	1	5	3.04	1.299	-.350	.230	-1.073	.457
Information storage	110	1	4	3.26	.786	-.852	.230	.193	.457
Employee e-procurement awareness	110	2	4	3.52	.520	-.273	.230	-1.477	.457
Employee training programs availability	110	1	5	3.32	1.066	-.808	.230	.429	.457
Resource availability	110	2	5	3.80	.855	-.320	.230	-.474	.457
Resource mobilization	110	3	5	4.07	.700	-.101	.230	-.930	.457
Systems Contribution	110	3	5	3.85	.666	.184	.230	-.741	.457
IT infrastructure	110	2	5	3.66	.870	-.305	.230	-.505	.457
Implementation measurement and control	110	1	5	3.14	1.223	-.388	.230	-.707	.457
Strategy	110	3	5	3.76	.620	.202	.230	-.555	.457
Supplier previous experience	110	1	5	3.45	1.201	-.748	.230	-.213	.457
Supplier views	110	1	5	3.50	1.163	-.677	.230	-.189	.457

Process engineering	110	1	5	3.07	1.261	-.167	.230	-.975	.457

Table 19: Descriptive Statistics on e-procurement. Source: Survey Data (2016)

The most significant critical factor for successful implementation of electronic procurement in the Kenyan public sector is the resources available for implementing electronic procurement with a mean of 3.94 out of 5. The second most significant factor is systems integration i.e. integration of e-procurement system with present organizational information systems. It had a mean of 3.85 which means that it leads to successful implementation of electronic procurement to a great extent. The strategy used for electronic procurement implementation with a mean of 3.76 is the third most significant. The fourth most significant factor is IT infrastructure available in an organization. It had a mean of 3.66. Supplier support is fifth with a mean of 3.48. Employee training and skills determine successful implementation of electronic procurement moderately at a mean of 3.42 making it sixth. The seventh most is the support of the top management with a mean of 3.29. Information security had a mean of 3.26 making it the eighth most significant factor. Measurement and control had a mean of 3.14 making it the ninth most significant factor while process engineering is the tenth most significant factor with a mean of 3.07.

Most of the data was negatively skewed (skewed left) meaning most of the data was clustered at the right side of the distribution with the peak being toward the right and the left tail longer. Since most of the skewness values were between -0.5 and 0 meaning the distribution of data is approximately symmetric. All the kurtosis values were less than 3 meaning the data was platykurtic meaning there were less extreme outliers which implies that the data had a uniform distributed. Since all the mean values were greater than 50%, this shows that all the critical factors determine successful implementation of electronic procurement in the Kenyan public sector (Brown, 2008).

4.17 Multiple regression

Based on correlation, multiple regression facilitates a more elaborate analysis of the relationship between variable sets. It is used in addressing various research questions. The sets of variables in this research are managerial factors, system and stakeholder factors which this research aimed at exploring their relationship with the dependent variable which is successful e-procurement implementation. The three major types of multiple regression analyses are: simultaneous or standard multiple regression analyses, sequential also known as hierarchical and stepwise regression analysis. The researcher used hierarchical multiple

regression in order to sequentially analyse the variables based on the theoretical category basis that the variables were categorized into. The sets of variables: managerial factors, system factors and stakeholder factors were entered into the equation in that order and their relationship to the dependent variable of successful e-procurement implementation analysed using SPSS. The variable sets were analysed in order to assess how they predict the dependent variable of successful e-procurement implementation.

4.17.1 Tests done to verify data suitability for multiple regression
In order to verify suitability for multiple regression data analysis, the researcher performed the following tests:

4.17.1.1 Multicollinearity and singularity
Some relationship should exist between the dependent variable and independent variables (a correlation of at least .3). However, multicollinearity should not occur whereby the independent variables are related highly with a correlation of .7 or above (Tabachnick & Fidell, 2001). Tabachnick and Fidell (2001) suggest combining such highly related independent variables. On the other hand, singularity happens if independent variables are actually combinations of other independent variables.

The correlation between all the independent variables and the dependent variable of implementation level is greater than .3 except for the correlation between the independent variable of information storage and the dependent variable implementation level which is .285 which is quite close to .3 and the correlation between the dependent variable resource mobilization and implementation level which is .187 which is less than .3. Multicollinearity does not occur since there was no correlation between independent variables equal to or greater than .7. There was no tolerance value less than .10 which demonstrates that the multiple correlations between the independent variables are low. All the variance inflation factor values were also less than 10 which indicate that there was no multicollinearity in the data (Tabachnick & Fidell, 2001). Singularity does not also occur in this research data since no independent variable emanates from other independent variables combinations. This shows that multiple regression is suitable for the data analysis since this tests are largely satisfied.

4.17.1.2 Outliers, homoscedasticity, residuals independence, linearity and normality
These refer to score distributions and variable relationships nature and aspects. Multiple regression is highly sensitive to outliers which are caused by very low or high scores. The

cook's distance is used to identify whether there are strange cases which negatively influence model results. Tabachnick and Fidell (2001) assert that cases with values greater than 1 are potential problems. The maximum Cook's distance value is .971 (as shown in table 20) which is less than 1 which means there are no undue influences on the model.

A straight line relationship was observed between the dependent variable scores and the independent variable scores. There was a normal distribution of residuals about the dependent variable scores as shown in figure 12 thus satisfying homoscedasticity. The Durbin-Watson statistic was 1.826 which is near 2 which means the residual values are independent (Tabachnick & Fidell, 2001).

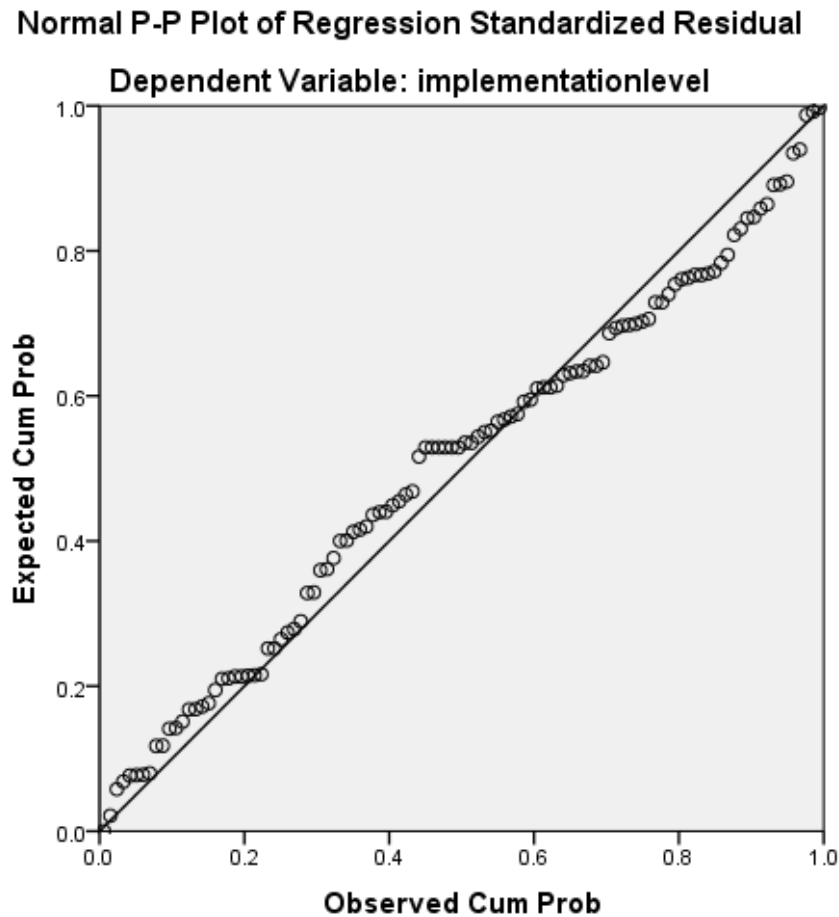**Figure 12: Normal P-P plot of regression standardized residual**

Figure 12: Normal P-P plot of regression standardized residual. **Source: Survey Data (2016)**

Table 20: Residuals Statistics

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.63	4.83	3.64	.534	110
Std. Predicted Value	-1.880	2.230	.000	1.000	110

Standard Error of Predicted Value	.034	.094	.056	.013	110
Adjusted Predicted Value	2.60	4.80	3.64	.528	110
Residual	-.632	.436	.000	.146	110
Std. Residual	-4.032	2.782	.000	.934	110
Stud. Residual	-5.052	3.319	.001	1.053	110
Deleted Residual	-.992	.620	.000	.188	110
Stud. Deleted Residual	-5.877	3.511	-.004	1.103	110
Mahal. Distance	4.233	38.605	13.873	7.134	110
Cook's Distance	.000	.971	.021	.098	110
Centered Leverage Value	.039	.354	.127	.065	110

a. Dependent Variable: implementationlevel

Table 20: Residuals statistics. Source: Survey Data (2016)

Table 21: Multiple Regression Analysis

Model Summary[d]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.910[a]	.828	.817	.237	.828	70.360	7	102	.000
2	.937[b]	.878	.865	.203	.049	13.342	3	99	.000
3	.964[c]	.930	.920	.157	.052	17.847	4	95	.000

a. Predictors: (Constant), resource mobilization, top management resource allocation, measure and control, process reengineering, strategy, resource availability, top management vision

b. Predictors: (Constant), resource mobilization, top management resource allocation, measure and control, process reengineering, strategy, resource availability, top management vision, systems contribution, information storage, IT infrastructure

c. Predictors: (Constant), resource mobilization, top management resource allocation, measure and control, process reengineering, strategy, resource availability, top management vision, systems contribution, information storage, IT infrastructure, employee training programs, supplier views, supplier previous experience, employee awareness

d. Dependent Variable: implementation level

Table 21: Multiple regression analysis. Source: Survey Data (2016)

4.17.2 Research hypothesis testing

H_{01}: The managerial factors of top management support, resources, the e-procurement strategy, measurement and control and process engineering do not influence successful e-procurement implementation.

As can be observed in the model summary in table 21, the managerial factors of top management support, resources, the e-procurement strategy, measurement and control and process engineering have an R square value of .828 which implies that the managerial factors explain 82.8 percent of the variance in successful e-procurement implementation and thus the null hypothesis H_{01} is rejected. The adjusted R corrects this value in order to provide a better estimate which is .817. This model reaches statistical significance Sig = .000: p is less than .0005 implying that these results are statistically significant.

H_{02}: The system factors of information security, IT infrastructure and system integration do not influence successful e-procurement implementation.

As can be observed in the model summary table 21, the system factors of information security, IT infrastructure and system integration have an R square value of .878 which implies that the system factors explain 87.8 percent of the variance in successful e-procurement implementation and thus the null hypothesis H_{02} is rejected. The adjusted R corrects this value in order to provide a better estimate which is .865. This model reaches statistical significance Sig = .000: p is less than .0005 implying that these results are statistically significant.

H_{03}: The stakeholder factors of supplier support and employee training and skills do not influence successful e-procurement implementation.

As can be observed in the model summary table 21, the stakeholder factors of supplier support and employee training and skills have an R square value of .930 which implies that the stakeholder factors explain 93 percent of the variance in successful e-procurement implementation and thus the null hypothesis H_{03} is rejected. The adjusted R corrects this value in order to provide a better estimate which is .920. This model reaches statistical significance Sig = .000: p is less than .0005 implying that these results are statistically significant.

Table 22: Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	.063	.141		.447	.655
Managerial factors	.480	.050	.472	9.634	.000

System factors	.248	.053	.230	4.670	.000
Stakeholder factors	.293	.035	.375	8.301	.000

a. Dependent Variable: implementation level

Table 22: Coefficients. Source: Survey Data (2016)

Table 22 shows how well all the variables contribute to the equation. A scan through the Sig. column shows that all the variables have statistically significant contributions to successful implementation of e-procurement (.000 which is less than .05). In order of contribution to the dependent variable (implementation level), the beta values are .472 for managerial factors making them the strongest contributor followed by .375 for stakeholder factors and .230 for system factors.

4.18 Discussions

This research assessed the influence of the various critical factors on successful implementation of electronic procurement in the Kenyan public sector. The critical success factors are the independent variables while successful implementation of electronic procurement is the dependent variable.

The study revealed that 110 respondents had worked in the public entities for 1-20 years. Most respondents had worked for 11-15 years represented by 39.1% (n=43) while the least had worked for 1-5 years represented by 9.9% (n=11). 29% (n=32) had worked between 6-10 years while 22% (n=24) had worked 16-20 years. This means that most of the organizations have been using e-procurement for a substantial duration. 59.1% of the respondents asserted that their public organizations had implemented electronic procurement to a great extent at (n=65). Several reasons were given for this. They included: increased ethical behaviour among procurement staff, establishment of marketing and customer service, proper management of logistics and facilities as well as financial resources.

Similar to Teo et al. (2008) views, a majority 53.6% (n=59) of the respondents were of the view that the involvement of top management in formulation of the mission, vision and future of the organization contributes to a great extent successful implementation of electronic procurement. 46.4% (n=51) viewed it at a moderate extent on the same. No respondent had views at very small extent, small extent and very great extent. Most respondents felt that it led greatly successful implementation of electronic procurement due to the fact that the employees under the organizations' management satisfactorily made high quality purchases.

35.5% (n=39) of the respondents viewed that the allocation of resources by the top management greatly led to successful implementation of electronic procurement and 10% (n=11) very greatly. This was due to less paperwork and bureaucracy, standardised documentation and processes and there was more clear and transparent processes done. This is similar to the view of Mohammadi (2013) that the commitment and motivation of the top management is vital in e-procurement development and implementation as shown in the literature review. Top management is also necessary in resource mobilization for e-procurement implementation to succeed in the Kenyan public sector.

A majority 45.5% (n=50) of the respondents thought that the availability of resources contributed to successful e-procurement implementation to a great extent. This was because there were enhanced interfaces with internal systems, improved and streamlined user training and due to availability of resources, there was better procurement management based on category and portfolio management concepts. Minority of the respondents 7.3% (n=8) were of the view that the availability of resources contributed to successful e-procurement implementation to a very small extent. This was because efforts were needed to motivate end users to adopt new technologies and internal process re-engineering leading with cross company cultural differences. A major portion of the respondents 50.9% (56) felt that the mobilization of resources contributed to successful implementation of electronic procurement greatly and 28.2% (31) very greatly. They said that resource mobilization streamlined catalogue management processes and supported development of procurement standards management while reducing development costs. This supports Huber et al. (2004) argument who asserted that resources are essential in acquiring proper ICT technologies suitable for e-procurement systems.

Majority of respondents 56.4% (n=62) had the opinion that e-procurement strategies contributed to successful implementation of electronic procurement to a great extent. They cited cost optimization being felt due to bulk procurement. This is in line with Mohammadi (2013) who suggested that aggregating departmental demands in e-procurement implementation strategy optimizes costs. Government should leverage its purchasing power with perspective suppliers. Other respondents 33.6% (n=37) perceived that e-procurement strategies contributed to successful e-procurement implementation to a moderate extent. They said that departmental interests and efforts are required in the implementing e-procurement. A number of respondents 10% (n=11) were of the view that e-procurement strategies contributed to successful implementation of electronic procurement to a very great extent.

They said that availability of proper e-procurement strategies helped a lot in ensuring successful e-procurement implementation and this helped in streamlining catalogue management process, supported electronic invoicing and payment processing and also streamlined user training.

Huber et al. (2004) suggested that e-procurement implementation measurement facilitates implementation control and facilitates feedback on e-procurement implementation process. Many respondents felt that the availability of mechanisms for measuring, controlling and evaluating e-procurement implementation contributed to successful implementation to a moderate extent: 31.8% (n=35) and 30.9% (n=34) to a great extent. They gave their reasons as improvement in paying terms with suppliers, improvement in accounting processes, procurement policy promotion and practice of system documentation across agencies.

Majority of the respondents 27.3% (n=30) were of the opinion that the degree to which policy makers contributed to smooth process re-engineering led to successful implementation of electronic procurement greatly, 26.4% (n=29) moderately and 13.6% (n=15) very greatly. This was so because there was legal harmonization, employment of digital signatures, availability of managerial and technical competencies and process re-engineering. This is similar to Panda and Sahu (2012) observation that the re-engineering of processes was essential for successful implementation of e-procurement in India. However, 18.2% (n=20) of the respondents had the opinion that the degree to which policy makers contribute to smooth process re-engineering only enhances successful implementation of electronic procurement to a small extent and 14.5% (n=16) to a very small extent. This was because they believed policy makers did not contribute so much to smooth process re-engineering towards successful e-procurement implementation. This was brought by leadership being poor in delivering e-procurement vision, consistency promotion in procurement policies, practices, documentation and systems across agencies and sectors was not enough for smooth re-engineering process, leadership and coordination was not provided in promoting cooperation within agencies and across all sectors of the economy. This is different from Pandu and Sahu (2012) and Mohammadi (2013) views that process engineering is essential in resolving various challenges and barriers in organizational structures to e-procurement implementation such as reporting hierarchies and relations.

44.5% (n=49) of the respondents were of the view that storage and encryption of data contributed to successful implementation of electronic procurement to a great extent since the

quality information was not tampered with and e-procurement management was enhanced. 2.7% (n=3) were of the view that storage and encryption of data contributed to successful e-procurement implementation to a very small extent. They were of the view that a lot of data was not stored or encrypted hence success in e-procurement implementation was not assured. This is similar to Panda and Sahu's observation that if the security, confidentiality and reliability of financial data such as bid amounts are not safeguarded, an e-procurement system may facilitate corruption unlike its major objective.

A majority of the respondents 46.4% (n=51) were also of the view that the availability of IT infrastructure contributed to successful implementation of electronic procurement to a great extent. This was due to several factors that included e-procurement software making loads of tasks easier while internet market exchanges through central virtual market makes goods and services rendered faster. This supports Carayannis argument that IT infrastructure is essential for the success of e-procurement in running organizational activities. Some respondents however said that IT infrastructure contributed to a small extent to successful implementation of electronic procurement 10.9% (n=12) due to the fact that IT infrastructure was not enough to support and lead to successful implementation of electronic procurement. They said that inadequate IT infrastructure could lead to failure in systems of supply chain management and ERP in addressing non – production related procurement and indifference to the problem on part of IT infrastructure.

A majority of the respondents - 53.6% (n=59) were of the view that compatibility of current systems with e-procurement contributed to successful implementation of electronic procurement greatly and 30.9% (n=34) moderately. They argued that mandatory processes optimized e-procurement usage but non-value adding and inefficient processes should be eliminated. They also argued that incompatible systems sometimes led to inefficient and unmanageable system flow. Minority 15.5% (n=17) of the respondents said that compatibility of current systems led to successful implementation of electronic procurement to a very great extent. This was evidenced by efficiency in reporting relations and hierarchy, reduced purchasing cycles, time and costs, enhancement of brand whereby it becomes more rapid and faster response to market needs. This is in line with Carayannis (2005) argument that technological resource integration with e-procurement such as software selection, configuration and data warehouse management are essential for successful implementation.

Majority of the respondents 52.7% (n=58) were of the opinion that the level of employee awareness on technology use contributes to a great extent successful implementation of electronic procurement. This was due to the fact that competency was felt in the working environment by the top management whereby ICT experts were readily available just in case the servers had problems and ICT was well used by the employees. This is similar to Panda and Sahu (2012) view that new system change over as well adoption of e-procurement by stakeholders depends on user training. Another respondent 0.9% (n=1) had the opinion that the level of employee awareness on technology use led to a small extent successful implementation of electronic procurement and commented that some of the employees were not aware of the technologies used in e-procurement implementation and they did not have adequate trainings and skills to implement the same. The extent at which availability of training programmes for employees contributed to successful implementation of electronic procurement was moderate according to 40% (n=44) respondents and 38.2% (n=42) to a great extent. This meant that there were so many strategic benefits which included:-better procurement, purchase and supply prices control as well as inventory policy emanating from centralized purchasing function adoption, better coordination between purchasers and users and better control over supply sources. There was also easier management of suppliers.

According to Teo et al. (2008) in order for an organization to implement e-procurement successfully, the organization should have perfect connection with its suppliers and business partner. The extent to which suppliers' views contributes to successful e-procurement implementation was to a great extent according to 38.2% (n=42) respondents. The chain of supply was reduced and it increased in visibility, procurement cycles became shorter with decreased transaction and administrative costs as well as improved decision making with better efficiency and effectiveness. They also asserted that trading communities were able to reach expansion levels for successful e-procurement process with no limitation of choices to only one number of prequalified suppliers. This enhanced the quality of products and services. Other respondents 11.8% (n=13) asserted that suppliers' previous experience contributed to successful e-procurement implementation to a small extent and 6.4% (n=7) to a very small extent. This was due to the problem of trading communities not being able to reach expansion levels for successful e-procurement process and choice limitation to only one number of prequalified suppliers which enhanced quality.

How do organizational managerial factors of top management support, resources, the e-procurement implementation strategy, measurement and control and process engineering influence successful e-procurement implementation in the Kenyan public sector?

The managerial factors had an R square value of .828 which implies that the managerial factors explain 82.8 percent of the variance in successful e-procurement implementation. This model reaches statistical significance Sig = .000: p is less than .0005 implying that these results are statistically significant. This means that the managerial factors greatly influence successful implementation of e-procurement in the Kenyan public sector in line with the reviewed literature which showed that the managerial factors greatly influence e-procurement implementation success. It is therefore important for public sector organizational management to support and facilitate the implementation of e-procurement and mobilize adequate resources towards its implementation. The top management of Kenyan public sector organizations should also have an appropriate e-procurement implementation strategy, implementation process engineering and measure and control the implementation process.

How do organizational system factors of information security, IT infrastructure and system integration influence successful e-procurement implementation in the Kenyan public sector?

The system factors of information security, IT infrastructure and system integration have an R square value of .878 which implies that the system factors explain 87.8 percent of the variance in successful e-procurement implementation. This model reaches statistical significance Sig = .000: p is less than .0005 implying that these results are statistically significant. This means that the system factors greatly influence successful implementation of e-procurement in the Kenyan public sector in line with the reviewed literature. E-procurement data and information in Kenyan public organizations should be encrypted, safeguarded and stored in a proper manner. IT infrastructure should be properly put in place in order for e-procurement systems to run efficiently and organizational systems should be engineered properly to run efficiently with e-procurement systems.

How do organizational stakeholder factors of supplier support and employee training and skills influence successful e-procurement implementation in the Kenyan public sector?

The stakeholder factors of supplier support and employee training and skills have an R square value of .930 which implies that the stakeholder factors explain 93 percent of the variance in successful e-procurement implementation. This model reaches statistical significance Sig = .000: p is less than .0005 implying that these results are statistically significant. This means that the stakeholder factors greatly influence successful implementation of e-procurement in the Kenyan public sector in line with the reviewed literature which showed that the stakeholder factors greatly influence success in e-procurement implementation. Kenyan public organizations should have a proper connection with their suppliers. Supplier views and their previous experience with e-procurement should be put into consideration when implementing e-procurement. There should also be proper training programs for employees in Kenyan public organizations especially for those in supply chains in order to enable them to use e-procurement systems efficiently.

CHAPTER FIVE: CONCLUSION, RECOMMENDATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

5.1 Introduction

This chapter is organized as follows: first it presents findings summary in accordance to the objectives of the research, then policy recommendations for the Kenyan public sector and suggestions for further research studies.

5.2 Conclusion

This research study sought to establish the critical success factors for successful e-procurement implementation in the Kenyan public sector. The research study revealed that the 110 respondents had worked in the entities for periods of 1-20 years. Most respondents had worked for 11-15 years represented by 39.1% while the least had worked for 1-5 years represented by 9.9%. 29% had worked between 6-10 years while 22% had worked 16-20 years.

The most significant critical factor for successful implementation of electronic procurement in the Kenyan public sector is the resources available for implementing electronic procurement with a mean of 3.94 out of 5. The second most significant factor is systems integration i.e. integration of e-procurement system with present organizational information systems. It had a mean of 3.85 which means that it leads to successful implementation of electronic procurement to a great extent. The strategy used for electronic procurement implementation with a mean of 3.76 is the third most significant. The fourth most significant factor is IT infrastructure available in an organization. It had a mean of 3.66. Supplier support is fifth with a mean of 3.48. Employee training and skills determine successful implementation of electronic procurement moderately at a mean of 3.42 making it sixth. The seventh most is the support of the top management with a mean of 3.29. Information security had a mean of 3.26 making it the eighth most significant factor. Measurement and control had a mean of 3.14 making it the ninth most significant factor while process engineering is the tenth most significant factor with a mean of 3.07.

The managerial factors had an R square value of .828 which implies that the managerial factors explain 82.8 percent of the variance in successful e-procurement implementation. This model reaches statistical significance Sig = .000: p is less than .0005 implying that these results are statistically significant. This means that the managerial factors greatly influence successful implementation of e-procurement in the Kenyan public sector.

The system factors of information security, IT infrastructure and system integration have an R square value of .878 which implies that the system factors explain 87.8 percent of the variance in successful e-procurement implementation. This model reaches statistical significance Sig = .000: p is less than .0005 implying that these results are statistically significant. This means that the system factors greatly influence successful implementation of e-procurement in the Kenyan public sector.

The stakeholder factors of supplier support and employee training and skills have an R square value of .930 which implies that the stakeholder factors explain 93 percent of the variance in successful e-procurement implementation. This model reaches statistical significance Sig = .000: p is less than .0005 implying that these results are statistically significant. This means that the stakeholder factors greatly influence successful implementation of e-procurement in the Kenyan public sector.

5.3 Recommendations

These are the recommendations based on the research study:

1. The top management of Kenyan public organizations should be highly involved in formulating the future mission, vision and future of the public organization and support e-procurement implementation by providing adequate resources for successful e-procurement implementation.

2. E-procurement data and information should be encrypted, safeguarded and stored in a proper manner.

3. Kenyan public organization supply chain and e-procurement employees should be educated and trained properly on e-procurement systems. Proper training programs should be established and implemented effectively.

4. IT infrastructure should be properly put in place for e-procurement systems to run efficiently.

5. There should be proper process engineering in order to resolve the relevant barriers and challenges to e-procurement implementation. Policy makers should be available and highly committed to ensuring e-procurement implementation.

6. For successful e-procurement implementation in Kenyan public sector organizations, it is also very essential for Kenyan public organizations to have a perfect connection with their business partners and suppliers. The views of suppliers towards e-procurement as well as the previous supplier experience in using e-procurement systems should be considered when implementing e-procurement projects.

7. There should also be an appropriate e-procurement implementation strategy which should be aligned to the general strategy of the public organization.

8. There should be proper mechanisms for measuring, evaluating and controlling e-procurement implementation in Kenyan public sector organizations.

9. Organizational systems should be engineered to be highly compatible to current e-procurement systems.

10. Adequate resources should be availed by the Kenyan government and top management in Kenyan public organizations for effective e-procurement implementation.

5.4 Future research suggestions

This research study established the critical factors for successful implementation of electronic procurement in the Kenyan public sector. However, it is necessary for more research to be performed to establish exactly how these critical success factors should be applied at all stages of e-procurement project implementation in order to ensure successful implementation. Further research should also be performed to determine the critical success factors for successful implementation of electronic procurement in the Kenyan private sector to ensure more effective and successful e-procurement implementation too.

APPENDIX 1

Questionnaire

This questionnaire is aimed at collecting information on the critical success factors for successful implementation of electronic procurement in the Kenyan public sector. Your input and cooperation will be highly appreciated.

Part 1: Bio data of public organization

1. What is the name of your public

organization?_____

2. Which department do you work for in the public organization?

_____

3. How long have you worked in this organization?

_____

Part 2: Extent of e-procurement implementation.

1. What materials are procured by your organization?

_____

_____

_____

_____

2. Does your organization use e-procurement? Please tick as appropriate:

Yes [　　　]

No [　　　]

3. If Yes above, for how long has your organization used e-procurement?

_____

4. To what is the extent that your organization has implemented e-procurement? Please tick as appropriate:

1- Very small extent ☐

2 -Small extent ☐

3-Moderate extent ☐

4-Great extent ☐

5-Very great extent ☐

Please give reason for your answer above_____

_____

_____

Part 3: Information on critical success factors for successful e-procurement implementation in the Kenyan public sector.

1 a) To what extent does the involvement of top management in formulating the mission, vision and future of the organization contribute to successful e-procurement implementation? Please tick as appropriate:

1- Very small extent ☐

2 -Small extent ☐

3-Moderate extent ☐

4-Great extent ☐

5-Very great extent ☐

Please give reason for your answer above_____

_____

_____

1 b) To what extent does allocation of adequate resources for e-procurement contribute to successful e-procurement implementation? Please tick as appropriate:

1- Very small extent ☐

2 -Small extent ☐

3-Moderate extent ☐

4-Great extent ☐

5-Very great extent ☐

Please give reason for your answer above_____

_____

_____

2. To what degree does the storage and encryption of data and information in the e-procurement system contribute to successful e-procurement implementation? Please tick as appropriate:

1- Very small extent ☐

2 -Small extent ☐

3-Moderate extent ☐

4-Great extent ☐

5-Very great extent ☐

Please give reason for your answer above_____

_____

_____

3 a) What is the extent to which the level of employee awareness on the usage of the e-procurement technology contributes to successful e-procurement implementation? Please tick as appropriate:

1- Very small extent ▢

2 -Small extent ▢

3-Moderate extent ▢

4-Great extent ▢

5-Very great extent ▢

Please give reason for your answer above_____

_____

_____

3 b) To what extent does availability of training programs for employees about e-procurement contributes to successful e-procurement implementation? Please tick as appropriate:

1- Very small extent ▢

2 -Small extent ▢

3-Moderate extent ▢

4-Great extent ▢

5-Very great extent ▢

Please give reason for your answer above_____

_____

_____

4 a) Are there adequate IT infrastructure for e-procurement? Please tick as appropriate:

Yes   ☐

No   ☐

4 b) If Yes, to what extent does the availability of IT contribute to successful e-procurement implementation? Please tick as appropriate:

1- Very small extent ☐

2 -Small extent ☐

3-Moderate extent ☐

4-Great extent ☐

5-Very great extent ☐

Please give reason for your answer above_____

_____

_____

5. To what degree do policy makers contribute to smooth process re-engineering towards successful e-procurement implementation? Please tick as appropriate:

1- Very small extent ☐

2 -Small extent ☐

3-Moderate extent ☐

4-Great extent ☐

5-Very great extent ☐

Please give reason for your answer above_____

6 a) What is the degree to which suppliers' views contribute to successful e-procurement implementation? Please tick as appropriate:

1- Very small extent ☐

2 -Small extent ☐

3-Moderate extent ☐

4-Great extent ☐

5-Very great extent ☐

Please give reason for your answer above_____
_____
_____

6 b) To what extent does suppliers' previous experience contribute to successful e-procurement implementation? Please tick as appropriate:

1- Very small extent ☐

2 -Small extent ☐

3-Moderate extent ☐

4-Great extent ☐

5-Very great extent ☐

Please give reason for your answer above_____
_____
_____

7. To what degree does the availability of e-procurement strategies contribute to successful e-procurement implementation? Please tick as appropriate:

1- Very small extent ☐

2 -Small extent ☐

3-Moderate extent ☐

4-Great extent ☐

5-Very great extent ☐

Please give reason for your answer above_____

_____

_____

8 a) Are there mechanisms for measuring, controlling and evaluating e-procurement implementation?

Yes ☐

No ☐

8 b) If yes, to what extent does the availability of these mechanisms contribute to successful e-procurement implementation? Please tick as appropriate:

1- Very small extent ☐

2 -Small extent ☐

3-Moderate extent ☐

4-Great extent ☐

5-Very great extent ☐

Please give reason for your answer above_____

_____

_____

9 a) To what degree do systems contribute to successful e-procurement implementation? Please tick as appropriate:

1- Very small extent ☐

2 -Small extent ☐

3-Moderate extent ☐

4-Great extent ☐

5-Very great extent ☐

Please give reason for your answer above_____

_____

_____

9 b) To what extent does the compatibility of current systems with e-procurement contributes to successful e-procurement implementation? Please tick as appropriate:

1- Very small extent ☐

2 -Small extent ☐

3-Moderate extent ☐

4-Great extent ☐

5-Very great extent ☐

Please give reason for your answer above_____

_____

_____

10 a) To what degree does the availability of resources contribute to successful e-procurement implementation? Please tick as appropriate:

1- Very small extent ☐

2 -Small extent ☐

3-Moderate extent ☐

4-Great extent ☐

5-Very great extent ☐

Please give reason for your answer

above_____

_____

_____

10 b) To what extent does the ease of mobilization of resources contribute to successful e-procurement implementation? Please tick as appropriate:

1- Very small extent ☐

2 -Small extent ☐

3-Moderate extent ☐

4-Great extent ☐

5-Very great extent ☐

Please give reason for your answer

above_____

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_____

Thank you for your contribution and cooperation!

Tourism, co-curricular and relations

Bomas of Kenya board

Kenya Utalii College council

Environment and Energy

Kenya Forest Service

Ministry of energy and petroleum

Agricultural

National cereals and produce board

Kenya Meat Commission

Services

Postal Corporation of Kenya

Ministry of information and communications technology

National development fund for persons with disabilities

Production

Exports processing zones authority

Kenya Pipeline Company Limited

Health

Kenyatta National Hospital Board

Transport

Kenya Ports Authority

Kenya Railways Corporation Board

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