KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI

COLLEGE OF ARCHITECTURE AND PLANNING

DEPARTMENT OF BUILDING TECHNOLOGY

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THE READINESS OF PUBLIC PROCUREMENT ENTITIES IN GHANA FOR E-PROCUREMENT: PERSPECTIVE OF PROCUREMENT PRACTITIONERS IN THE ROAD SECTOR IN GHANA

A thesis submitted to the Department Building Technology of the Kwame Nkrumah University of Science and Technology in partial fulfillment of the requirements for the degree of Masters of Science in Procurement Management

By

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NONEMBER, 2014

DECLARATION

I hereby declare that this submission is my own work toward the attainment of Master of Science in Procurement Management, and that, to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the University, except where due acknowledgement has been made in the text.

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(Head of Department) Signature Date

DEDICATION

To the entire family, my wife, Mrs. Portia Owusu Darquah and two children, Benjamin and Benjamina

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I thank God for making it possible for me to successfully complete this programme.

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ABSTRACT

Successful implementation of the e-procurement system would require massive infrastructural change by government in order to ensure that all procurement practitioners in public procurement entities have access to internet, sensitive and educated on the changes required for a successful implementation. In lieu of these, currently, the country is not ready for e-procurement. However, ongoing activities and money voted by the World Bank to establish e-procurement under e-Ghana's project indicates that the government is preparing for the implementation of such a system. But are these institutions really ready for the implementation and how successful would be the pilot run? This research identified the drivers and barriers to the successful implementation of e-procurement in public procurement entities in the road sector with the aim to determine their readiness for a successful implementation of e-procurement. In order to achieve the overall aim, the specific objectives of identifying drivers and barriers to the implementation of e-procurement in public procurement entities in the road sector were accomplished. Cast in the quantitative research approach, questionnaire survey was used to elicit the perceptions of respondents on the barriers and benefits of e-procurement. The response data gathered was subjected to analysis using inferential analysis including factor analysis and descriptive statistics. The findings of the study revealed the following factors as the most significant challenges of e-procurement in public procurement entities in Ghana: End-user uptake and training (User involvement, user support/communication, user training); Supplier Adoption (Supplier e-readiness); Lack of eProcurement Implementation Strategy (documented and executable strategies prior to the deployment); costly technological solutions; and lack of top management support (Management involvement & investment in organizational change). The resolution of these challenges is inevitably critical to the successful implementation of e-procurement in public procurement entities in the road sector in Ghana. Based on the findings of the study, the following recommendations were made: Adequate resources must be made available to organizations implementing and those seeking to implement e-procurement; Organizations must have a good IT structure and also provide employees with IT education; and lastly ensure that the service providers are well tooled through the provision of reliable access hubs. Therefore, this study is important to stakeholders and policy makers in the road sector seeking

innovative ways to implement e-procurement successfully. Further study is recommended for the impacts of eprocurement on organizational success.

Keywords: Benefits, Challenges, Ghana, Public Procurement Authority, E-procurement.

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LIST OF ABBREVIATIONS AND ACRONYMS

PPA	Public Procurement Authority
SCM	Supply Chain Management
SCMU	Supply Chain Management Unit
IT	Information Technology
ICT	Information and Communication Technology
UN	United Nations
UNICITRAL	United Nations Commission for International Trade Law
GP	Government Procurement
EC	European Commission
EU	European Union
HTTP	Hypertext Transfer Protocol
ERP	Enterprise Resource Planning
FTP	File Transfer Protocol
MRO	Maintenance, Repair and Operation
RFx	Request for Information, Proposal and Quotation
e-Procurement	Electronic Procurement
e-Government	Electronic Government
e-GP	Electronic Government Procurement
e-GP	Electronic Government Procurement
B2B	Business to Business
B2C	Business to Consumer
B2G	Business to Government
www	World Wide Web
GDP	Gross Domestic Product
GNPC	Ghana National Procurement Agency
IS	Information Systems

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EFT	Electronic Fund Transfer
EDI	Electronic Data Exchange

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KEYWORDS AND MEANINGS

Drivers: used here means impacts or benefits to be derived from the implementation of eprocurement in an organization

Barriers: used here means anything tangible or intangible that would impede or proof challenging to the successful implementation of e-procurement.

Adoption: The act of deciding to use a particular plan, method, or system.

Awareness: Knowledge or understanding of a particular subject or situation.

E-Commerce: A system of transaction in business done through electronic means.

E-Government: The system of government that uses the information technology in its management.

Framework: Principles, policies and rules governing a system to be adopted.

Infrastructure: The basic systems and structures that organization needs in order to work properly.

Procurement: an official means of acquiring goods, works and services from eligible suppliers in a competitive manner.

Procurement Practitioners: concerned with procurement and implementation of procurement plan.

Supplier: A company that provides particular products that is needed for an organization or another company.

Implementation: is an effort beginning with the first thought of developing a system and not ending until the project is completed or abandoned.

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Procurement is the acquisition of goods, services or works from an external source and it is of grave importance that these are favourably and appropriately acquired at the best possible cost to meet the needs of the buyer in terms of quality and quantity, time and location (Weele and Van, 2010).

The internet and the World Wide Web (www) have provided the electronic platform where business activities can be carried out .The Internet market can be loosely classified according to their target customers such as businesses seeking to trade with other businesses termed Business-to-Business (B2B), Business-to-Consumer (B2C) are businesses selling their product or service to consumers, while in Business-toGovernment (B2G) businesses are selling their product or service to government agencies. The applications employed by these businesses to enable transactions or procurements with other entities over the Internet are generally termed electronic procurement, or e-procurement. In other words, e-procurement is the use of integrated information technology for part of or all the procurement functions, from the beginning to end, that is from searching, sourcing, negotiating, ordering, and receipt to post-purchase review (Say *et al.*, 2012). Recently, e-procurement has been receiving much attention from businesses, industries and governments as it is reportedly become a powerful tool to improve effectiveness and efficiencies as well as service quality of its adopters.

1.2 STATEMENT OF PROBLEM

Establishing a successful e-procurement system is a long process requiring strategic planning. Successful implementation of the e-procurement system would require massive infrastructural change by government in order to ensure that all procurement practitioners in public procurement entities have access to internet, be sensitive and educated on the changes required for a successful implementation. Also, government leadership is important at the bureaucratic and policy levels if e-procurement is to be successfully implemented. In lieu of these, currently Ghana is not ready for e-procurement. This view is shared by numerous experts and procurement practitioners in the country.

However, ongoing activities such as e-Ghana's project to establish internet infrastructure for all government offices in the country, establishment of Community Information Centres by the Ministry of Communications to enable the public easy access to the internet as well a Budgetary support of two million US Dollars($2,000,000.00) voted by the World Bank for the establishment of e-Procurement under the e-Ghana project, indicates that the government is preparing for the implementation of such a system (Bondzi, 2010).

Also, the Chief Executive Officer of the PPA, Mr. Samuel Sallas-Mensah, announced at the 5th PPA Public forum in the Ashanti Region that the Public Procurement Authority (PPA) has rigorously commenced processes to implement a pilot e-procurement system to be test run by the Volta River Authority, Ghana Grid Company Limited, Ghana Cocoa Board, the Ministry of Finance and Economic Planning, Ghana Health Service, and the Department of Feeder Roads (Okine, 2012).

But are these institutions really ready for the implementation and how successful would be the pilot run?

1.3 SIGNIFICANCE OF THE STUDY

The management of public purse through the administration of a well reformed procurement system in Ghana is very important to propel national development. As a result, successive governments have realized that reformation in the procurement laws is very imperative for the judicious use of the taxpayer‘s money. Thus procurement regimes are strongly regulated and implemented to ensure value for money through transparency, fairness, cost-effectiveness, efficiency and promotion of competitive local industry. The usage of Public Procurement Act 663 has streamlined procurement processes in the country by establishing a high level of sanity in the procurement environment. It is entirely manual base process amidst allegations of delays in procurement, lack of transparency and fairness and also indications show that there is massive corruption which has become a major source of worry and has led to some procurement practitioners calling for the establishment of e-Procurement in the country which would seek to remedy all these inefficiencies.

The crucial role e-procurement would play in building public and donor trust and confidence makes it important for this study to be undertaken to determine the preparedness of the selected public procurement entities for a successful pilot implementation.

1.4 AIM OF THE STUDY

This study aimed at determining the readiness of public procurement entities in the road sector for a successful implementation of e-procurement.

1.5 OBJECTIVES OF THE STUDY

In order to achieve the aim the following specific objectives were accomplished:

1. To identify the drivers for the implementation of e-procurement in public procurement entities in the road sector.

2. To identify the barriers to the implementation of e-procurement in public procurement entities in the road sector.

1.6 RESEARCH QUESTIONS

In accordance with the objective of the study, the following research questions are posed to guide this research.

1. What are the drivers for the implementation of e-procurement in public procurement entities in the road sector?
2. What are the barriers which inhibit the implementation of e-procurement in public procurement entities in the road sector?

1.7 METHODOLOGY OF THE STUDY

The study by purpose falls within a descriptive research framework. In order to get a representative sample with the requisite knowledge of e-procurement, preliminary consultations was first held with potential respondents before being included in the survey. This necessitated the use of purposive sampling. The methodology adopted for the research involved.

1. Study available literature to identify drivers and barriers to e-procurement.
2. Design and administer questionnaires to identify drivers and barriers to successful e-procurement implementation in the Department of Feeder Roads.
3. Analyze the identified drivers and barriers to determine whether the pilot implementation of e-procurement would succeed.
4. Make conclusions and recommendations based on findings.

1.8 SCOPE OF THE STUDY

This research focused on the readiness of the Department of Feeder Roads in Ghana for a successful test run of the pilot e-procurement system as the only public road entity listed to test the pilot e-procurement system by Public Procurement Authority. It was further limited to procurement practitioners within the ten (10) regional offices of the Department of Feeder Roads.

1.9 PROPOSED STRUCTURE OF REPORT

The study was organized into five chapters.

Chapter one discussed the overview of the study, problem statement, research objectives, research questions, significance and scope of the study.

Chapter two presented the relevant literature reviewed on e-procurement and the theoretical framework for adoption in Ghana.

Chapter three addressed the design and identification of the most suitable methodology for the research.

Chapter four presented a data analysis of the survey.

Chapter five addressed the findings, conclusions and recommendations.

CHAPTER TWO LITERATURE REVIEW

2.1 INTRODUCTION

This chapter delves into the relevant literature on the area of this research work. In this chapter, concepts and theories underpinning the research topic and other findings of the research are reviewed to facilitate the development of theoretical framework for the research work. This chapter gives more insight into the status quo of public procurement in

Ghana, its importance to the economy and the challenges it faces in delivering its core mandate.

Also, an overview into electronic procurement is presented highlighting on the benefits and requirement for a successful implementation. The chapter seeks to review requirement that may support e-Procurement implementation in public procurement entities. Also, relevant literatures on the drivers and barriers to e-procurement in public procurement entities in Ghana are presented in order to establish and provide answers to the research questions.

2.2 THE CONCEPT OF PUBLIC PROCUREMENT REVIEWED

Public procurement is the process by which governments and other publicly-funded entities acquire goods, works, and services needed to implement public projects. Numerous government are able to maximize the buying power of their budgets and also improve the quality of service delivery to their citizens by reducing bottlenecks, combating corruption and building capacity in procurement. Therefore a key element to achieving sustainable development and successful societies in Africa are competitive and transparent procurement systems (World Bank, 2013).

Developing countries procurement budgets account for about 20 per cent of government expenditure globally (Mlinga, 2009), many governments have embarked on reforms in their procurement systems to streamline and harmonize legal and institutional framework. Public procurement in Ghana is about 24% of total imports with the exception of personal emoluments, public procurement represents 50 -70% of the national budget and 14% of Gross Domestic Product (World Bank CPAR 2003).

According to a recent study by the World Bank, Corruption costs the African Continent about $148 billion approximately 25% of its Gross Domestic Product (GDP). Consequently

the government of Ghana has found it prudent to institute several reviews with the sole objective of protecting the public purse.

2.3 PUBLIC PROCUREMENT REFORMS IN GHANA

The procurement processes and procedures in Ghana have gone through a lot of reviews with the sole purpose of reducing or at best eliminating corruption in public procurement, realizing value for money, efficiency in the procurement process among others.

Formerly, the Ghana National Procurement Agency (GNPA) and Ghana supply Company Limited (GSCL) were the main agents that procured all public goods for the government (Verhage *et al.,* 2002, Anvuur and Kumaraswamy, 2006).This was because there was no comprehensive procurement guidance. These bodies did not regulate procurement but rather purchased goods and services on behalf of public entities. The government of Ghana launched the Public Financial Management Reform Program (PUFMARP) in 1996 with the aim of improving public financial management in Ghana. Public Financial Management Reform Program identified weakness in the procurement system.

Amongst the weaknesses identified were the lack of comprehensive Public Procurement Policy and technical expertise in central body and again there was the absence of clearly defined roles, responsibilities and authority for procurement entities and no comprehensive legal regime to safeguard public procurement.

There was the lack of rules and regulations to guide, direct, train and monitor public procurement and no independent appeals process to address complaints from tenderers and lastly there was no authority to dispose of public assets and no independent procurement auditing function.

In 1999, the Government of Ghana established the Public Procurement Oversight Group to steer the development of a comprehensive public procurement reform program. They presented a draft public procurement bill in 2002 which was passed into law in December 2003.

The passing of the Public Procurement Act 663 in 2003 brought about a major change and a new era in public procurement.

2.4 ROLES AND CHALLENGES TO THE IMPLEMENTATION OF THE PUBLIC PROCUREMENT ACT, 2003

The public procurement Act, 663 was promulgated to harmonize all procurement activities in the public sector in order to ensure the economic, judicious and efficient use of public funds and also to ensure that there is fairness, transparency and nondiscrimination in public procurement functions (PPA, 2003).

Environmental factors were posited as one of the public procurement implementation challenges (Chiele and Mccue, 2006). These included market conditions, legal and political environment, organizational and socio-economic environmental factors.

According to Ghana's procurement assessment report (2003) as cited by Ameyaw *et al.* (2012) most staff members of Ministries, Departments and Agencies (MDAS) and district Assemblies who are responsible for procurement are not procurement proficient even though they have been trained.

The World Bank (2004) stated that political interference with the procurement process poses a challenge to the implementation process and public procurement reforms. These politicians presume that they have the right to intervene in the country's procurement procedure thereby leading to bad procurement decisions. World Bank (2003b) as cited by

Ameyaw *et al.* (2012) revealed that the lack of career development path and low salaries of procurement personnel also mitigated against procurement reforms implementation.

Azeem (2007) posited delay in payment of contractors and suppliers as a contributory factor. Also, Ameyaw *et al.* (2012) indicates that there is high inclination towards the use of less competitive procurement methods for procuring goods, works and services contracts in Ghana and this can be attributed to low capacity if suppliers involved in the procurement process.

The study also uncovered that procurement officials deliberately split contract packages as a result of poor interaction between most of the procurement entities and the public procurement authority.

The above clearly depicts the status quo in the procurement dispensation in Ghana.

2.5 ICT IN THE CONSTRUCTION INDUSTRY

The benefits of e-business have been widely promoted by numerous governments the world over and Ghana is no exception but the Architecture, engineering and construction sector of the Ghanaian economy has lagged behind other sectors in the adoption of eprocurement. Over the years one of the business processes that has gain significant benefits from the application of ICT is procurement and the construction industry is one such sector with a significant procurement component.

Goulding and Lou (2013) pointed out that, recent technological advances have improved performance within construction industry. There have been several innovative initiatives within construction in many countries in the last two decades to introduce technological reforms to improve industry performance (Smyth, 2010).

In lieu of these benefits, a panel of industry leaders at the recent Construct Canada conference in 2013 concluded that Canada is ready for electronic procurement, though the construction industry has to work together to ensure a smooth transition (joconl,n.d).

Substantial evidence in technology transfer literature suggest that technological knowhow relating to developing countries construction industries is similar to the situation in Ghana. Technology transfer remains an essential component in the development of the construction industries in developing countries (Carrillo, 1996).

E-mailing for exchanging business information for instance, has become common practice in the construction sector (Wong and Sloan, 2004). Communication has always been a challenge for the construction industry (Ibid). Wong and Sloan (2004) point out that the emergence of ICT applications facilitates today‘s construction process. It is worth noting that use of ICT is improving communication for construction businesses (Wong and Sloan, 2004).

Aranda-Mena and Stewart (2004) and Chen *et al.*(2011) reports that despite the novelty and the little use of e-Business application within the construction industry in developed economies, there is a strong link to substantial research in the sector.

Ayarkwa *et al.* (2010) reported that the construction industry in Ghana is characterized by a multiplicity of small firms. Also out of a total number of 7095 construction firms registered in Ghana, ninety per cent (90%) are small contractors who belong to lower classes and undertake less complex construction jobs with tender sums up to one million dollars ($1,000,000.00) (Egmond and Erkelens ,2007). This was further confirmed by Amoah *et al.* (2011) in their work ―factors affecting construction performance in Ghana: the perspective of small-scale building contractor‖.

Owusu-Tawiah (1999) cited in (Ayarkwa *et al.*, 2010) explored issues that industry reports indicate that majority of Ghanaian contractors do not have sufficient funds and credit facilities and also lack appropriate technological capabilities, plant and equipment as well as key personnel to handle construction projects properly. In lieu of these difficulties faced by contractors would they be in pole position to take advantage of the numerous benefits to be derived from the implementation of e – procurement in Ghana as a result of the fact that the government is the major employer in the construction sector in Ghana.

2.6 DEFINITIONS

2.6.1 E –Business

E-business is defined as an all electronically mediated information exchanges, both within an organization and with external stakeholders supporting the range of business processes (Chaffey, 2004).

DTI (2000) defines e-business as follows: when a business has fully integrated information and communication technologies (ICTs) into its operations, potentially redesigning its business processes around ICT or completely reinventing its business model. E-business is understood to be the integration of all these activities with the internal process of a business through ICT.

2.6.2 Procurement

Croom and Johnston(2003) states procurement is usually responsible for the identification of customer‘s needs and the translation of those needs into specifications, management of the delivery of goods and services and an assessment of the internal customer satisfaction with those goods and services acquired. The other elements of the process involve

communication with the suppliers, requests for tenders, price negotiation, ordering, receipt and invoicing.

2.6.3 E-Procurement

Knudsen (2002) simple describe e-procurement as aspects of the procurement function support by various forms of electronic communication and its use in both the public and private sectors takes various forms including:

Electronic Data Interchange – inter-organizational information system using structured data exchange protocols often through value added networks.

E-MRO - Mechanism for ordering indirect items from an on-line catalogue.

Enterprise resource planning (ERP) – this is the automation of procurement related workflows including auto-faxing, auto-emailing or other forms of messaging directly with suppliers.

Web-Based Enterprise Resource Planning- this is an automated procurement workflows but web based.

E-Sourcing – this portal provides a way of identifying new sources of supply using internet technologies

E-Tendering - the process of inviting offers from suppliers and receiving their responses electronically

E-Reverse Auctioning - using internet technologies bidders usually bid down the price of their offers against those of other bidders until no further down-ward bids are received

E-Auction for Disposals - using internet technologies for on-line auctions of items for disposal

E-Informing - use of internet technologies for gathering and distributing related information

E-Collaboration - collaborative procurement related planning and design using facilitating technologies.

Toland (2006) defined e-procurement as the use of the internet by organizations to procure or purchase goods and services, advertise their needs, select vendors, manage services, organize fulfillment of contracts and effect payments.

E-procurement is the electronic integration and management of all procurement activities including purchase request, authorization, ordering, delivery and payment between a purchaser and a supplier (Chaffey, 2004).

E-Procurement is defined as an internet-enabled purchasing of goods, works and services by one buyer from many suppliers (Andries, 2006)

Smart (2010) defines e-Procurement as an application hosted by the buying firm to allow users to search for products, place and track orders, receive and pay for purchases. Uses catalogues provided by suppliers or draws product data from supplier sites through punch-out (retrieving data from web sites).

2.6.4 E-Commerce

E-commerce is often thought simply to refer to buying and selling using the internet. But it involves much more than electronically mediated financial transactions between organizations and customers. Many commentators refer to e-commerce as all

electronically mediated transactions between an organization and any third party it deals with. By his definition, non-financial transactions such as customer request for further information would also be considered to be part of e-commerce (Chaffey, 2004). Generally e- commerce is considered as a subset of e-business (Chaffey, 2004). The two terms however are often used interchangeably and for the purpose of this study e-business shall be used to cover e-commerce as well.

Electronic Commerce in summary is a methodology of modern business which addresses the need of business organizations, vendors and customers to reduce cost and improve the quality of goods and services while increasing the speed of delivery (tutorialpoint.n.d).

E-commerce refers to paperless exchange of business information using following ways.

- Electronic Data Exchange (EDI)
- Electronic Mail (e-mail)
- Electronic Bulletin Boards
- Electronic Fund Transfer (EFT)
- Other Network-based technologies

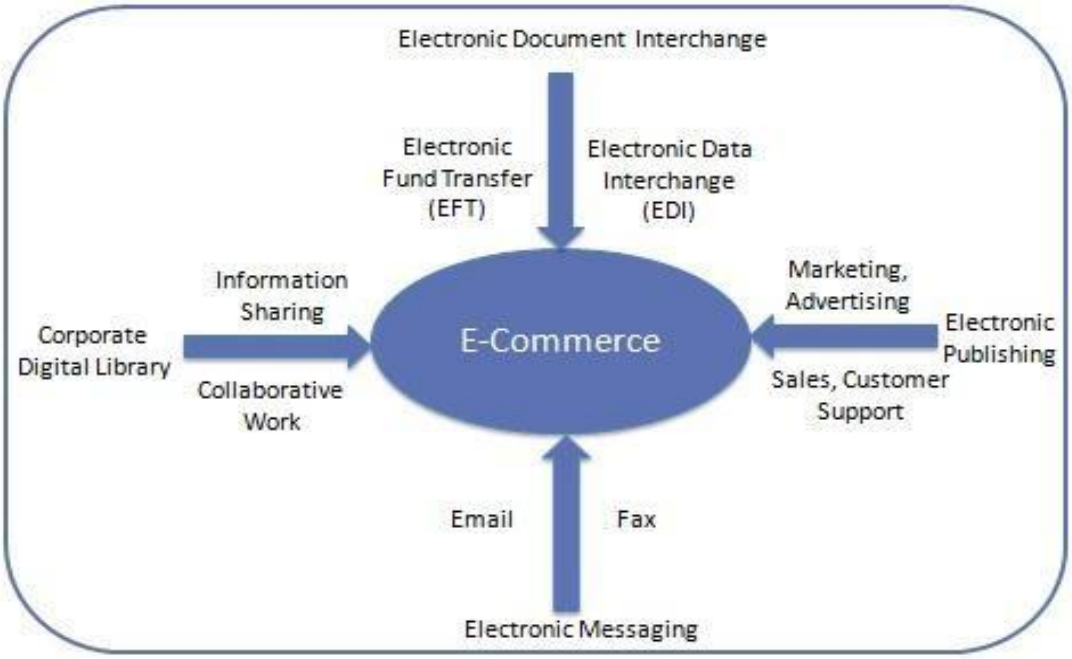

Figure 2.1 Overview of E-Commerce

Source: tutorialspoin(n.d)

2.6.5 E-Service

De Meo *et al.* (2006) defined e-service as a collection of network-resident software programs that collaborate for supporting users in accessing and selecting data and services of their interest which is present in a provider site. Examples of e-services are ecommerce, e-learning, and e-government applications.

2.7 OVERVIEW OF E- BUSINESS

E-business is the use of information communication technology (ICT) for business activities and processes. In today‘s modern business world where there is the interconnectivity of computers and other electronic devices in order to boost ease of communicate and interaction with other devices over a variety of networks such as the internet, developments around the internet have been profound. The emergence of ephenomena has led to the generation of different ideas and business models in order to

enhance how businesses are conducted. On the forefront of these phenomena are words such as e-business, e-commerce and e-procurement.

E-business has been seen as a major force behind new economy and it has led to emergence of technology and products, less predictable customer demand, shortened product life cycles and price transparency (Zhao, 2005).

A fully functional e-business is a complete automation of processes within a company that would minimize operational costs to a minimum. E-business ensures that buyers and sellers have a new and effective way of communication and gives them an opportunity to have new market places. The advent of technology and the internet has completely changed the way business is being conducted as companies continually seek for ways of serving their customers efficiently and effectively in order to provide sustainable value.

Aranda-Mena and Stewart (2004) and Li (2007) reported that the terms e-business and ecommerce have created a lot of misconceptions. They explained that the misconceptions include the lack of understanding of the difference between _e-business‘ and _ecommerce‘. They reported that e-Commerce is essentially a part of e-business that is concerned with financial transactions. These are emerging concept that describes the process of buying, selling, or exchanging products, services and information via computer networks, including the Internet and therefore does not require shared or redesigned business processes.

Aranda-Mena and Stewart (2004) and Li (2007) further explained that typically, ebusiness is anchored on the capabilities of ICT facilities to thrive and this has been demonstrated in many economic sectors. E-Business essentially has the potential to streamline organizations processes through integration thereby enhancing the traditional processes (Ruikar and

Anumba, 2008). E-Business aims at ensuring optimization of communication and sharing information without making any reservation of the traditional barriers that exist between design, engineering and construction within the construction industry (Worst, 2009). It is obvious that e-business has a solution to fragmented and geographical barriers within construction industries (Oyediran and Odusami, 2005; Worst, 2009).

E- Business has played a very important role in highlighting the importance of eprocurement as a strategic issue.

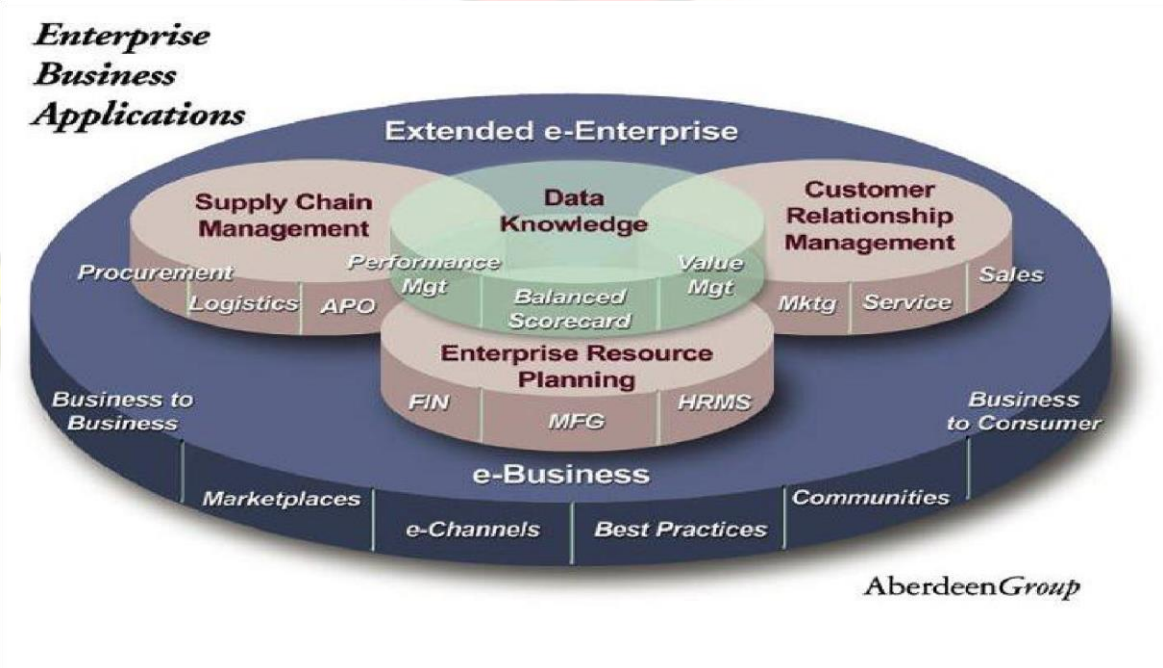

Figure 2.2: An Overview of E-Business

Amongst the numerous multifaceted compositions of the enterprise business applications is the electronic market. The advent of internet and the World Wide Web (www) have provided this electronic platform where business activities can be carried out. The types of electronic markets and their objective behind their creation are as shown in fig 2.3

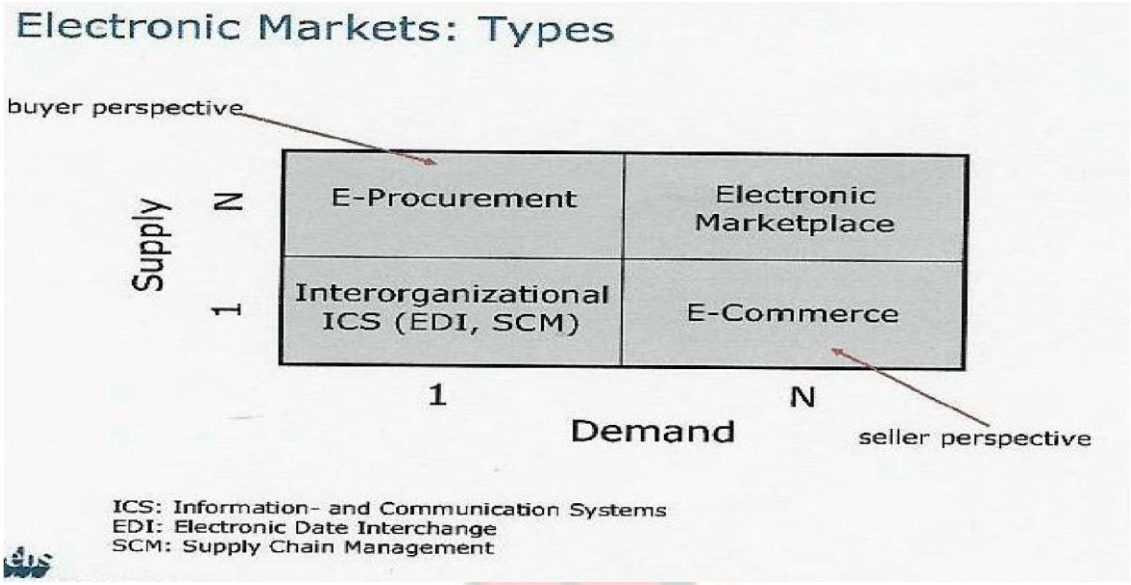

Figure 2.3: Electronic Markets

Source: Strahringer (2002)

2.8 OVERVIEW OF ELECTRONIC PROCUREMENT

The incorporation of e-Government Procurement (eGP) also known as E-Procurement is believed would further strengthen the act and offer greater opportunities than the traditional paper based process currently employed. E-procurement is the process of purchasing goods and services electronically Mitchell (2000), Presutti (2003), and can be defined as ―the use of integrated (commonly web-based) communication systems for the conduct of part or all of the purchasing process; a process that may incorporate stages from the initial need identification by users, through search, sourcing, negotiation, ordering, receipt and post-purchase review‖ (Croom and Brandon-Jones, 2007). ―Advances in e-procurement technologies coupled with complementary technologies such as sourcing and contract management have accelerated the adoption and value of eprocurement‖ (Aberdeen Group, 2006).

An Aberdeen report divides e-procurement technologies into three categories as follows (Hawking and Stein, 2004):

- Indirect Procurement - This includes the procurement of non production goods and services such as office supplies, printing, advertising and casual labour;
- Direct Procurement - This includes the procurement of raw materials, parts and assemblies (that is organisation and management of raw materials, parts and assemblies)
- Sourcing - identification, evaluation, negotiation of products and supplies for both the indirect and direct supply chain.

The terms ―e-Procurement‖ and ―e-Purchasing‖ have been used synonymously in many jurisdictions in an attempt to prove their involvement in the e-Commerce revolution (MacManus, 2002), the term ―purchasing‖ has a narrower scope. e-Procurement refers to the use of Internet-based (integrated) information and communication technologies (ICTs) to carry out individual or all stages of the procurement process including search, sourcing, negotiation, ordering, receipt, and post-purchase review (Croom and BrandonJones, 2004). While there are various forms of e-Procurement that concentrate on one or many stages of the procurement process such as e-Tendering, e-Marketplace, eAuction/Reverse Auction, and e-Catalogue/Purchasing, e-Procurement can be viewed more broadly as an end-to-end solution that integrates and streamlines many procurement processes throughout the organization.

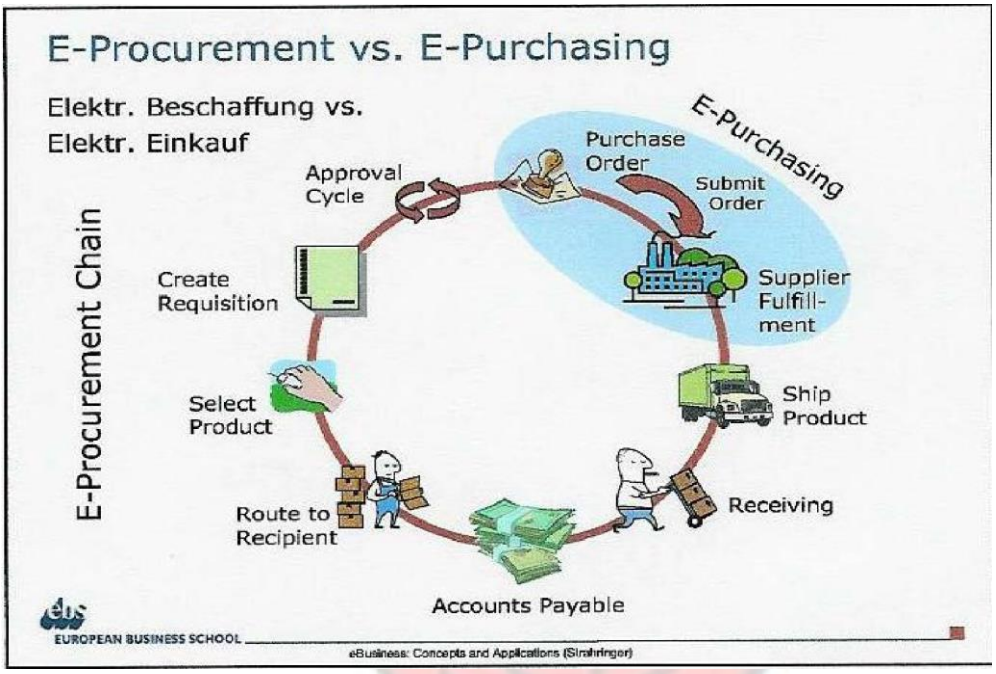

Figure 2.4: An Overview of E-Procurement Chain

Source: Strahringer (2002)

2.8.1 History of E-Procurement

In the last half of the twentieth century, there was a revolution in the industry as a result of the harnessed power of seemingly ever-increasing capacity, speed and functionality of computers and microprocessors (Chang and Yoon, 2004).This trend made a way for management and workers within industries with new capabilities for management, planning and control, design, quality assurance and customer support. Structured information flow became the foundation of industrial companies. New applications, tools and information technology systems emerged and evolved to facilitate companies to integrate the various departments like Design, Procurement, Manufacturing, Sales and Finance within companies, predominantly the larger ones, including international corporations, providing opportunities for them to meet new demands for product time to market, just in time supply of orders, and customer support (Chang and Yoon, 2004).

The earliest literature on e-procurement is that relating to electronic data interchange – a technology that has been in use in organizations since the 1960s, (Millman 1998). Most dialogue about electronic inter-organizational systems in the academic literature up until the mid 1990s involved electronic data interchange. It was not until the mid 1990s that there was a shift towards the discussion of the use of the internet for electronic commerce. In contemporary times it still stands that electronic data interchange continues to be the primary medium of electronic commerce. According to (Neef, 2001), the emergence of eprocurement is not just as an improvement of EDI technologies, but it is a way of conducting purchasing transactions over the Internet.

E-procurement effectively began in late 1990s when several startup software companies, led particularly by Ariba and Commerce One, began to develop a suite of applications that allowed vendors to create electronic catalogs (Neef, 2001). This turn of events dramatically altered the activities of purchasing and transformed the purchasing process from a tactical into a strategic activity and tried to eliminate maverick buying that did not involve the purchasing department.

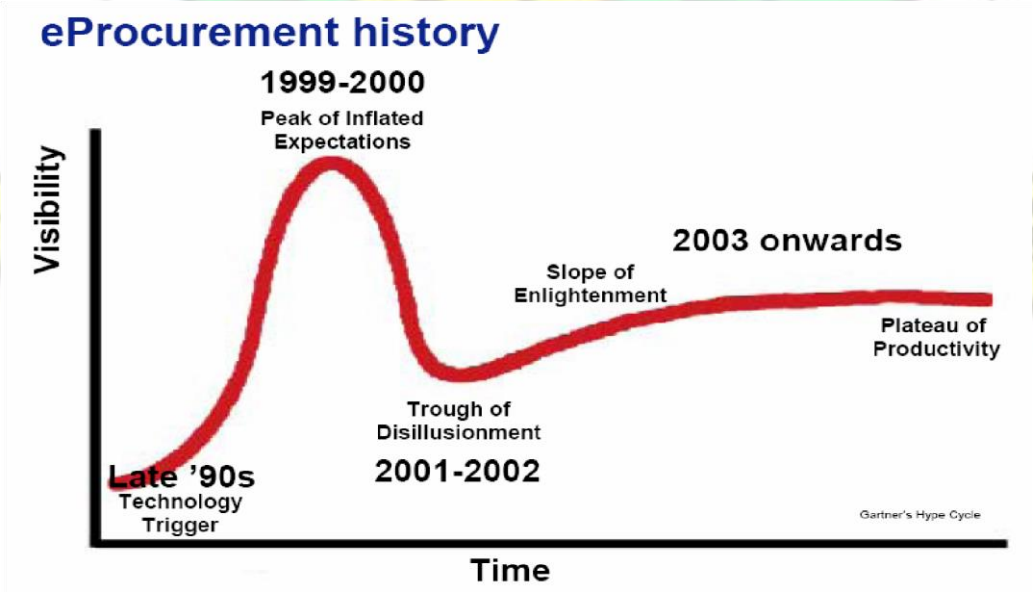

Figure 2.5: History of E-Procurement

Source: Dagg (2005)

The diagram in Fig 2.5 illustrates that it was only in the 1990s that the World Wide Webthe multimedia capability of the Internet - became widely enabled and provided the essential resource for the automation of procurement (Office of Government Commerce, 2002).

This triggered a lot of excitement over the use of electronic means to do business and eprocurement was one of the first business application areas to make use of the internet in the 1990s.

Many companies wanted to be part of this technological trigger. However, the period 1999 to 2000 shows that the expectations were rather too high as a lot of companies needed to put a lot of things in place before this new technology could work well for them. As the dust of excitement settled, the era was followed by the trough of disillusionment in the period 2001-2002 as many companies' expectations were not met. From 2003 onwards, there has been a steady appreciation of e-procurement as a lot of companies have put things in place and they have seen e-procurement work for them.

The Figure 2.6 depicts the stages that e-procurement has gone through since its conception to modern times.

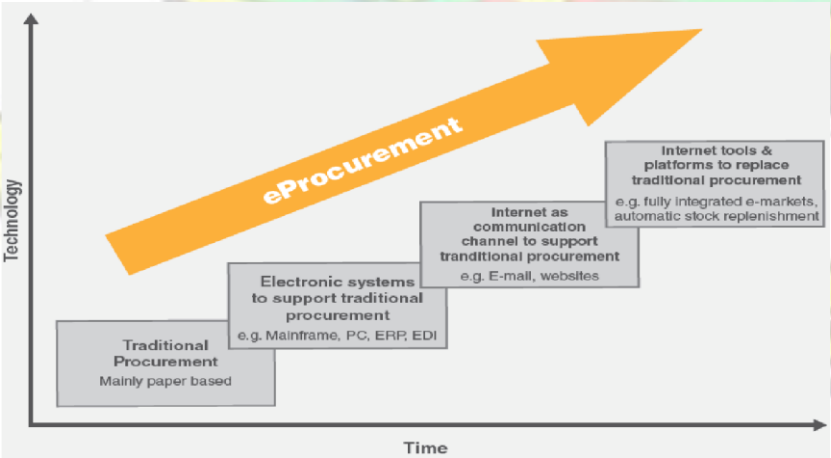

Figure 2.6 Evolution of E-Procurement

Source: PayStream Advisors (2013)

2.8.2 Evolution of E-Procurement Tools

Online e-procurement tools have been around since the late 1990‘s, and as such, have evolved significantly to provide a robust set of tools used frequently by Fortune 500 companies as part of their procurement tool kit. These tools are also part of an overall procure-to-pay process supported by a variety of industries as procurement best practices. As these tools have evolved, so have the opinions of the tools by users, participants and industry groups. Ultimately these tools have evolved to be used for all types of sourcing such as commodities, services and just about an expense or capital related item. Some companies even use these tools in the form of Forward Auctions in order to sell out of cycle merchandise, excess inventory and used equipment where buyers bid up the price. As with most technologies, e-procurement tools, specifically Reverse Auctions, went through the normal early adopter life cycle (Figure 2.7) generally described, in order, as innovators, early adopters, early majority, late majority and laggards. The late majority and laggards generally represent about 50% of the adoption pool.

Ronald D. Southard opined in his white paper on 'Construction Sourcing with eProcurement Tools‘ that these stages also follow very closely the rhetoric relative to the potential for success of the technology due to the level it may be perceived to disrupt work process, workflow, jobs or in the case of e-procurement tools, existing supplier relationships by impacting on their business or profitability.

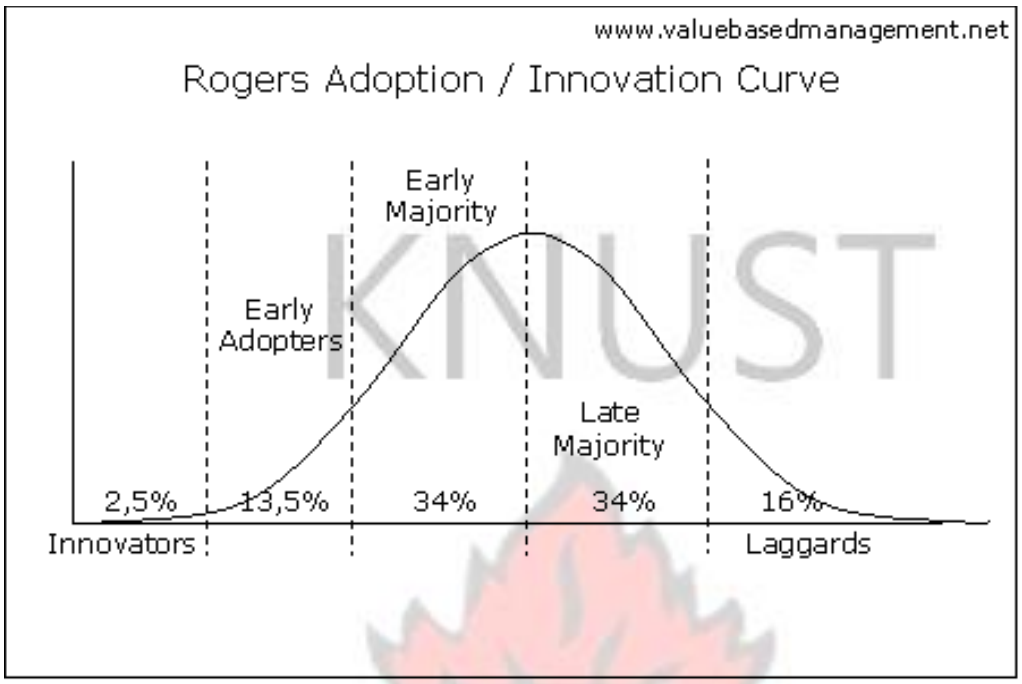

Figure 2.7: The Evolution of E-Procurement

Source: valuebasemagement (n.d.)

E-business has brought to the fore the importance of procurement as a strategic function since introducing e-procurement which can achieve savings and other benefits which directly impact the customer. E-procurement has been the subject of a great deal of research. Inefficient and maverick buying habits, redundant business processes are symptoms of poor procurement practices. E-procurement is not just an addition of technological aspects to traditional procurement but thus, mirror the procurement process through the provision of two discrete, but connected infrastructures, internal processing (corporate intranet) and external communication processing (internet based plat form) (Croom and Johnston,2003).

Bocij *et al.* (1999) highlighted the growing importance of e-procurement as they reported that around 90% of companies planned to implement an electronic management system within the next five years, with the majority identifying cost savings as their primary goal. The adoption of electronic procurement systems is necessitated by the need to reduce costs and encourage purchases in large quantities, thereby limiting the number of contracts.

2.9 THE CONCEPT OF IMPLEMENTATION IN INFORMATION SYSTEMS

The term implementation has been defined in different ways as with e-procurement. A typical general definition from the Information Systems (IS) literature, states that implementation is ―an effort beginning with the first thought of developing a system and not ending until the project is completed or abandoned‖ (Ginzberg, 1979).

Chan and Swatman (1998), however, state that IS implementation is best described as a process of organizational change that extends over a considerable period of time. More recent definitions of the term stem from the diffusion-based models of innovation adoption in relation to e-Commerce/e-Business (Srinivasan *et al.*, 2002).

Cooper and Zmud (1990) propose a five-stage framework of initiation, adoption, acceptance, routinization, and infusion in explaining how an IT solution (application) is implemented in organizations.

Drivers in this paper have been defined as the impacts or benefits to be derived from the implementation of e-procurement in an organization whereas barriers are anything tangible or intangible that would impede or proof challenging to the successful implementation of e-procurement.

2.9.1 Drivers for the Implementation of E- Procurement

There is strong consensus among researchers and practitioners regarding the strategic importance of developing efficient procurement functions to reduce costs. An increasing number of government authorities are adopting e-procurement solutions to reap the benefits that companies in the private sector have already achieved (Panayiotou *et al.*, 2004). In the private sector, e-procurement generally provides annual cost savings of between 25 and 50 percent and potentially can reach the same level in the public sector

(Mitchell, 2000). The governmental sector in Europe represents 45 percent of the GDP, 15 percent of which is related to public procurement (Davis *et al.*, 2007). The statistical services of Ghana reported in 2008 that the Government services in Ghana contributes about 11 percent to Ghana's GDP and all these services both public and civil services are involved in some level of procurement in the execution of their core functions.

A Deloitte Consulting survey found that companies expect to save 5-15% of total corporate spending by investing in e-procurement initiatives. The research firm Aberdeen Group reports that with e-procurement, transaction-processing costs may drop by 70%, from an average of $107 to $30 per order. And industry experts from Price Waterhouse Coopers and Killen & Associates claim that reducing purchasing costs by 5-10% can increase profit margins, or in respect of Local Government, cost effectiveness by 28-50%.

Panayiotou *et al.* (2004) reported the actual benefits of using e-procurement system in governmental purchases as tangible benefits and intangible benefits. Tangible benefits are easily quantifiable, for example costs and time savings that translate into improved effectiveness and efficiency of organization, as well as revenue increase resulting from access to new markets or new business opportunities.

Intangible benefits are benefits such as improved customer satisfaction, better integration of business processes, and better communication with other businesses that improve business relationships, which are not so easily quantifiable.

Ronchi *et al.* (2010) also divided benefits of using e-procurement system into two categories, financial performance and organizational performance, the former of which are measured in definitive, financial terms while the latter is qualitative in nature (intangible) thus similar to the tangible or intangible split proposed by Panayiotou *et al.* (2004).

Ngonzi and Anderson (2000) also gave the potential benefits of e-procurement implementation as:

- Cost Reduction through effective and efficient procurement by streamlining processes, improve volume and price.
- Improved audit control by ensuring proper authority of purchasing.

According to Hearn & Gibbons, some of the other benefits that e-Procurement can provide are:

- Reduced order cycles and time to market by purchasing online and reducing the interruptions of constant calls on the telephone.
- Communications are instantaneous and exact; thus would improve business processes to reduce the time that purchasing agents spend processing orders.
- Improving access to spending data to analyze overall purchases—to look for consolidating purchases into one online application.
- Control through supply chain automation. Corporate headquarters can control what a unit can buy and choose appropriate substitutes when something is out of stock. This would also translate into simplifying the training of new managers –to have all of the information at their fingertips to help them make better decisions and frees them up to do other things.

Systems Union (2006) reports on the numerous benefits accruing from e-procurement implementation as:

- Reduced purchasing costs by ensuring goods are bought under pre-negotiated contracts, this could be one of the most significant cost savings

- Reduction in the time that it takes to process orders

- Lower overhead costs on stationery, postage and telephones which are eliminated by automated systems.

- Efficiencies and cost savings brought about by acquiring a similar volume of goods or services with fewer staff to manage the process which allows some people to be freed from purchasing so that they concentrate their efforts other important activities within the organization.

Edmiston (2003) has identified major advantages with e-procurement such as: reduction of supply costs, reduction of cost per tender, lead time savings, simpler ordering, reduced paperwork, decreased redundancy, less bureaucracy, standardization of processes and documentation, online reporting, clearer and more transparent processes, ensured compliance with procurement laws and regulations, minimization of errors, and easier access to information

Also e-procurement may lead to increased quality and more adequate purchasing (Engström *et al.*, 2008).

In addition, e-procurement has been found to facilitate decentralization of procurement and, thereby, enable purchasing professionals to focus more efforts on strategically important issues (Panayiotou *et al.*, 2004).

Neef (2001) and Vaidya *et al.* (2006) citing AGV (2003) and Croom and Brandon-Jones (2004) gave the potential benefits of e-procurement implementation as:

- reduction of supply costs,
- reduction of cost per tender,
- lead time savings,
- simpler ordering,
- reduced paperwork,
- decreased redundancy,
- less bureaucracy,
- standardization of processes and documentation,
- online reporting,
- clearer and more transparent processes,
- ensured compliance with procurement laws and regulations,
- minimization of errors, and
- easier access to information.
- Increased quality and more adequate purchasing

Davenport (1994) as defines the nine principal groups of positive effects of IT on organizational processes as:

- Automation or reduction of the duration of the phases of the process
- Quality and availability of information to promote better understanding
- Standardizing, expediting and innovation which eliminates overlapping activities
- Better organization and archiving of offers which improves monitoring
- Administrative simplification which allows employees the opportunity to master the process
- Better communication which improve the ability to coordinate remote processes
- Univocal attribution of responsibilities allowing employees to execute activities within his competence

- Increased transparency as result of ease access to information
- Streamlining, reduction of bureaucratic procedures and errors

Andersen (2005) also proposes that the direct impact of e-procurement adoption and implementation are:

- Increased control and management of the tendering procedures, results and quality of the expenditure
- Improved transparency in the tendering procedures
- Increased knowledge of the procurement processes
- Increased time available for activity generating a higher value-added
- Improved mastery of IT instruments
- New interaction, collaboration and sharing opportunities both within and outside the organization.

The EC in its Green Paper support for improvement in governance and management in 2011 provides the benefits of the introduction of e-procurement as follows:

- Reduced administrative costs of individual procurements;
- Streamlined procurement procedures;
- Faster procurement procedures;
- Increased transparency by providing information about individual tender opportunities but also providing a clearer and broader picture of tenders on a wider basis;
- Better monitoring of procurement;
- Encouraging cross border competition by reducing barriers presented by paper based procurement processes;

- Supporting the development of centralized procurement administration resulting in the potential reduction of costly procurement back-office functions and taking advantage of economies of scale in procurement administration;
- Wider administrative modernization and simplification, thus encouraging the integration of various administrative processes as well as the diffusion of information technology solutions within and by government

E-procurement‘s benefits are widely found in the SCM and e-procurement literature and they are so great, that e-procurement has turned the formerly ignored traditional procurement function into a competitive weapon. Buyers indicated that the conversion from paper-based to e-purchasing resulted in a reduction of 5% to 10% on purchasing price, 25% to 50% reduction at inventory level, a 5-day reduction in cycle time, a US$77 saving in per requisition administrative cost (Brack, 2000). Major e-procurement benefits include (Min and Galle, 2003; Roth, 2001):

- Cost savings and subsequent increase in return-on-investment (ROI) resulting from reduced paper transactions, shorter order cycle time and the subsequent inventory reduction due to the speedy transmission of order related information;
- Just-in-Time inventory and procurement practices;
- Enhancement of supply chain efficiency by providing real-time data regarding product availability, inventory level, shipment status, production requirements;
- Facilitation of collaborative planning among supply chain partners by sharing data on demand forecasts and production schedules that dictate supply chain activities;

- Effective linkage of customer demand information to upstream SCM functions, while also facilitating ―pull‖ (demand-driven) SCM operations.

2.9.2 Barriers to the Implementation of E- Procurement

Despite the various benefits offered by the use of e-procurement, organizations will meet a number of challenges when implementing such systems. While various governments are encouraging public sector agencies to adopt e-Procurement, its implementation does not appear to have been smooth and the rate of e-Procurement implementation success has been less than spectacular, as supported by Steinberg's (2003) claim that ―Government eProcurement projects have been notoriously unsuccessful‖.

There is, however, a view that the rumors of e-Procurement's demise have been greatly exaggerated (Harris, 2002). For example, Davila *et al.* (2003), using a survey of 168 US public and private sector organizations, indicate that e-Procurement technologies will become an important part of supply chain management and that the rate of adoption will accelerate as the adopters share their experiences of success factors and perceptions of low risk.

Such success and failure stories imply that there is a need for a much better understanding of the drivers and barriers with regards to e-Procurement implementations and use in the public sector.

Engaging suppliers in the process - especially smaller organizations – would prove to be difficult given the level of investment expected in terms of providing catalogue information to buyers, and marketplaces using different technologies, platforms and business languages (OGC, 2002).

World Bank (2003), CGEC (2002) and ECOM (2002) realized the threat posed by enduser uptake and training. As e-Procurement includes new technologies and changes in traditional procurement approaches, the need to train staff in procurement practices and the use of e-Procurement tools are critical to the success of an e-Procurement initiative. Also there is the need for public sector agencies to identify the skills required by all those engaged in procurement.

E-Procurement implementation success is closely related to early supplier involvement. It is important to demonstrate the proposed solution to the suppliers and discuss any necessary changes, issues, and concerns through consultation as early as possible (Birks *et al.*, 2001).

It is very important to determine the level of integration required between the eProcurement solution and existing information systems (KPMG, 2001). The CIPFA report reasoned that if integration issues are complex, it is more likely that underlying business processes within an organization should be changed or adapted (ECOM, 2002).

Due to the sensitivity of the government data and the legal nature of orders and payments, security of data is critical in e-Procurement systems. The system must have mechanisms for identifying and authenticating the user who places an order so that the supplier knows it is safe to fulfill the order. Stenning and Associates (2003) reiterate that in order to encourage buyers and suppliers to engage in e-Procurement, it is critical that both parties have complete confidence and trust in the underlying security infrastructure.

ECOM (2002) and KPMG (2001) also recognized the need for e-Procurement to be viewed as an enabling mechanism to make the process of procurement more efficient thus where existing procurement practices and procedures may contradict the goals and objectives of

the new initiative, the implementation of e-Procurement will require the reengineering of existing purchasing processes.

The continuous measurement of the key benefits that is performance measurement is regarded as vital to the successful delivery of the business case. Measurement drives behavior and is a key to making the change a success (Birks *et al.,* 2001).

AGV (2003) also recognizes top management support as instrumental because there is little doubt that senior management leadership is critical to the success of an eProcurement implementation.

The World Bank Report cautions that change management may be the least expensive aspect of an e-Procurement project but the lack of it can be a leading cause of project failure (World Bank, 2003).

OGC (2002) cites consultation, communication, and issue resolution as the three effective ways to achieve change management in e-procurement implementation.

The creation of documented and executable strategies prior to the deployment of the e-Procurement solution is an important factor to successful e-procurement implementation

(Neef, 2001). A clearly defined e-Procurement strategy not only emphasizes the importance of e-Procurement in the public sector but takes into consideration major institutional changes from the procurement process perspective as well as from the organizational perspective (World Bank, 2003).

E-Procurement requires various buyer-supplier systems to exchange information and electronic documents. This requires common standards. The World Bank (2003) suggests

that developing an e-Procurement system in an open environment allows it to link to other systems for interoperability and simplifies upgrading the system.

According to the DOF (2001), successful introduction and adoption of e-Procurement in the public sector also depend on the ease with which procurement-related data can be exchanged both within the agencies and between their supply bases.

Satyanarayana (2007) gave the challenges in the successful implementation of eprocurement as:

- Complexity of procurement reforms procedures
- Wide range of items to be procured Organizational resistance
- Lack of IT skills among employees
- Lack of resources with Government
- Difficulties in establishing & maintaining the system
- Lack of financial resources for maintenance & transaction handling
- Concerns of confidentiality of bids and authenticity of bids
- Varying requirements of Multiple Departments

The EC in its Green Paper support for improvement in governance and management in 2011 highlighted a number of issues that have arisen in the implementation of eprocurement in EU member states, including:

- Technology: The technology is available to permit e-procurement at all phases of the procurement transaction but the technological solutions may be costly and some are not so good at dealing with certain phases of the procurement.

- Participation by contracting authorities: Where the use of e-procurement is not mandated, then the take up by contracting authorities appears to have been slow.

In the EC‘s view this can be attributed to the costs of reorganizing internal systems and low awareness of the advantages.

- Participation by suppliers: Suppliers do not always see the benefit of making the transition. SMEs in particular are concerned that they may be edged out of the procurement market by the introduction of e-procurement combined with increased aggregation and centralization. Another issue affecting suppliers is the problem of over onerous requirements of some e-procurement processes, particularly with reference to supplier registration and bidder authentication processes.

- Lack of common standards: Suppliers are faced with different e-procurement platforms, arrangements and problems with the functionality of the systems. This points to the need for increased standardization and alignment of e - procurement systems.

This also links in with problems arising from the lack of mutual recognition of national electronic solutions.

The Technical Consultation meeting held in Korea (March 2011) cited in the expert group report, identified different challenges resulting from the experience. They include:

1. Lack of awareness and capacity building programs:
   - Lack of government policies and legal frameworks (e-GP is not just ICT).
   - Lack of institutional capacity for public procurement.
2. Resistance to change: Procuring agencies‘ reluctance to convert to e-procurement.
3. IT infrastructure and Internet readiness:

○ IT infrastructures for e-commerce not mature in many developing countries. ○ IT divides in different regions within a country.

4. Lack of cross-governmental coordination:

○ Difficulties in legislation.

○ Multiple platforms may jeopardize long-term goals of e-procurement.

5. Ineffective implementation:

○ Improper Business Process Re-engineering (BPR). ○ Digitalization without procurement reform. ○ Technology can complicate rather than simplify procedures.

6. Obstacles for cross-border e-procurement: Electronic signatures are recognized only domestically.

CHAPTER THREE RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter discusses the research methodology adopted for the study to answer the research questions raised in order to achieve the research aim and objectives. Methodology typically refers to the techniques that are used to conduct research. This include data collection instruments such as questionnaires, interviews or observation as well as sampling procedures and statistical techniques for organizing and interpreting unstructured data (Bryman, 1992). The methodology presented in this chapter involves the research approach, research design, population, sample and sampling procedure, data collection methods, issues of confidentiality, the validity and reliability of the study and an overview of the methods used in data analysis. According to Burns and Grove (1987), methodology includes design, setting, sample, methodological limitation and data collection and analysis techniques in a study. It is the know-how of the scientific methods and techniques employed

to obtain the valid knowledge. Thus methodology is the way by which we gain knowledge about the world, trying to discover how we can go about the task of finding out what we believe to be true (Christou *et al.,* 2008).

3.2 RESEARCH APPROACH

In conducting a research, a qualitative and, or a quantitative approach can be adopted by a researcher. The simplest way to distinguish between qualitative and quantitative research technique is that qualitative methods involve a researcher describing kinds of characteristics of people and events without comparing events in terms of measurements or amounts, whereas, quantitative methods, on the other hand, focus attention on measurements and amounts (more and less, larger and smaller, often and seldom, similar and different) of the characteristics displayed by the people and events that the researcher studied.

Qualitative research is multi-method in focus, involving an interpretive, naturalistic approach to its subject matter. This means that, qualitative researcher study things in their natural settings, attempting to make sense of, or interpret phenomena in terms of the meanings people bring to them. It involves the studied use and collection of a variety of empirical materials, case study, personal experience, introspective, life story, and interview, observational, interactional, historical, and visual texts that describe routine and problematic moments (Denzin and Lincoln, 1994).

Quantitative research uses numbers and statistical methods. It tends to be based on numerical measurements of specific aspects of phenomena; it abstracts from particular instances to seek general description or to test casual hypotheses, it seeks measurements and analyses that are easily replicable by other researchers (King *et al.,* 1994). It also seeks explanations and predictions that will generalize to other persons and places. Careful

sampling strategies and experimental designs are aspects of quantitative methods aimed at producing general results (Glesne and Peshkin, 1992).

There is the need for the literature to contain a multitude of research methods that bear a multitude of labels and focus on diverse aspects of the research process. Both qualitative and quantitative methods can be used effectively in the same research project, but herein only a quantitative method has been adopted in this current research.

A quantitative approach was adopted for this study in order to measure the opinion of procurement practitioners in the road sector on the readiness of public procurement entities in Ghana for e-procurement. Similarly, the nature of the measurement and the scale used in the collection of data makes the adoption of a quantitative approach appropriate. The approach was adopted with the philosophical underpinning of social constructivism (Polit and Hungler, 1999). This approach was chosen to enable the study explore into greater details the issues captured in the scope of the research. The quantitative research approach enables respondents to be intensively engaged in responding to the questions geared towards the objectives of the study.

3.3 RESEARCH DESIGN

Research design has three common methods, the exploratory, descriptive and the explanatory research designs. Exploratory research is developed based on grounded theory which was intended as a flexible approach to formulate theory based upon generic principles of theoretical saturation, constant comparison method of analysis and theoretical saturation (Glaser and Straus, 1967). The exploratory research design also aims to explore the specific nature of a problem. Two other advantages of the exploratory research are the adaptability and flexibility to change (Saunders *et al.,* 2009). However, when using the

descriptive research, the goal is to reveal an accurate profile of events, persons or situations. The descriptive research can be related to both an extended version of exploratory and a piece of explanatory research design (Saunders *et al.*, 2009). The last method is the explanatory study. The explanatory design establishes relationship between studies and variables, meaning that the aim is to study situations or problems, trying to find a relationship between variables (Ibid). However, this research focused more on the descriptive aspects.

3.4 POPULATION AND SAMPLING PROCEDURES

This section considers the population of the study, the sample size and the sampling technique.

3.4.1 Population and Sample

The population of any research is made up of the individual units or an aggregate, that is the unit or the individuals that form the population whereas a sample is a section of the population selected randomly or otherwise to represent the population (Punch, 2000). This study was to determine the perspective of procurement practitioners in the road sector on the readiness of public procurement entities in Ghana for e-procurement. The population included civil engineers and quantity surveyors of the Department of Feeder Roads occupying the following key technical offices who were involved in or directly in charge of procurement and the implementation of procurement plans.

These people were therefore selected from each regional cluster to form the sample size of 48 for the study:

- Regional Manager
- Deputy Regional Manager

- Contracts Manager
- Operations Managers

3.4.2 Sampling Techniques

According to Saunders *et al.* (2009), purposive sampling enables the researcher to select cases that will best enable the researcher to answer research question(s) and to meet the research objectives. This form of sampling technique was used due to the fact that it included just the people who can provide particularly the information needed to meet the research objective.

Purposive sampling also increases the likelihood that variability common in this social phenomenon would be represented in the data. The purposive sampling technique is a non-probability sampling method which involves the conscious selection of certain subjects to be included in the study (Polit and Hungler, 1999).

The purposive sampling technique was used in identifying the key respondents, namely civil engineers and quantity Surveyors of the Department of Feeder Roads involved in the study. This was because the researcher required certain categories of respondents who had been involved in or directly in charge of procurement and the implementation of procurement plans to answer the questionnaires. Using the purposive sampling resulted in selecting civil engineers and quantity surveyors from the ten regional offices of the Department of Feeder Roads since the researcher believed that they were representative to the population of interest and could give practical and convincing answers to the questions asked.

Moreover, non-probability sampling designs are suitable in situations where the number of elements in the population is either unknown or cannot be individually identified (Kumar,

1999). In addition, Burns and Grove (2003) emphasize that these sampling methods enable the researcher to select specific subjects who will provide the most extensive information about the phenomenon being studied.

3.5 SOURCES OF DATA

Data for this study was gathered from both primary and secondary sources. The administration of questionnaires forms the basis of the primary data. Data from this source focused on the background characteristics of respondents and their knowledge on electronic procurement. The secondary data (literature review) was extracted from documented facts. The data extracted from literature formed the theoretical framework for the research.

3.6 DATA COLLECTION METHOD

Primary data was collected and used for the research. A questionnaire was developed to elicit information on the perceptions of respondents on the readiness of public procurement entities in the road sector for e-procurement implementation. The items were divided according to the objective of the research. A close-ended structured questionnaire was used for the data collection. The content of the questionnaire was clear and easy to understand. The layout made it easy to read and at the same time pleasant to the eye with a carefully designed sequence that made it easier to follow. Questionnaires were administered to the respondents and collected by the researcher after they have been completed within the given response time. Questionnaires were used because data collected using questions can be stable, constant and has uniform measure without variation. It also reduces bias caused by the researcher‘s presentation of issues.

3.7 PILOT TESTING OF DATA COLLECTION INSTRUMENTS

A pre-testing activity of the data collection instruments was carried out to test the adequacy of the questionnaire in eliciting the needed response. The focus was on the construction of the English language, validity and reliability of the questions. It was undertaken in two of the branches which were not part of the actual data collection exercise. The pilot study was very helpful to the researcher because it proved to the researcher whether the questions were eliciting the needed response required for the study. It also indicated to the researcher whether there would be follow-up questions aimed at clarifying some answers. This would make the researcher anticipate and prepare for the possible questions which made the survey very successful.

3.8 VALIDITY AND RELIABILITY OF DATA

The findings from the study gave credence to its validity and reliability. Saunders *et al.* (2007) observe that these two constitute the credibility of a study. Validity confirms if the findings actually represent what they purport (Ibid). Neuman (2006) refers to it as: ―the ability to generate findings beyond a specific study‖. For qualitative data analysis, he refers to validity as how the researchers' data and analysis accurately represents the realities in the field. He gives four points on the authentication and trustworthiness of a research project:

- Ecological Validity: how the researchers data represent the response of respondents and the extent to which the researcher serve to distract respondents.
- Natural Validity: in-depth account of a logical procedure

- Member Validation: confirmation of researcher‘s report by the elements he studied.
- Competent Insider Performer: researcher‘s participation as an element of studied population.

The validity of this study is rooted in the close alignment of the research questions, frame of reference and the design and purpose of the questions administered in the questionnaires distributed to customers. The data gathered directly addressed the issues raised in the research question. With a well- calculated approach to sampling, the administering of questionnaires to respondents, cross checking of data and alignment of the research questions to respondents‘ answers, the findings of the study reflected generally the perceptions of procurement practitioners in the road sector in Ghana of readiness of public procurement entities in Ghana for e-procurement.

The reliability of a study refers to, according to Yin: ―demonstrating that the operations of the study- such as data collection procedure- can be repeated with the same results‖ (Jung and Widmark, 2005). In this regard, the respondents of the questionnaires were treated with tact and the questions was administered meticulously so as not to influence any response. Simple language was used in the questionnaire to facilitate understanding in addition to thorough explanation of the purpose of the questionnaire. The steps employed to gather data was coherent and reinforced each other:

Table 3.1: Summary of Validity and Reliability

Validity	Reliability
Validity of data from different sources	Coherence of procedure

Validity of data from literature review	Appropriate sampling frame
Logical data collection procedure	Appropriate frame of reference

3.9 DATA ANALYSIS AND STATISTICAL CONSIDERATIONS

According to Sullivan (2001), data analysis can be the most challenging and interesting aspect of research. It refers to deriving meaning from the data that had been collected in a study. Data analysis assumes many forms. Quantitative data analysis involves the use of statistical methods to assemble, classify, analyze and summarize the data to derive meaning. As indicated earlier, field research was conducted to collect data from civil engineers and quantity surveyors of the Department involved in the study using questionnaires.

After the data collection, data reduction was conducted to select, arrange, refine, focus and summarize the data for onward analysis. The data collected was transformed into a form appropriate for manipulation and analysis. The data gathered from the questionnaire was edited to ensure completeness, consistency and accuracy.

Statistical Package for Social Sciences (SPSS) version 17 and Microsoft excel was used in processing primary data obtained through questionnaires survey. In analyzing the data, tables and figures and analytical tools such as descriptive statistics, one sample t-test and factor analysis was used. Quantitative explanations were then made of quantitative data to give meaning to them and to also explain their implications. From these, appropriate conclusions and recommendations were made from the findings of the research.

3.10 CHAPTER SUMMARY

In summary, this chapter addressed the research methodology of the study, explained the sample selection, described the procedure used in designing the instrument and collecting the data, and provided an explanation of the statistical procedures used to analyze the data.

The next chapter is devoted to the analysis and discussion of the survey results.

CHAPTER FOUR DATA ANALYSIS AND DISCUSSION OF RESULTS

4.1 INTRODUCTION

The essence of this study was to determine the readiness of public road entities in Ghana for a successful implementation of e-procurement.This chapter (chapter four) presents the data analysis and discussions of results on the data collected from respondents involving operations managers, engineers and Quantity Surveyors of the department of feeder roads in Ghana.

The study sampled forty eight (48) respondents comprising of operations managers, engineers and Quantity Surveyors of the Department of Feeder roads in Ghana. The tool used in collecting data was a structured close ended questionnaire. Data analysis tools used were the Statistical Package for Social Sciences (SPSS) and Microsoft excel. The data was presented and interpreted in line with the research objectives and questions. The analysis was done using descriptive statistics in terms of percentages, frequencies, mean scores and standard deviations and inferential analysis involving factor analysis and one sample t-test. The findings were presented in form of tables, percentages and figures.

4.2 QUESTIONNAIRES RETURN RATE

Out of the 48 questionnaires issued to the respondents in the study, 38 were completed and returned giving a 79.17% response rate. This high response rate is as a result of persistent

follow ups by the researcher to retrieve the questionnaires and the adoption of on the spot completion and retrieval of the questionnaires from the respondents.

4.3 ANALYSIS OF DEMOGRAPHIC CHARACTERISTIC OF RESPONDENTS

Although it was not part of the purpose of the study, this set of data was intended to describe demographic variables of the sample and to assess for any influence on the research findings. Demographics refer to qualities such as age, sex, income levels etc. relating to a set or particular group of people. For this study, the demographic data consisted of sex, age group, professional background, level of education, professional membership, rank, and position of respondents and years of working experience in the road construction sector by respondents. Table 4.1 and Figures 4.1 and 4.2 summarize the demographic profile of respondents.

From table 4.1, in terms of sex of respondents, 36 representing 94.7% of the respondents were males whiles 2 representing 5.3% were females. This is an indication that majority of the respondents involved in the study were males with only 2 females. The findings here are in support of the fact that the construction industry is dominated by males.

As can be seen from the Table 4.1, majority of the respondents are within the age category of 41-55 years (17, 44.7%), followed by those within the age category of 2540years (16, 42.1%) and finally by those within the age category of over 55years (5, 13.2%). This gives an indication that majority of senior employees at the department of feeder roads are very matured. 57.9% of the respondents fall under this category. This is because the condition of service with the Department of Feeder Roads is such that employees need to rise to higher positions which are most often dependent on the number of years of service.

With regards to the professional background of respondents, 63.2% representing the majority of the respondents indicated that they are civil engineers and the remaining 36.8% indicating that they are quantity surveyors by profession.

Looking at the educational level of the respondents, it is clearly seen from Table 4.1 that most of the respondents are MSc holders (22, 57.9%). This is followed by BSc holders (15, 39.5%). However it is quite surprising that none of the respondents are HND and CTC holders. This is an indication that the department rigorously implements the scheme of service and this is clearly evident in the respondents' high education. Thus all holding positions where they are directly or indirectly involved in procurement and the implementation of procurement plans can read and write.

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Table 4.1: Respondents' Demographic Profile

1.Sex of respondents	**Frequency**	**Percentage (%)**
Male	36	94.7
Female	2	5.3
Total	**38**	**100.0**
2. Age group of respondents		
41-55years	17	44.7
25-40years	16	42.1
over 55years	5	13.2
Total	**38**	**100.0**
3. Professional background of respondents		
Civil Engineer	24	63.2
Quantity Surveyor	14	36.8
Total	**38**	**100.0**
4. Level of education of respondents		
MSc	22	57.9
BSc	15	39.5
Other	1	2.6
HND	0	0.0
CTC	0	0.0
Total	**38**	**100.0**
5. Professional membership of respondents		
Ghana Institute of Engineers	25	65.8
Ghana Institute of Surveyors	12	31.6
Total	37	97.4
Missing System	1	2.6
Total	**38**	**100**
6. Position of respondents		
Regional Contracts Manager	12	31.6
Operations Manager	10	26.3
Deputy Regional Manager	8	21.1
Regional Manager	8	21.1
Total	**38**	**100**

Source: Field survey, 2014

Respondents were asked to indicate their membership of professional bodies if any. Out of the 38 respondents, 25 representing 65.8% of the respondents reported that they are

members of the Ghana Institute of Engineers. This constitutes the bulk of the respondents. 12 representing 31.6% also reported that they are members of the Ghana Institute of Surveyors (Table 4.1). The reason for this results may be that majority of the respondents earlier in Table 4.1 indicated that they are engineers. Finally in Table 4.1, for the respondents‘ positions, 31.6% of the respondents which is the majority indicated that they are regional contracts managers with the minority being regional managers (8, 21.1%). Respondents also indicated they have other positions including operations managers, deputy regional managers and regional managers. All of which belong to accredited and respective professional bodies as required by the scheme of service.

In addition to the demographics data presented in Table 4.1, respondents were further asked to indicate their ranks and years of working experience of respondents in the road construction sector. Data collected in response to these questions were subjected to descriptive analysis and summarized in Figures 4.1 and 4.2. From Figure 4.1, 31.6% of the respondents representing the majority are principal engineers, 26.3% are senior engineers, and 10.5% are principal quantity surveyors and others. However, very few (2.6%) have their rank as quantity surveyors. This shows that averagely all respondents who are directly or indirectly involved in procurement and the implementation of procurement plans are senior staff with years of working experience.

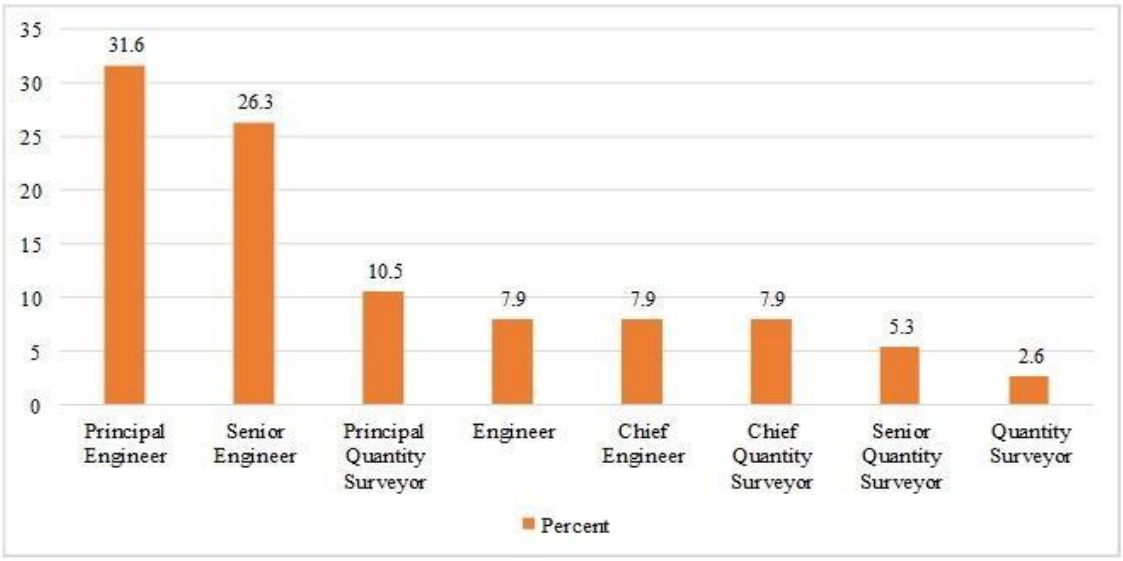

Figure 4.1: Percentage Distribution of Respondents by Rank

Source: Field survey, 2014

From Figure 4.2 below, majority of the respondents have had a long service experience with the road construction sector. As many as 89% having been in the sector 6 to10 years with 50% having been in the sector for 11 to 15 years and 39% for 16 and above years. The long working experience of the respondents in the sector will give the data a greater reliability and credibility.

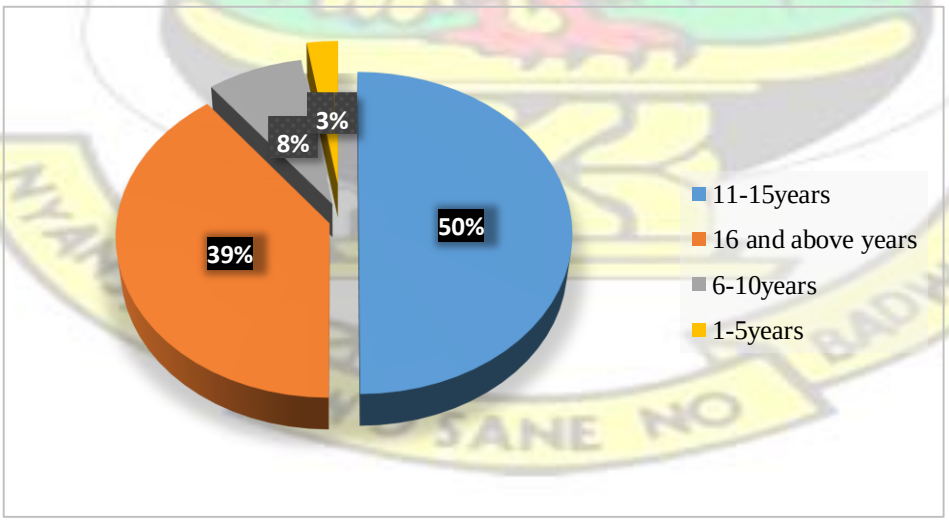

Figure 4.2: Years of Working Experience of Respondents in the Road Construction Sector

Source: Field survey, 2014

4.4 VALIDITY AND RELIABILITY TEST OF THE INSTRUMENT

Validity test implies ascertaining whether the research or the research instrument used in conducting the test of the research work is used in another place has the same or similar variables with the earlier data used, the result of the test will be very similar. Hence, reliability of a measurement can be said to be the extent to which a measurement is free from viable errors. This implies that a research methodology can be said to be reliable only when it produces the same result after repeated use. However, the reason for testing reliability of research work is to ensure that variability of the generalization of the conclusion (Bayode and Adebola, 2012).

Table 4.2: Reliability Statistics

Cronbach's Alpha	N of Items
.772	58

Source: Field Survey, 2014

Cronbach's alpha is a measure of internal consistency, that is, how closely related a set of items are as a group. It is considered to be a measure of scale reliability. The Cronbach's alpha coefficient, in this case is .772 (see Table 4.2). This value is above 0.7, so the scale can be considered reliable with our sample.

4.5 BENEFITS OF E-PROCUREMENT

E-procurement if properly and effectively managed and carried out can be very beneficial to an organization and vice versa. In this vein, this section of the questionnaire sought to give respondents the opportunity to show by indicating on a five point Likert scale, where

1=Strongly disagree, 2=Disagree, 3=Not sure, 4=Agree and 5=Strongly agree, their extent of agreement or disagreement that expected benefits of e-procurement listed in the survey questionnaire are indeed benefits of e-procurement or not. In analysing the data collected for the benefits of e-procurement, one-sample t-test was used in establishing the relative significance of the variables.

The one sample t-test is normally used to establish whether a sample mean is significantly deviant from a hypothesized mean or not (Ahadzie, 2007). The hypothesis for a single sample –test is typically set at:

Ho: U=Uo

Ha: U<, >Uo

Where, Ho represents the null hypothesis, Ha represents the alternative hypothesis and Uo represents the hypothesized or population mean.

Subsequently, a statistical t-test of the mean was carried out to determine whether the population considered a specific benefit to be significant or otherwise. The mean ranking of each factor tabulated to help express the consensus reached by the respondents. Thus, a summary of the test results presented in Table 4.3. In addition, the mean for each factor including the associated standard deviation and standard error mean are illustrated in Table 4.3. For each benefit, the null hypothesis was that the benefit was not significant (Ho: U= Uo) and the alternative hypothesis was that the benefit was significant (Ha: U>Uo), where Uo is the population mean. Hence, Uo represents the critical rating above which the factor is considered significant. For the purpose of this study, the rating scale adopted assigned higher ratings of 4 and 5 to agree and strongly agree respectively. 3 on the scale represent a neutral agreement and in this regard the Uo was fixed at an appropriate level of

3.5 with the significance level also set at 95% in accordance with orthodox risk levels. That is based on the five-point Likert scale rating, a success benefit deemed significant if it obtains a mean of 3.5 or more. Where two or more variables have the same mean, the one with the lowest standard deviation is assigned the highest significance ranking (Ahadzie, 2007).

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The standard error mean is the standard deviation of sample means as well as a measure of how likely a sample represents the population (Ahadzie, 2007). A large standard error (relative to the sample mean) indicates that there is a lot of variability between means of different samples whiles a small standard error indicates that most of the sample means are similar to the population mean, therefore the sample is likely to be an accurate reflection of the population (Field, 2005; Ahadzie, 2007). The standard error associated with all the means is relatively close to zero indicating that the sample chosen is an accurate reflection of the population (Table 4.3).

The fact that all the factors had standard deviations less than 1.0 (see Table 4.3) indicates that there was very little variability in data gathered and hence no or very little differences in how respondents interpreted the benefits. Alternatively, standard deviation values of less than 1.0 indicate consistency in agreement among the respondents of the reported level of results.

Table 4.3 One - Sample Statistics of Benefits

Benefits of e-procurement	**N**	**Mean**	Rank	**Std. Dev.**	**Std. Error Mean**
Simpler ordering	38	3.8421	14th	.67888	.11013
Reduced paperwork	38	4.3684	1st	.54132	.08781
Streamlining, decrease bureaucracy and errors	38	3.7632	18th	.71411	.11584

Standardization of processes and documentation	38	3.6316	22nd	.67468	.10945
Online reporting	38	4.0526	6th	.69544	.11282
Clearer and more transparent processes	38	4.1579	2nd	.71759	.11641
Ensured compliance with procurement laws and regulations	38	3.8947	11th	.95265	.15454
improved access to spending data	38	3.9474	9th	.65543	.10632
Easier access to information	38	3.9474	7th	.61281	.09941
Transparency of contract details	38	3.7895	17th	.70358	.11414
Elimination of buying out of contract (maverick buying)	38	3.5789		.72154	.11705
Supporting the development of centralized procurement administration	38	3.9211	10th	.53935	.08749
Cost and time savings through effective and efficient procurement	38	4.0526	5th	.61281	.09941
Encouraging cross border competition by reducing barriers	38	3.9737	8	.75290	.12214
Better monitoring of procurement	38	4.1316	3rd	.62259	.10100
Greater management control	38	3.8158	15th	.65162	.10571
Effectiveness and efficiency of organization	38	3.6579	21st	.66886	.10850
Improved customer satisfaction	38	3.7368	19th	.60109	.09751
Better integration of business process	38	3.7895	17th	.74100	.12021
Improved audit control and ensure proper authority of purchase	38	3.8684	13th	.81111	.13158
Administrative simplification which allows employees to master process	38	3.5526	23rd	.55495	.09002
Improved interaction, collaboration and opportunity sharing both within and outside the organization	38	3.7368	20th	.72351	.11737
Decentralization of procurement	38	3.8684	12th	.70408	.11422
Better communication which improve ability to coordinate remote process	38	4.1316	3rd	.62259	.10100

Source: Field survey, 2014

From Table 4.3, it is realized that all the factors identified as the benefits of eprocurement obtained mean scores greater than 3.5 which is the test value indicating that all the factors are significant benefits of e-procurement. However it is also revealed that although all the factors are deemed significant, the evidence of the factors obtaining different means indicates that the benefits do not have equal level of significance. In order of significance, the five (5) most significant benefits of e-procurement according to the findings of this study are as follows:

1. Reduced paperwork;
2. Clearer and more transparent processes;
3. Better monitoring of procurement;
4. Better communication which improve ability to coordinate remote process; and
5. Cost and time savings through effective and efficient procurement.

4.5.1 Reduced paperwork

Manual methods of conducting and managing procurement activities are generally known to involve a lot of documentations which are most often paperwork intensive. Thus relieving staff of the administrative burden of these paper chasing and automating tasks saves them time and therefore saves the organisation money. With the introduction of electronic procurement system (e-procurement), this remarkable disadvantage of the manual system is minimized or totally eliminated. Respondents agreed that reduced paperwork, among all the 23 benefits of e-procurement is the most significant. This is evident when respondents ranked this factor first (1^{st}) by obtaining the highest mean score of 4.3684 and standard deviation of .54132 (Table 4.3).

4.5.2 Clearer and more transparent processes

Preceded by reduced paperwork, clearer and more transparent processes emerged the second (2^{nd}) most significant benefit of e-procurement. Clearer and more transparent processes obtained a mean value of 4.1579 and a standard deviation of .71759 (Table 4.3). The study has revealed that with successful implementation of e-procurement, procurement processes would turn to be clearer and transparent. This increase in the level of transparency would promote fairness in the procurement process and build public and donor confidence in our procurement systems. This cannot in some way be said about the manual means since individual biases and selfish interest may influence the process.

4.5.3 Better monitoring of procurement

Procurement, if monitored properly can be a major influence on organizational success. The findings of the study have revealed that another significant benefit of e-procurement is better monitoring of the procurement process. With e-procurement the entire procurement process is monitored electronically, which means that offers, documents and answers to eligibility requirements, are automatically organized by the platform, in the same way for each supplier. Thus, it‘s faster and easier to compare the offers and access them in every phase of the process.

There is no risk of losing documents or confusing them with those presented by other suppliers, or even regarding a different tendering procedure.

Every event or activity regarding a procedure is tracked and available to every stakeholder at any time thus it is not as error prone as compared to manual monitoring by individuals within the organization. This benefit was ranked third by the respondents with a mean value of (4.1316) and a standard deviation of (0.62259).

4.5.4 Better communication which improve ability to coordinate remote process

Like better monitoring of procurement, better communication which improves ability to coordinate remote process was also ranked third by the respondents. These two benefits had equal mean scores and standard deviations indicating that their significance levels are the same. With the electronic process, there is better communication which promotes easier collaboration and knowledge sharing with other Public Boards. Also there is a more effective managing of bundled tendering procedures, like framework contracts.

Possibility of working from remote locations is enhanced thus managers can coordinate many tendering procedures more effectively because communication between parties involved in the procurement process is improved significantly.

4.5.5 Cost and time savings through effective and efficient procurement

Another benefit of e-procurement revealed by the findings of the study is cost and time savings through effective and efficient procurement. This benefit was ranked fifth (5^{th}) by the respondents. The factor obtained a mean score of (4.0526) and standard deviation of (0.61281). Cost and time savings is achieved through e-procurement as the automation simplifies and expedites procedures and also reduces ―administrative / bureaucratic‖ activities and redundancies among others.

4.6 FACTOR ANALYSIS FOR IMPLEMENTATION CHALLENGES OF EPROCUREMENT (BARRIERS TO IMPLEMENTATION SUCCESS OF EPROCUREMENT)

Based on the extensive number of dependent variables (i.e. 26 challenges), there is a possibility that some of the variables will result in effects which are directly related. A reduction technique is needed to ascertain which of the specific variables could be measuring aspects of the same underlying facet. According to Ahadzie (2007), factor

analysis is useful for finding clusters of related variables and thus ideal for many variables into fewer ones that can be more easily understood. During factor extraction, the shared variance of a variable is partitioned from its unique variance and error variance to reveal the underlying factor structure and hence only shared variance appears in the solution.

4.6.1 Initial Considerations

Factor analysis relies on the correlation matrix of the variables involved and the correlations usually need a large sample size before they are stabilized. The reliability of factor analysis is reliant on the size of the sample. A minimum of ten observations per variable is necessary to avoid computational difficulties (Decoster, 1998). A suitable choice is offered by SPSS to check whether the sample is big enough: the Kaiser-Meyer Olkin measure of sampling adequacy (KMO test). According to existing literature, the value of the KMO must be greater than 0.5. In reference to the data presented in Table 4.4, the data from the survey for the implementation challenges of e-procurement is adequate by these tests. The value of KMO test is greater than 0.5.

Table 4.4 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.553
Bartlett's Test of Sphericity	Approx. Chi-Square	574.708
	Df	325
	Sig.	.000

Source: Field survey, 2014

4.6.2 Data Screening/Preliminary Analysis

After all necessary tests of reliability and survey instrument, survey size adequacy and population matrix were satisfied, the data set was subjected to factor analysis using

principal component analysis (PCA) with varimax rotation. Preceding the principal component analysis, the communalities involved were first recognized. Communalities show how much of the variance in the variables has been accounted for by the extracted factors and it is extremely useful in deciding which factors to finally extract. From Table 4.5, the average of the extractions is 0.751.

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Table 4.5: Communalities

Implementation Challenges of E-procurement	Initial	Extraction
End-User Uptake and Training (User involvement, user support/communication, user training)	1.000	.801
Supplier Adoption (Supplier e-readiness)	1.000	.827
System Integration (sending and receiving of real time information to other information systems)	1.000	.861
Security and Authentication (security requirements)	1.000	.880
Re-engineering of existing purchasing processes (Transparency improvement & compliance with purchasing procedures)	1.000	.683
Lack of performance Measurement (Key performance Indicators)	1.000	.721
Lack of top management support (Management involvement & investment in organizational change)	1.000	.664
Change in Management Program (Identification and management of key stakeholders)	1.000	.832
Lack of common standards(Technical standards, content standards)	1.000	.694
Varying requirements of Multiple Departments	1.000	.585
Organizational resistance	1.000	.866
Lack of financial resources for maintenance & transaction handling	1.000	.630
Lack of resources from Government	1.000	.786
Lack of IT skills among employees	1.000	.663
Lack of cross-governmental coordination	1.000	.739
Wide range of items to be procured	1.000	.882
Complexity of procurement reforms procedures	1.000	.691
Lack of awareness and capacity building programs	1.000	.742
Resistance to change: Procuring agencies‘ reluctance to convert to e-procurement.	1.000	.829
Digitalization without procurement reform	1.000	.716
Technology can complicate rather than simplify procedures.	1.000	.605
Lack of e-Procurement Implementation Strategy (documented and executable strategies prior to the deployment)	1.000	.659
Costly technological solutions	1.000	.752
Difficulties in establishing & maintaining the system	1.000	.795

IT infrastructure and Internet readiness	1.000	.778
Improper Business Process Re-engineering (BPR)	1.000	.841

Extraction Method: Principal Component Analysis. Source: Field Survey, 2014

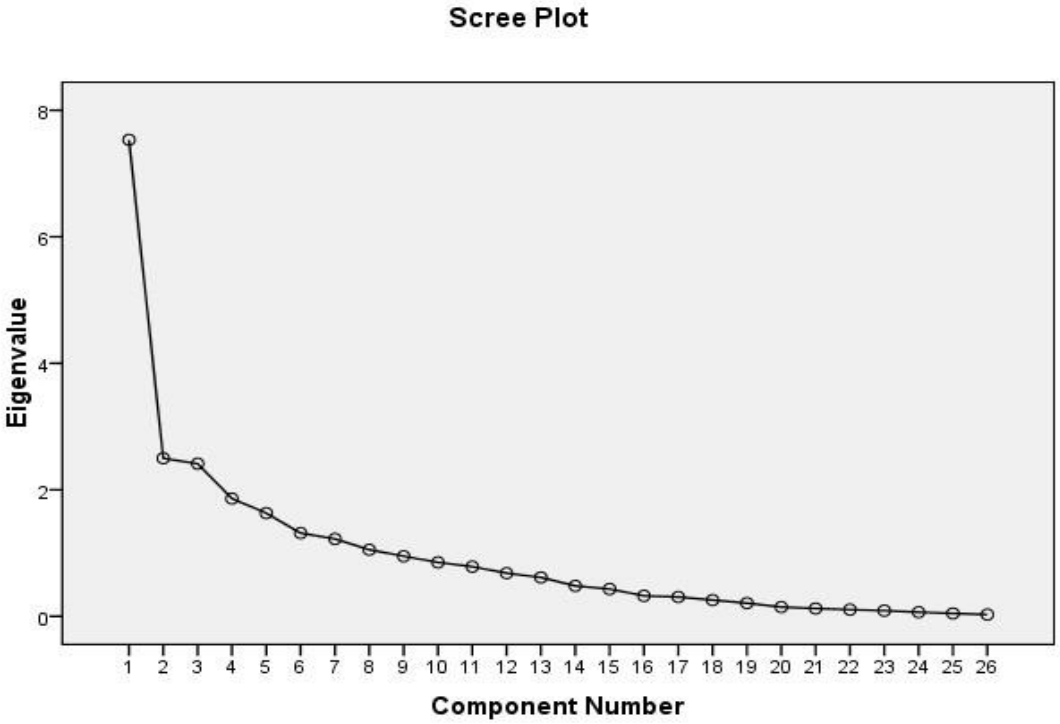

Figure 4.3: Scree Plot for Implementation Challenges of E-procurement

Source: Field Survey, 2014

The Guttmann-Kaiser rule and the Cattel scree test were used in determining the number of factors to be extracted. Guttmann-Kaiser rule suggests that only factors with an eigen value greater than 1 should be retained whilst the Cattel scree test suggests that all further components after the one starting the elbow should not be included. Applying these criteria on the number of principal components to be extracted suggests that eight (8) components should be extracted. As demonstrated in Table 4.6, and Figure 4.3, eight components were extracted

Table 4.6: Total Variance Explained

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.533	28.974	28.974	7.533	28.974	28.974
2	2.498	9.606	38.580	2.498	9.606	38.580
3	2.412	9.277	47.857	2.412	9.277	47.857
4	1.861	7.158	55.015	1.861	7.158	55.015
5	1.630	6.271	61.285	1.630	6.271	61.285
6	1.315	5.057	66.342	1.315	5.057	66.342
7	1.223	4.705	71.047	1.223	4.705	71.047
8	1.052	4.045	75.091	1.052	4.045	75.091
9	.949	3.649	78.741			
10	.852	3.277	82.018			
11	.784	3.014	85.032			
12	.681	2.620	87.652			
13	.614	2.361	90.013			
14	.480	1.848	91.861			
15	.430	1.653	93.514			
16	.322	1.239	94.753			
17	.305	1.172	95.925			
18	.255	.982	96.907			
19	.208	.799	97.707			
20	.145	.556	98.263			

21	.122	.471	98.734
22	.105	.402	99.136
23	.089	.342	99.478
24	.064	.245	99.723
25	.046	.175	99.898
26	.026	.102	100.000

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Extraction Method: Principal Component Analysis.

Source: Field Survey, 2014

The initial number of factors is the same as the number of variables used in the factor analysis. However, not all 26 factors will be retained. In this analysis, only the first 8 factors were retained. The initial eigenvalues are the variances of the factors. Because the factor analysis was conducted on the correlation matrix, the variables are standardized, which means that each variable has a variance of 1, and the total variance is equal to the number of variables used in the analysis, in this case, 26. The _Total' column contains the eigenvalues. The first factor always accounts for the most variance (and hence have the highest eigenvalue), and the next factor will account for as much of the left over variance as it can, and so on. Hence, each successive factor will account for less and less variance. The percentage of variance column contains the percent of total variance accounted for by each factor. The cumulative percentage column contains the cumulative percentage of variance accounted for by the current and all preceding factors. In this study, the first 8 factors accounted for 75.091. Together, the total components extracted cumulatively explained 75.091% of the variation in the data set and fulfills the cumulative proportion of variance criterion which states that the extracted components should together explain at least 50% of the variation.

The number of rows in the Extraction Sums of Squared Loadings panel of the table corresponds to the number of factors retained. In this study, they were 8 factors. The values in this panel of the table are calculated in the same way as the values in the left panel, except that here the values are based on the common variance. The values in the Rotation Sums of Squared Loadings panel of the table represent the distribution of the variance after the varimax rotation. Varimax rotation tries to maximize the variance of each of the factors, so the total amount of variance accounted for is redistributed over the three extracted factors.

Table 4.7: Rotated Component Matrix

Implementation Challenges of Eprocurement	**Component**							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
End-User Uptake and Training (User involvement, user support/communication, user training)	**.768**	-.030	.322	.199	.227	.053	.097	-.057
Supplier Adoption (Supplier ereadiness)	**.811**	.226	.221	.073	.126	.016	.118	.183
System Integration (sending and receiving of real time information to other information systems)	.338	.125	-.098	**.844**	.032	-.018	.085	.025
Security and Authentication (security requirements)	-.080	-.044	.001	.025	.008	.132	.075	**.921**
Re-engineering of existing purchasing processes (Transparency improvement & compliance with purchasing procedures)	-.084	.063	.090	.126	-.075	**.757**	.155	.214
Lack of performance Measurement (Key performance Indicators)	.195	.333	**.621**	.030	-.145	-.042	-.253	.314

Lack of top management support (Management involvement & investment in organizational change)	.027	.358	.445	.164	-.008	-.128	**.526**	.130
Change in Management Program (Identification and management of key stakeholders)	.012	.096	**.888**	.086	.056	-.011	.135	-.075
Lack of common standards(Technical standards, content standards)	**-.765**	.035	.053	-.088	.248	.135	-.039	.127
Varying requirements of Multiple Departments	.127	.008	-.170	.042	.333	**.647**	-.099	-.010
Organizational resistance	.071	-.019	-.071	.072	.158	.101	**.899**	.085
Lack of financial resources for	.463	.073	.260	-.051	-.061	.002	**.573**	-.093
maintenance & transaction handling								
Lack of resources from Government	.475	.313	**.658**	.021	.133	.033	.090	-.046
Lack of IT skills among employees	.249	.408	.357	**.546**	.054	.045	-.070	.003
Lack of cross-governmental coordination	.356	.000	.052	.276	**.557**	-.414	-.092	.209
Wide range of items to be procured	-.110	.016	.286	**.767**	.210	.343	.170	.090
Complexity of procurement reforms procedures	-.022	**.584**	-.003	.473	.261	-.116	-.109	-.177
Lack of awareness and capacity building programs	.381	**.638**	-.041	.219	.167	-.329	.058	-.020
Resistance to change: Procuring agencies‘ reluctance to convert to eprocurement.	-.049	.013	-.033	.033	**.892**	.092	.140	-.016
Digitalization without procurement reform	.299	**.506**	-.042	.337	.183	.424	-.088	-.185
Technology can complicate rather than simplify procedures.	.177	.246	.181	.238	**.559**	.319	.046	-.086

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Lack of e-Procurement Implementation Strategy (documented and executable strategies prior to the deployment)	**.573**	.383	-.082	.239	.205	.098	.244	-.090
Costly technological solutions	**.634**	.518	.034	-.042	.105	.212	-.142	-.051
Difficulties in establishing & maintaining the system	.262	**.654**	.420	.188	-.075	-.034	.259	-.116
IT infrastructure and Internet readiness	-.036	**.790**	.331	.087	-.032	.105	.149	.045
Improper Business Process Reengineering (BPR)	.110	**.710**	.356	-.174	-.020	.362	-.037	.186

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 11 iterations.

Rotated Factor Matrix table contains the rotated factor loadings (factor pattern matrix), which represent both how the variables are weighted for each factor and also the correlation between the variables and the factor. Because these are correlations, possible values range from -1 to +1. For orthogonal rotations, such as varimax, the factor pattern and factor structure matrices are the same. The columns under this heading are the rotated factors that have been extracted. From the Table 4.7, 8 factors were extracted. Names were assigned to all the grouped factors as presented in Table 4.8 below.

Table 4.8: Component Extraction Showing Descriptive Statistics

DESCRIPTION OF COMPONENT	**Mean**	**Std. Dev.**	**Rank**	**Factor loading**
Component 1: Organizational Challenges				
End-User Uptake and Training (User involvement, user support/communication, user training)	4.0000	.92998	1st	.768

Supplier Adoption (Supplier e-readiness)	3.9474	.86828	2nd	.811
Lack of common standards(Technical standards, content standards)	3.3421	.84714	5th	-.765
Lack of e-Procurement Implementation Strategy (documented and executable strategies prior to the deployment)	3.5526	.95003	4th	.573
Costly technological solutions	3.7895	.77661	3rd	.634
Component 2: Process Challenges				
Complexity of procurement reforms procedures	3.2368	.88330	6th	.584
Lack of awareness and capacity building programs	3.6842	.87318	3rd	.638
Digitalization without procurement reform	3.5263	.92230	5th	.506
Difficulties in establishing & maintaining the system	3.8947	.83146	1st	.654
IT infrastructure and Internet readiness	3.7895	1.11883	2nd	.790
Improper Business Process Re-engineering (BPR)	3.6053	.94553	4th	.710
Component 3: Performance and Resource Challenges				
Lack of performance Measurement (Key performance Indicators)	3.6579	.84714	2nd	.621
Change in Management Program (Identification and management of key stakeholders)	3.4474	.82846	3rd	.888
Lack of resources from Government	4.0789	.85049	1st	.658
Component 4: Competency Challenges				
System Integration (sending and receiving of real time information to other information systems)	3.8421	.71759	1st	.844
Lack of IT skills among employees	3.8421	.88612	2nd	.546
Wide range of items to be procured	3.3947	.78978	3rd	.767
Component 5: Operational Challenges				
Lack of cross-governmental coordination	3.7895	.66405	2nd	.557
Resistance to change: Procuring agencies‘ reluctance to convert to e-procurement.	4.0263	.54460	1st	.892

Technology can complicate rather than simplify procedures.	3.6053	.88652	3rd	.559
Component 6: Purchasing Challenges				
Re-engineering of existing purchasing processes (Transparency improvement & compliance with purchasing procedures)	4.7895	4.75427	1st	.757
Varying requirements of Multiple Departments	3.5263	.68721	2nd	.647
Component 7: Motivational Challenges				
Lack of top management support (Management involvement & investment in organizational change)	3.8684	.87522	3rd	.526
Organizational resistance	4.0000	.65760	2nd	.899
Lack of financial resources for maintenance & transaction handling	4.0263	.71610	1st	.573

Source: Field Survey, 2014

NB: Components 8 were excluded from the analysis since only one factor loaded well on the component.

4.6.3 Discussion

Component 1: Organizational Challenges

Component 1 comprised of 5 of the variables with 1 of them loading excellently well with 0.8 and the above. The remaining 4 variables also loading well above 0.57. The variables loaded onto this component with their respective eigenvalues of .768, .811, -.765, .573 and .634 are End-User Uptake and Training (User involvement, user support/ communication, user training), supplier Adoption (Supplier e-readiness), lack of common standards (Technical standards, content standards), lack of e-Procurement Implementation Strategy (documented and executable strategies prior to the deployment) and costly technological solutions respectively. The component accounted for 28.974% of the total variance and has been termed *organizational challenges*. End-User Uptake and Training (User involvement,

user support/communication, user training) was ranked 1st as the most significant challenge in terms of organizational challenges whereas lack of common standards (Technical standards, content standards) was revealed not to be significant since it obtained a mean value of less than 3.5 (see Table 4.8).

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Component 2: Process Challenges

This extracted component accounted for 9.606% of the total variance with 6 variables loaded unto it. The component has been termed *process challenges*. All the 6 variables loaded well with above 0.57. The component comprises the following variables: complexity of procurement reforms procedures, lack of awareness and capacity building programs, digitalization without procurement reform, difficulties in establishing & maintaining the system, IT infrastructure and Internet readiness, improper business process re-engineering (BPR). Among all these factors, difficulties in establishing and maintaining the system was ranked first (1st) as the most significant challenge to implementing e-procurement in terms of process challenges whereas complexity of procurement reforms procedures was revealed not to be significant since it obtained a mean value of less than 3.5 (see table 4.8).

Component 3: Performance and Resource Challenges

The third component extracted accounted for 9.277% of the total variance, loading unto it three of the variables with all the three variables loading well above 0.57. This component has been termed *performance and resource challenges.* Lack of performance measurement (Key performance Indicators), change in management program (Identification and management of key stakeholders) and lack of resources from government are the variables loaded unto this component. Lack of resources from government emerged as the most significant whereas change in management program (Identification and management of key stakeholders) is not significant.

Component 4: Competency Challenges

The variables loaded unto this component are system integration (sending and receiving of real time information to other information systems), lack of IT skills among employees and wide range of items to be procured. However, system integration (sending and receiving of real time information to other information systems) was ranked 1st whiles wide range of items to be procured was revealed as not a significant challenge under competency challenges. This component extracted accounted for 7.158% of the total variance and has been termed *competency challenges*

Component 5: Operational Challenges

This component loaded three variables which were all significant. The variables which were loaded on the fifth component are lack of cross-governmental coordination, resistance to change: Procuring agencies' reluctance to convert to e-procurement and technology can complicate rather than simplify procedures. This extracted component accounted for 6.271% of the total variance explained and has been termed *operational challenges.*

Component 6: Purchasing Challenges

This component loaded unto it only two variables which were all significant. The sixth component extracted accounted for 5.057% of the total variance explained and has been termed *purchasing challenges*. The variables loaded unto this component are reengineering of existing purchasing processes (Transparency improvement & compliance with purchasing procedures) and varying requirements of Multiple Departments.

Component 7: Motivational Challenges

The last component extracted accounted for 4.705% of the total variance explained and has only three variables loaded onto it. The variables loaded unto this component are lack of

top management support (Management involvement & investment in organizational change), organizational resistance and lack of financial resources for maintenance and transaction handling which were all significant but lack of financial resources for maintenance and transaction handling had the highest significance rank. The component has been termed motivational Challenges.

4.7 CHAPTER SUMMARY

Data analysis and discussions of the results have been presented in this chapter systematically and chronologically according to the items in the questionnaires. The purpose of the study was laid out together with the research objectives. Data was analyzed using computer programmes called SPSS and Microsoft excel. Descriptive statistics in terms of percentages, frequencies, standard deviations, mean scores and inferential analysis involving factor analysis and one sample t-test and figures and tabulations were added to summarize the results. The results were supported by references to the literature where applicable. The next chapter is devoted for presenting a summary of the findings, conclusions and recommendations drawn based on the findings of the study.

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CHAPTER FIVE SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

This study has focused on the readiness of public road entities in Ghana for a successful implementation of e-procurement. This chapter presents a summary of data findings obtained and also provide recommendations of possible solutions to identified problems based on the findings of the research. The summary of the findings is presented based on the research objectives and questions outlined in chapter one and the literature reviewed in chapter two of the dissertation. The chapter ends with a conclusion of the dissertation and recommendations for further research that can be conducted based on the conclusions and limitations of the study.

5.2 SUMMARY OF FINDINGS

The findings obtained from the research are summarized in this section. This is presented based on the research objectives. In respect of the research objectives, the study findings are summarized as follows:

5.2.1 Drivers for the implementation of E-procurement in public entities

Drivers in this section have been defined earlier in the study as benefits. After conducting this research it has been revealed that e-procurement has a lot of benefits if well implemented. Benefits of e-procurement were identified from literature and preliminary survey and listed in the survey questionnaires and given to respondents to rate on a five point Likert scale. The data generated was analyzed using one sample t-test and all the factors were found to be significant from the respondents‘ opinion. This is because the researcher set a test value of 3.5 and all the benefits obtained mean scores greater than the test value. However, there were 23 benefits of e-procurement identified which the study

revealed that their level of significance were not equal. Out of the 23 identified benefits, the study revealed the following benefits as the five (5) most significant benefits in order of significance: Reduced paperwork; Clearer and more transparent processes; Better monitoring of procurement; Better communication which improve ability to coordinate remote process; and Cost and time savings through effective and efficient procurement.

5.2.2 Barriers to the implementation of E-procurement in public procurement entities

This objective was solely achieved by the use of the survey questionnaires adopted in the study. The questionnaire captured 26 factors as the barriers to the implementation of eprocurement in public procurement entities in Ghana. Data collected from the field was subjected to factor analysis which extracted the factors in seven (7) major components. Names were then assigned to the components as organizational challenges, process challenges, performance and resource challenges, competency challenges, operational challenges, purchasing challenges and motivational Challenges. All the factors under the various components mentioned above were revealed by the study to be significant barriers to the implementation of e-procurement in public procurement entities with the exception of a few. The significant barriers includes, end-user uptake and training (User involvement, user support/communication, user training), supplier Adoption (Supplier ereadiness), lack of e-Procurement Implementation Strategy (documented and executable strategies prior to the deployment), costly technological solutions, lack of top management support (Management involvement & investment in organizational change), organizational resistance and lack of financial resources for maintenance and transaction handling, etc.

5.2.3 Analyzing the benefits and barriers of E-procurement with the view to determine whether the implementation would be a success

The challenges identified with the implementation of e-procurement as well as the benefits were also analyzed to determine whether the implementation of e-procurement will be a success to the organization or not. With the findings of the study, it is revealed that there are a number of significant barriers to the implementation of e-procurement which gives a clear indication that the Department of Feeder Roads is still not ready for a successful implementation. However with proper management and elimination of these barriers through government initiative, e-procurement will produce the compelling benefits identified in the study.

5.3 CONCLUSION TO THE STUDY

E-procurement can be a powerful concept for the success of any entity. It paves way to maintain better monitoring of procurement process, better communication which improves the ability to coordinate remote process and cost and time savings through effective and efficient procurement. From the research study, it is evident that eprocurement must be implemented in public procurement entities in Ghana and the eprocurement process has to be systematic. The study further reveals that e-procurement is beneficial to organizations who implement it. Benefits such as encouraging cross border competition by reducing barriers, effectiveness and efficiency of organization, better integration of business process, improved audit control and ensure proper authority of purchase and administrative simplification which allows employees to master process are derived from e-procurement. This is not to say that the implementation of e-procurement therefore has no barriers. The study has revealed that there are barriers to a successful implementation of e-procurement.

In conclusion, the researcher would like to maintain that e-procurement is a tool that can have a significant influence on organizational success.

5.4 RECOMMENDATIONS

After conducting a research on e-procurement, and based on the findings of the study, the researcher will like to make the following recommendations to concerned bodies:

1. Adequate finance must be made available in organizations who wish to implement e-procurement since lack of finance was identified in the study as one of the barriers to the implementation of e-procurement.
2. Government must provide adequate resources to support entities implementing the e-procurement system.
3. Organizations must provide adequate IT education for their employees to enhance the implementation.
4. Technology has a major impact on e-procurement. Therefore institutions must develop and maintain a good IT structure to satisfy employees' needs.
5. The government must make a conscious effort to ensure that the service providers (suppliers) at the other end of the continuum are well tooled through the provision of reliable access hubs and education.

5.5 DIRECTIONS FOR FURTHER RESEARCH

This research exposes a number of areas, which need research attention. The following recommendations are made for future research:

1. Future research on benefits of e-procurement to public entities.
2. Future research on barriers to the implementation of e-procurement in public

entities.

3. Future research on the effect of technology on the implementation of eprocurement in both private and public entities.

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APPENDICES

APPENDIX I: QUESTIONNAIRE

The study that underpins this questionnaire is to collect data on the expected Benefits and Challenges to the implementation of E-procurement in Public procurement entitiesin Ghana.

Please kindly respond to all the questions by ticking ☑ in the appropriate option in the box provided for each question and write briefly where required. Please note that all information provided shall be used strictly for this study and shall not be disclosed to any third party.

Demographic data

i. Sex ❑ M ❑ F ii.

Age group

 under 25yrs ❑ 25 – 40yrs ❑ 40 – 55yrs ❑over 55yrs iii.

Professional Background of respondent:

 Civil Engineer ❑ Quantity Surveyor ❑ Geodetic Engineer

❑Materials Engineer ❑ Other

Other please state:……

iv. Level of education of respondent:

❑ CTC ❑ HND ❑ BSc. ❑MSc. ❑ Other

Other please state:……

v. Professional Membership

❑ Ghana Institution of Surveyors ❑ Ghana Institution of Engineers ❑ Other

Other please state:……

vi. What is your rank? ❑ Asst. Eng.❑ Eng.❑ Senior Eng.❑ Principal Eng.

❑ Chief Eng. ❑ Asst.Q/S ❑ Q/S ❑ Senior Q/S

❑ Principal Q/S ❑ Chief Q/S

vii. What is your position? ❑ Reg. Manager ❑ Deputy Reg. Manager

❑ Contracts Manager ❑ Operations Manager

viii. Years of working experience in the Road Construction Sector

❑ < 1 year ❑ 1-5years ❑ 6-10years ❑ 11- 15years ❑ 16 and above

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PREAMBLE

E-procurement is the term used to describe the use of electronic methods, typically over the Internet to conduct transactions between awarding authorities and suppliers. It replaces the traditional manual paper based process.

The process of e-procurement covers every stage of purchasing, from the initial identification of a requirement, through to the tendering process, to the payment and potentially the contract management phase.

1. Expected Benefits of e-procurement

Will the above method promote the following?

Use the scale: 1.strongly disagree 2 .Disagree 3. Not sure 4. Agree 5.Strongly agree

	Benefits of e-procurement	**1**	**2**	**3**	**4**	**5**
i	Simpler ordering					
ii	Reduced paperwork					
iii	Streamlining, decreased bureaucracy and errors					
iv	Standardization of processes and documentation					
v	Online reporting					
vi	Clearer and more transparent processes					
vii	Ensured compliance with procurement laws and regulations					
viii	Improved access to spending data					
ix	Easier access to information					
x	Transparency of contract details					
xi	Elimination of buying out of contract(maverick buying)					
xii	Supporting the development of centralized procurement administration					

Use the scale: 1.strongly disagree 2 .Disagree 3. Not sure 4. Agree 5.Strongly agree

	Benefits of e-procurement	**1**	**2**	**3**	**4**	**5**
xiii	Cost and time savings through effective and efficient procurement					
xiv	Encouraging cross border competition by reducing barriers					
xv	Better monitoring of procurement					
xvi	Greater Management Control					
xvii	Effectiveness and efficiency of organization					
xviii	Improved customer satisfaction					
ixx	Better integration of business process					
xx	Improve audit control and ensure proper authority of purchase					
xxi	Administrative simplification which allows employees to master process					
xxii	Improved interaction, collaboration and opportunity sharing both within and outside the organization					
xiii	Decentralization of procurement					
xiv	Better communication which improve ability to coordinate remote process					

Additional Comments……

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2. Implementation Challenges of e-procurement

How significantly will the following affect the successful implementation of eprocurement in your department?

Use the scale: 1. Insignificant 2. Slightly Significant

3. Quite Significant 4. Very Significant 5. Extremely Significant

	Barriers to implementation success	**1**	**2**	**3**	**4**	**5**

i	End-User Uptake and Training (User involvement, user support/communication, user training)					
ii	Supplier Adoption (Supplier e-readiness)					
iii	System Integration (sending and receiving of real time information to other information systems)					
iv	Security and Authentication (security requirements)					
v	Re-engineering of existing purchasing processes (Transparency improvement & compliance with purchasing procedures)					
vi	Lack of performance Measurement (Key performance Indicators)					
vii	Lack of top management support (Management involvement & investment in organizational change)					
viii	Change in Management Program (Identification and management of key stakeholders)					
ix	Lack of common standards(Technical standards, content standards)					
x	Varying requirements of Multiple Departments					
xi	Organizational resistance					
xii	Lack of financial resources for maintenance & transaction handling					
xiii	Lack of resources from Government					
xiv	Lack of IT skills among employees					
xv	Lack of cross-governmental coordination:					
xvi	Wide range of items to be procured					
xvii	Complexity of procurement reforms procedures					
xviii	Lack of awareness and capacity building programs					
ixx	Resistance to change: Procuring agencies‘ reluctance to convert to e-procurement.					
xx	Digitalization without procurement reform					
xxi	Technology can complicate rather than simplify procedures.					

Use the scale: 1. Insignificant 2. Slightly Significant

3. Quite Significant 4. Very Significant 5. Extremely Significant

	Barriers to implementation success	**1**	**2**	**3**	**4**	**5**
xxii	Lack of e-Procurement Implementation Strategy (documented and executable strategies prior to the deployment)					
xxiii	Costly technological solutions					

xxiv	Difficulties in establishing & maintaining the system					
xxv	IT infrastructure and Internet readiness					
xxvi	Improper Business Process Re-engineering (BPR)					

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Additional Comments…….

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THANK YOU

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APPENDIX 2:

A TYPICAL ORGANOGRAM

KEY POSITIONS AND ROLES

REGIONAL OPERATIONS