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KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY,

KUMASI

COLLEGE OF ARCHITECTURE AND PLANNING

DEPARTMENT OF BUILDING TECHNOLOGY

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**AN EXPLORATORY STUDY INTO THE SUCCESSFUL IMPLEMENTATION
OF E-PROCUREMENT BY MMDAs IN GHANA: A CASE STUDY OF
CENTRAL REGION**

BY

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BSc (BUILDING TECHNOLOGY)

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**A THESIS SUBMITTED TO THE DEPARTMENT OF BUILDING
TECHNOLOGY IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR
THE AWARD OF
MASTER OF SCIENCE IN PROCUREMENT MANAGEMENT,**

NOVEMBER, 2013

DECLARATION

I hereby declare that this submission is my own work towards the MSc 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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ABSTRACT

Procurement in this country has been designed to eliminate or minimize the corruption often common in the public sector. This is aided with the introduction of procurement Act 663,2003 to actually harmonise and guide all procurement conducted in the public sector. Ghana is feverishly working towards decentralization in the country; the MMDAs must therefore be equipped to handle all procurement activities themselves. The traditional approach to procurement has allowed public officials to manipulate the procurement system. Also International bidders find it difficult to bid when they actually qualified to do so. This cumbersome system of procurement has necessitated the use of electronic procurement. This system of procurement has been established to be fast and reliable putting in place all protections of tender. This research explores the potential for the adoption of e-procurement by MMDAs in Ghana. There was a review of literature and interviews of procurement officers and MMDA engineers to identify the current practices of electronic procurement. The semi-structured interview was also used to identify the opinions of both engineers and procurement officers on electronic procurement practices. It was identified that there is a low usage of electronic procurement by the MMDAs. However, most of the procurement officers are aware and are willing to adopt such new system if all the facilities and training are put in place. It was also discovered that not all the MMDAs are connected to the Internet regularly, which makes the electronic procurement process difficult. Nevertheless, most MMDAs saw electronic procurement to be a much more transparent and less costly if implemented. It has been recommended from the findings of literature and interviews that, education of professionals should be a topmost priority before adopting the use of electronic procurement. The Internet, which serves as the medium of communication, was considered as one of the major factors for the successful adoption of E-procurement. Moreover, E-procurement can be done on pilot basis to know the possible drawbacks during its adoption and implementation. A of how electronic procurement can be adopted by MMDAs has been recommended for further study.

ACKNOWLEDGEMENT

I am most grateful to my supervisor Dr. Emmanuel Adinyira for the guidance, directions and advice that enabled me to carry out this dissertation. I would like to say thank you.

I would like to acknowledge Architectural and Engineering Services Limited (AESL), for supporting and allowing me to attend my MSc programme.

I am most grateful to all my respondents for taking time off their busy schedules to give me the necessary information. Your contribution is deeply appreciated.

My special thanks would go to my parents, Alhaji Mohammed Tahiru and Hajia Amaama Abdullah, and my brothers, sisters for their immense love and support throughout my programme. I say a big thank you.

I would like to give my thanks to Mr. Joseph K. Afful, Mr. Emmanuel Oduro Asare, Vida Osarfo and Mariam Ahmed for their help and motivation.

I would like to give special thanks to the Almighty Allah, for his love and protection throughout my entire life. I give him praise and honour.

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Abbreviations/ Acronyms	Terms
AESL	Architectural and Engineering Service Limited
AGM	Agency of Government Management
B2B	Business to Business
BDA	Bulletin of the Adjudication
DOC	Microsoft MS Word document (.doc)
DTC	Dynamic Trade Centre
EC	European Commission
EDI	Electronic Data Interchange
e-GP	Electronic Government Project
EOF	Electronic Order fulfillment
EC	Electronic Commerce
EP	Electronic Procurement
EPS	Electronic Payment and Settlement
EPI	Electronic Procurement Innovation
EU	European Union
FedICT	Federal Public Services of Information and Communication Technology
GE	General Electric
GM	General Motors
ICT	Information and Communication Technology
IT	Information Technology
ITT	Invitation to Tender
KPIs	Key Performance Indicators
MMDA	Metropolitan, Municipal and District Assembly

Abbreviations/ Acronyms	Terms
MoD	Ministry of Defence
MRO	Maintenance, repair and Operating
OGC	Office of Government Commerce
PPA	Public Procurement Authority
PDF	Portable Document Format
PQQ	Pre-Qualification Questionnaires
RFP	Request for Proposal
SCM	Supply Chain Management
SDLC	System Development Life Cycle
SFs	Success Factors
SSL	Secure Sockets Layer
UK	United Kingdom
USA	United State of America
TPN	Trading Process Network
VAN	Value Added Network
VFM	Value for Money
XLS	Microsoft MS Excel spreadsheet (.xls)
XML	Extensible Markup Language

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

Procurement processes and procedures in Ghana have gone through a number of changes. The main objective was reducing or at best eliminating corruption in public procurement, realizing value for money and efficiency in the procurement process among others. A major change was the passing of the Procurement Act, Act 663, in 2003(PPA 2010).

As much as the usage of Act 663 has streamlined procurement processes in the country as well as establishing a high level of sanity in the procurement environment, it's entirely manual base has led to some procurement practitioners calling for the establishment of E-Procurement in the country. E-Government Procurement (e-GP) also referred to as E-Procurement is defined as a comprehensive process in which governments use IT systems (including the Internet) to establish agreements for the acquisition of products or services. The Internet's rapid growth has driven many governments to add an electronic commerce component to their operations to gain competitive advantage. Business-to-business online procurement has recently emerged as one of the hottest topics in the world of commerce and technology (PPA 2010).Ghana is currently implementing the e-Ghana project to enhance the use of technology in government's dealings with the public. It is therefore imperative that e-Procurement is adopted as one of the applications of the e-Ghana project (PPA 2010).

Advancements in information and communication technology (ICT) have made possible fundamental changes in the methods of practice of all businesses and industries. It is now a fact that the much-anticipated global village is a reality. The amount of business conducted electronically has reached hundreds of billions of dollars, and there is little doubt that the emergence of the Internet is continually revolutionizing access to communication and information (Christianson, 2003; Kajewski&Weippert, 2004). The construction industry has been one of the most impacted by these radical changes. Construction industry professionals now aim at paralleling the level of use of ICTs by other industries in the performance of their activities (Ibidapo, 2000).

Tendering is one of the aspects of the procurement process where information technology is useful. Tendering electronically can empower construction industry professionals with the means to take ~~more~~ control over the elements of tendering, providing improved and secure access to tender information to construction industry practitioners (Davila et al; 2002; Henriksenetal;2004). Despite the managerial and administrative benefits e-tendering offers to the procurement process in the

Ghanaian construction industry, there are still numerous setbacks (Blacketal;2005). Awareness about e-procurement is an essential factor in promoting widespread acceptance and usage of e-procurement as a better alternative to the traditional paper-based process. The lack of awareness among other factors has been classified as a specific barrier to the growth of construction collaboration environments (Lou &Ashalwi, 2009).

Furthermore, a serious subject of doubt is that the availability of the facilities necessary for participation in e-procurement by industry practitioners is in question. Most professional practices in Ghana make use of stand-alone computers running few application packages for word processing and spread sheeting. A moderately high level of proficiency in the use of ICT tools is also a pre-requisite for the use of e-procurement facility by stakeholders. This is necessary since several technicalities are usually involved in forming and managing electronic collaborative relationships between professionals with often-diverse interests and contributions. It is also one of the factors that affect the success or otherwise of an e-procurement system (Lou &Ashalwi, 2009).The necessary requirements in terms of proficiency are far from being met. This is indicative of a gap in skill as mapped out in the work of Oyediran&Kalu (2005).

The procurement process has traditionally involved slow manual procedures and even slower systematic processes for handling procurement transactions (Hawkingetal;2004). E-procurement has had an increasingly important role in business-to-business (B2B) commerce. Web-enabled B2B e-commerce enhances inter-organizational coordination resulting in transaction cost savings and competitive sourcing opportunities for the buyer organization (Subramaniam& Shaw 2002). Nevertheless, despite the proliferation of literature dedicated to theory andpractice, most of the contribution delivers only partial solutions regarding general rules of behavior. Supply managers now need to understand the impact of technology and gain competency in making a business case for e-procurement (Presutti,2003).

In recent years organizations are becoming more discerning about e-procurement decisions that need to be made and how they respond to the multitude of pressures and influences.

Civil societies play an important 'watchdog' role in any society. Turning a procurement department into an e-procurement environment is a difficult proposition, but organizations that can manage it can reap huge rewards. E-procurement, which is defined as the process of electronically purchasing the goods and services required for an organization's operation, offers a real-time platform for conducting business while providing a significant opportunity to reduce costs, increase organizational effectiveness, and enhance customer service(PPA,2011). However, establishing and implementing E-procurement system calls for substantial planning to develop solutions that integrate the strategy, technology, processes, and people that are involved.

A number of public sector agencies worldwide have identified Electronic Procurement (E-Procurement) as a priority in Government agenda and have implemented or are in the process of implementing buy side E-Procurement systems. However, the scholarly evaluation of e-Procurement initiatives, especially in relation to the use of Success Factors (SFs) in e-Procurement is very limited (Birks et al;2002).

1.2 STATEMENT OF PROBLEM

Although the Procurement Act, 663,2003 has systematically laid down various procurement processes traditionally, it appears that the public sector go through a lot of lengthy bureaucratic processes in acquiring goods, works and services. The procurement process has traditionally involved slow manual procedures and even slower systematic processes for handling procurement transactions (Hawking, et al;2004). This, according to Nketia-Asante (2009), leads to low productivity, inefficiency and loss of money, and detrimental effect on government budget. Some Consultants, Contractors and Suppliers dealing with the public sector have complained about the cumbersome nature of the procurement procedures and long delays from advertisement through pricing to contract delivery or closure.

E-procurement is a powerful tool for saving time and reducing in the construction industry. However, despite the numerous benefits to be obtained from e-tendering, it seems the adoption and implementation of it is becoming a mirage. This research is therefore aimed at assessing the factors that would make the adoption and implementation of e-procurement a reality.

1.3 RESEARCH QUESTIONS

A genuine desire to successfully achieve the implementation of e-procurement at the Public Sector in Ghana would require candid answers to these questions and genuine actions taken to address the problem areas.

1. What factors are likely to make the adoption and implementation of e-procurement possible?
2. Are there any benefits to be accrued from the implementation of e-procurement?
3. What are the likely constraints to the implementation of e-procurement?
4. What is the state-of-the art of e-procurement in Ghana?

1.4 SIGNIFICANCE OF STUDY

The outcome of this research will enable both PPA and the public agencies to efficiently and effectively on timely basis procure goods, works and services without necessarily going through the bureaucratic procedures when using the traditional methods. The research outcome will also help the public sector, in Ghana to carefully consider the various success factors before implementing E-procurement. The implementation of E-procurement will however enhance governance in terms of transparency and accountability and will also enhance economic development through infrastructural development and capacity building.

1.5 AIM OF RESEARCH

The research aims to explore the potential for the adoption of e-procurement by MMDAs in Ghana.

1.6 OBJECTIVES

In order to achieve the aim of the research, the following objectives have been set

- To establish the state-of - the - art with regards to e-procurement among MMDAs in Ghana
- To determine the benefits MMDAs stand to get from the successful adoption of E-procurement.
- To determine the likely constraints to the implementation of e-procurement by MMDAs.
- To determine the infrastructure requirements for the successful adoption of e-procurement by MMDAs.

1.7 JUSTIFICATION FOR THE STUDY

In this Global era of ever fast Internet communication and transactions, tendering cannot rely on its traditional style of procuring and communicating information to its stakeholders. It is therefore necessary for a new way to be devised to further enhance and expedite action on procuring works; goods and services to increase value for money (VFM), encourage good governance and also increase fairness and efficiency.

Procurement Act, 663(2003), was enacted eight (8) years to create common platform for all eligible tenders to bid. The overall objective of the public procurement system is to provide value for money to the Government by ensuring that public funds are spent in transparent, efficient and fair manner.

However, the manual process involved in implementation of the Act 663, (2003) has left much to be desired, with complaints from major stakeholders, especially tenders. Their major concerns are

- Cumbersome procedures to follow during procurement.
- Involves a lot of paper work
- Traditional process of procurement are expensive and
- Risky

It is in view of this that this research is being carried out to examine the various factors that would make it possible to adopt and implement E-procurement successfully.

1.8 SCOPE OF STUDY

This research was focused on the state of E-Procurement. Questionnaire distribution was limited to public agencies, contractors, consultants and suppliers, found within Cape Coast in the Central Region of Ghana and was focused on mainly soliciting their views on factors likely to make the adoption and implementation of e-procurement feasible.

1.9 LIMITATIONS

One of the main challenges faced by the researcher was getting enough respondents to have enough time to actively involve themselves in the survey. Most of the professionals approached were not willing to take part in the survey, due to time constraints. The researcher however, managed to gather a lot of data from the MMDAs.

1.10 RESEARCH METHODOLOGY

Explanatory research was used for this study. Data was collected from Engineers and Procurement Authorities through well-structured questionnaires. Questionnaires were then analyzed and the results made available with recommendations and conclusions.

1.11 STRUCTURE OF DISSERTATION

Chapter1:The first chapter provides background information of the study, which includes introduction, problem statement, research questions and objectives, justification, and scope of the study.

Chapter2: Literature review, this reviewed existing literature on e-procurement, success factors influencing the adoption and its implementation.

Chapter3: Research design and Methods, this described the evaluation of the methods, techniques and procedures used in the research. There was review of literature and semi-structured questionnaires. There was Content analysis of the questionnaires accounts and themes identified for analysis. Data sources and Sampling, was also presented in this chapter.

Chapter 4: Results and Analysis, this chapter described the detailed and deeper analysis of the findings. There was interpretation of findings and patterns that had emerged were discussed.

Chapter 5: Conclusion and recommendations, this was a summary of the main findings as a series of statements. Conclusions and directions for further research were drawn and recommendations made.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter is a review of literatures on public sector procurement requirement, public sector traditional tendering, e-procurement in the public sector, barriers to successful e-tendering implementation, survey of success factors and e-procurement success factors. This chapter critically reviews other researchers work in these fields and identify themes that will be used to for further analysis with the data that will be collected from the surveys. The review of literature also fulfills the objective of the study, which is to review literature on success factors influencing the adoption and implementation of e-procurement in the public sector.

2.2 PUBLIC SECTOR PROCUREMENT REQUIREMENTS

Public procurement is an important function of government (Thai, 2001). It has to satisfy requirements for goods, works, systems, and services in a timely manner. Furthermore, it has to meet the basic principles of good governance: transparency, accountability, and integrity (Wittig, 2003; Callender&Schapper, 2003). Another main principle of governments is to achieve value for money in procurement (DOF, 2001). However, public procurement has been a neglected area of academic education and research, although governmental entities, policy-makers, and public procurement professionals have paid a great deal of attention to procurement improvements and reforms (Thai, 2001).

Conventional wisdom suggests that government procurement differs from private procurement. Public sector procurement is large and complex, accounting for between twenty (20%) and thirty (30%) percent of gross domestic product (Thai & Grimm, 2000) and traditionally attempts to meet many social and political objectives (Tether, 1977). Governments procure goods and, in order to preserve accountability and transparency services, use a complex contractual system designed to protect the public interest (Rasheed, 2004). While private sector procurement is practiced under the sponsorship of each individual firm's governance policies, public sector procurement must operate within a range of regulations and policies established to accomplish desirable social (Tether, 1977) as well as economic (OCIO, 2000), financial, and public audit requirements.

Government procurement officials issue requests for bids and/or proposals with product or service specifications that are unique to each contracting event and economies of scale are difficult to achieve (Rasheed, 2004). There are also bargaining and opportunism costs of governance unique to public procurement that result in high transaction costs (Globerman & Vining, 1996).

A core difference is the relationship between the buyer and the supplier in each entity. In the public sector, the buyer attempts to include as many sellers as possible in order to broaden competition and maximize opportunities for value for money whereas, in the private sector, buyers may seek to use a small number of suppliers based on trusted relationships in order to minimize operating risks (OCIO, 2000). Governments are also obliged to disclose purchasing and contracting information to the public, including details about the outcome of government contracting decisions. While government procurement policies and legislation have been established to limit discrimination in government procurement, it is unclear how successful they have been (Rasheed, 2004).

Thai (2001) views the public procurement system from three perspectives: the nested structure of systems within systems, organizational structures within organizational structures, and many independent procurement systems. MacManus (2002) notes the need to re-examine the four key principles of lowest price; demonstrable separation of buyer and seller; fixed term, fixed price contracts; and accountability and transparency that have guided public procurement over the past few decades. These diverging views and established principles may need to be examined as public procurement becomes more sophisticated and enabled.

2.3 E-COMMERCE AND THE INTERNET

Electronic Commerce (EC) and Supply Chain Management (SCM) are fundamental strategic concepts when businesses are forging links with their suppliers and customers. On the evolution from the old to the 'new economy', many mature industries are being transformed. This is reflected in the deconstruction of value chains (Evans & Wurster, 1999), the rise of new intermediaries, such as Amazon in book retailing (Hagel & Singer, 1998; Giaglis et al, 1999), new business rules (Kelly, 1998), and new requirements to meet customer demand in terms of speed, availability, cost and service (Rodin & Hartmann, 1999).

Although first EC systems had been developed back in the 1960s (e.g. Videotext, Computer Reservation Systems and Electronic Data Interchange), significant momentum was lacking until the emergence of Internet technologies. Today, EC is omnipresent and attributed considerable economic impact.

This is also reflected in the definitions which see EC “as the entire collection of actions that support commercial activities on a network” (Adam & Yesha, 1996) or as any form of economic activity conducted via electronic connections (Wigand, 1997). To identify the main EC processes, a transaction-oriented perspective is widespread in the literature. Transactions link the activities of buyers and sellers and can be broken down into various phases. (Malone et al; 1987; Schmidt& Lindeman, 1998; Chester & Kaura, 1998)

- **Information.** At the beginning of a transaction is the identification of vendors and products. Typically, EC encompasses fixed and flexible price transaction scenarios. The former include catalog-based buying from single vendor or multi-vendor catalogs and the latter electronic auctions.
- **Contracting.** Once vendor and product have been determined, negotiation and decision-making concerning a specific product occurs in the contracting phase. Allocation rules are used, e.g. hit-and-take in catalog-based transactions and price-time priority in auction-based transactions.
- **Settlement.** Based on a legal contract, the finalized order is entered and delivery and payment of the selected goods are initiated.

Most EC solutions have evolved to support sales and procurement transactions. Sell-side EC primarily comprises electronic product catalogs, which permit browsing through, configuring and ordering of goods from one or more vendors. Well-known systems are from Inter-shop, Open market or Broad vision. Solutions for buy-side EC (or e-Procurement) are designed to bundle catalogs according to conditions that are pre-negotiated with a supplier. Well-known systems are from Ariba, Commerce One or SAP (Davila et al; 2003).

2.4 PROCUREMENT

2.4.1 Procurement Definition

Procurement includes all activities from obtaining goods and services and their management of its inflow into an organization. The corporate function of procurement traditionally is divided into two tasks: strategic and operational. Strategic task is sourcing activities, supply management, design and implementation of buying procedure, and optional tasks include all transaction- oriented activities like excitement of purchasing orders (Kauffman et al; 1999) (Gebauer & Segev, 2001), Procurement which is mostly referred to the purchasing of goods and services for frequently use in operation of a business is one of the most essential parts in organization ability in order to work and function efficiently and effectively (Leonard, 2000).

2.4.2 E-Procurement

Simply stated, e-procurement is using Internet for convenient buying as a technology solution. It is strong enough to change the purchasing process due to its power to penetrate the whole steps, which has been recognized. Here e-procurement is broadly defined to include e-design at the specification development stage of the purchasing process, ending with the supply manager's efforts to evaluate and rate supplier performance. The clearest indication that businesses grasp, at least intuitively, the benefits of e-procurement is found in projections for the growth of corporate buying expected to be done on the Internet. For example, the Boston Consulting Group estimates that business-to-business Internet purchases will reach \$2 trillion by 2003, up from \$92 billion in 1998 (Whyte, 2000). Although projections vary, they are generally in this range, demonstrating the inexorable move toward technology-facilitated purchasing as we move deeper into the new millennium.

A discussion may be made that already so many large firms have been applying Electronic Data Interchange for several years that is why the e-procurement is not a new subject. EDI facilitates mutual transactions of two parties by integrating databases using a standardized form for purchasing orders and other elements in the purchasing transactions. It is using one special technology known as VAN (Value-Added Network) in order to connect buyer and seller. The implementation of EDI is too expensive, which takes about millions of dollars, although it has improved the traditional way of exchanging of information which was paper-based that allowed the important information related to purchasing be directly forwarded to supplier's system. So, the costs related to implementation are one of the most important barriers for using EDI as one of facilitators for e-procurement. And because of this, in Business-to-business circumstances, just large companies and firms used EDI. The internet-based developments in recent years are a great help for facilitating this expensive technology and this form of e-procurement will become more known to other businesses (Turban et al; 2000).

As companies strive to provide more value to customer by improving site performance and reducing costs, they are also turning their attention to the procurement process (Monczka, et al; 2001). This process, which serves as the interface between an organization and its suppliers, used to be viewed as having little strategic importance (Pearson et al; 1996; Rossler & Hirsz, 1996; Williams et al; 1994). Many purchasing departments were viewed as merely "buying" or "shipping" units. In addition, their function was inefficient (Segev & Gebauer, 2001), e.g., nearly 95% of the non-production goods, which account for a third or more of a corporation's expenditures, are still acquired using paper-based processes (Croom S. R., 2000). The lack of efficiency is so bad that many companies spend far more on managing the procurement cycle than on the goods actually purchased (Attaran, 2001); e.g., on average it costs \$ 107 to process a paper-based purchase order

with an average cycle time of 7.3 days from order to fulfillment (Brack, 2000). It provides a means to improve the procurement process by providing a digital infrastructure for collaboration. General Electric (GE) in the USA is a company, which is realizing benefits by using the Internet. Its trading process network (TPN) is an online business community that allows it to transact over \$ 1 billion worth of business with more than 1400 suppliers around the world. TPN simplifies the old time-consuming contract bidding and award processes. Unlike industry giants, most companies are using off-the-shelf solutions to facilitate their procurement process. Electronic procurement tools are targeted at procurement related activities that enable organizations to integrate processes with suppliers and yield benefits for participants in the value chain (Aruna et al; 2006).

Online procurement (e-procurement) has been identified as the most important element of e-business operational excellence for large corporations (Barua, et al; 2001). An e-procurement technology is defined as any technology designed to facilitate the acquisition of goods by a commercial or a government organization over the Internet. E-Procurement technologies including e-Procurement software, B2B (business-to-business) auctions, B2B market exchanges, and purchasing consortia — are focused on automating workflows, consolidating and leveraging organizational spending power, and identifying new sourcing opportunities through the Internet. Future developments are expected to extend these technology models to create collaborative supply chain management tools (Brunnelli, 1999; Carabello, 2001). Not surprisingly, e-procurement technologies have been credited with providing significant benefits to companies who venture into them. These advantages include reducing administrative costs, shortening the order fulfillment cycle time, lowering inventory levels and the price paid for goods, and preparing organizations for increased technological collaboration and planning with business partners (Croom S. R., 2000; Roche, 2001; Gamble, 1999; Greenemeier, 2000; Murray, 2001). The relevance of these advantages suggested a rapid migration from traditional to e-based procurement models. Accordingly, just a few years back, market analysts predicted that Internet B2B transactions — a subset of e-procurement technologies — would increase from approximately \$600 billion in 2000 to over \$6.3 trillion by 2004 (Forrester Research, 2004).

2.4.3 Electronic procurement innovation

To improve the procurement process, many organizations have started to use electronic procurement innovations (EPIs); these, when acquired and deployed, change how an organization conducts procurement. Core procurement processes include supplier selection, order placement, order fulfillment, and payment and settlement (Wright, 2000). Each of these processes is supported through EPIs that have been developed for reverse auctions, catalog management, order fulfillment, and payment and settlement (Lee & Whang, 2001). The table below provides the definitions for each of these four EPIs. Traditionally, if a buyer needed some specific product or service, he or she had to investigate, qualify, and negotiate with several potential suppliers before selecting one. To facilitate this process, the online reverse auction was introduced to enable temporal and geographical convenience, reduced cost of contact, instant feedback, and privacy. In electronic reverse auctions, a buyer offers a tender to invited suppliers who bid for the contract at the lowest price, usually in a short time span (hours or minutes). By putting these auctions online, buyers can streamline the process. This creates the potential for savings by stimulating increased competition. Such auctions have increased in popularity, because they emphasize short-term price savings and easy negotiation. They have been found to achieve as much as 5–40% savings (Tully, 2000) with average savings of 15– 20% (Cohn, 2000). They also drastically reduce the average time from 6 weeks to a few hours. The electronic catalog provides an electronic representation of information about products and/or services offered by an organization (Segev et al; 1995). In contrast to paper-based catalogs, they can carry an almost unlimited volume of product related information.

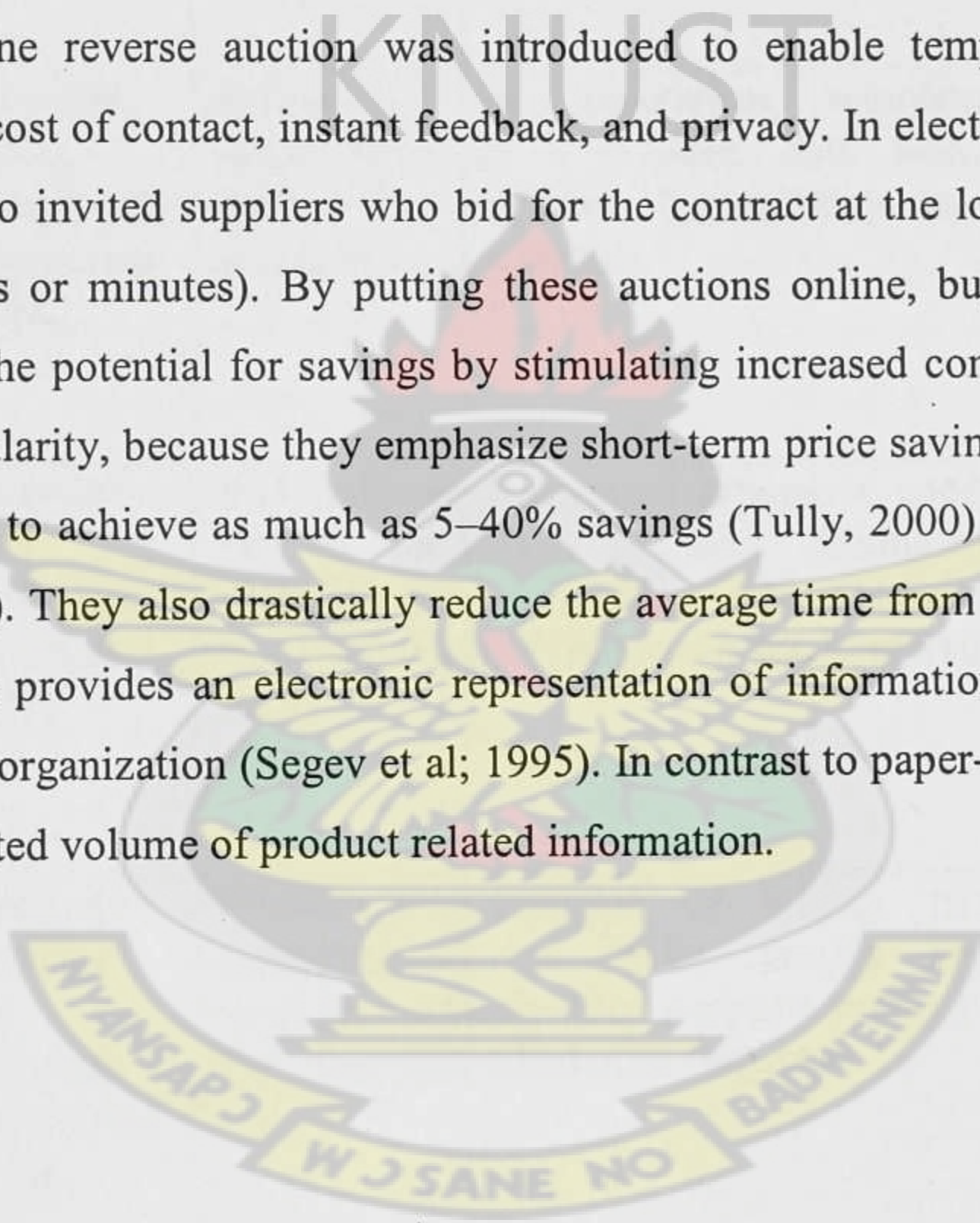


Table 2.1: Definition of Electronic Procurement Innovation

<i>Definition of electronic procurement innovations</i>		
Supplier selection	Electronic reverse auctions (ERA)	Reverse auctions are the reverse of traditional auctions in which the seller accepts bids from potential buyers. In reverse auctions that are now commonly hosted on web sites, a buyer receives bids from several would be sellers and settles on an offer. Goods are bought and sold, and information is exchanged among buyers and sellers in a private (i.e., hosted by a single company) or public (i.e., with many firms) electronic marketplace
Order placement	Electronic catalog management innovations (ECM)	Refers to the generation, maintenance, and presentation of web-based data about products offered by suppliers. Typical data include price, availability, and quality
Order fulfillment	Electronic order fulfillment innovations (EOF)	Refers to automation of processes conducted after sale is confirmed. Includes automated ordering, shipping and reordering, and receiving.\ Allows provision for real-time order tracking and requisition status
Payment and settlement	Electronic payment and settlement innovations (EPS)	Provide for issuance of billing, payment and reconciliation of debits, credits and invoices between partners. Also supports product returns and their associated financial impacts

Source: Arun Rai et al, 2005

They are also much easier to maintain; therefore, they usually carry more accurate, real-time product information. Web-based catalogs simplify searches, thus providing easy location and comparison of supplier goods (Baron et al; 2000; Yen & NG., 2003). Its use also creates an inter-organizational system that allows organizations to exchange information in an automated, electronic, form (Choudhury, 1997).

Electronic order fulfillment innovations refer to the automation of processes conducted after a sale. Such innovations provide web-based interaction to customer processes so that buyers, sellers, and logisticians can coordinate their activities. Key processes include picking and shipping of orders, analyzing solutions to ship quantities, and tracking the orders when shipped. Its assimilation enables fast and continuous communication within and between firms, which helps both to avoid lost orders and to find and correct errors. It can also be used to speed delivery by tracking the location of products and the status of orders (Rae-Smith & Ellinger, 2002). Electronic payment and settlement systems involve the issuing of bills, payment and reconciliation of accounts, and logging of credits and invoices between partners. They also support transactions associated with product returns. Electronic funds transfers are cheaper, safer, and easier to make and track. An electronic payment can be made for less than 2cents, compared to 43 cents by check. Further, they will prevent check related crimes, including mail theft and forgery (Glassman & Wells, 1996). Electronic payments benefit payers by cutting payment processing costs. Payees, on the other hand, have an alternative means to get their payment, which can be deposited directly into their account. In addition, time and cost of reproduction, retrieval, and distribution can be significantly reduced (Aruna et al; 2006).

2.4.3.1 The Model of Electronic Procurement

There are many different models for procurement. As these models are changing so rapidly, it is so hard to choose from them (Chaffey, 2004). There are 3 prominent models for B2B e-commerce: first: sell-side, second: buy- side and third: marketplace-based. These options are summarized in the below figure which then will be followed by the advantages and disadvantages of each in the given table (Chaffey, 2004).

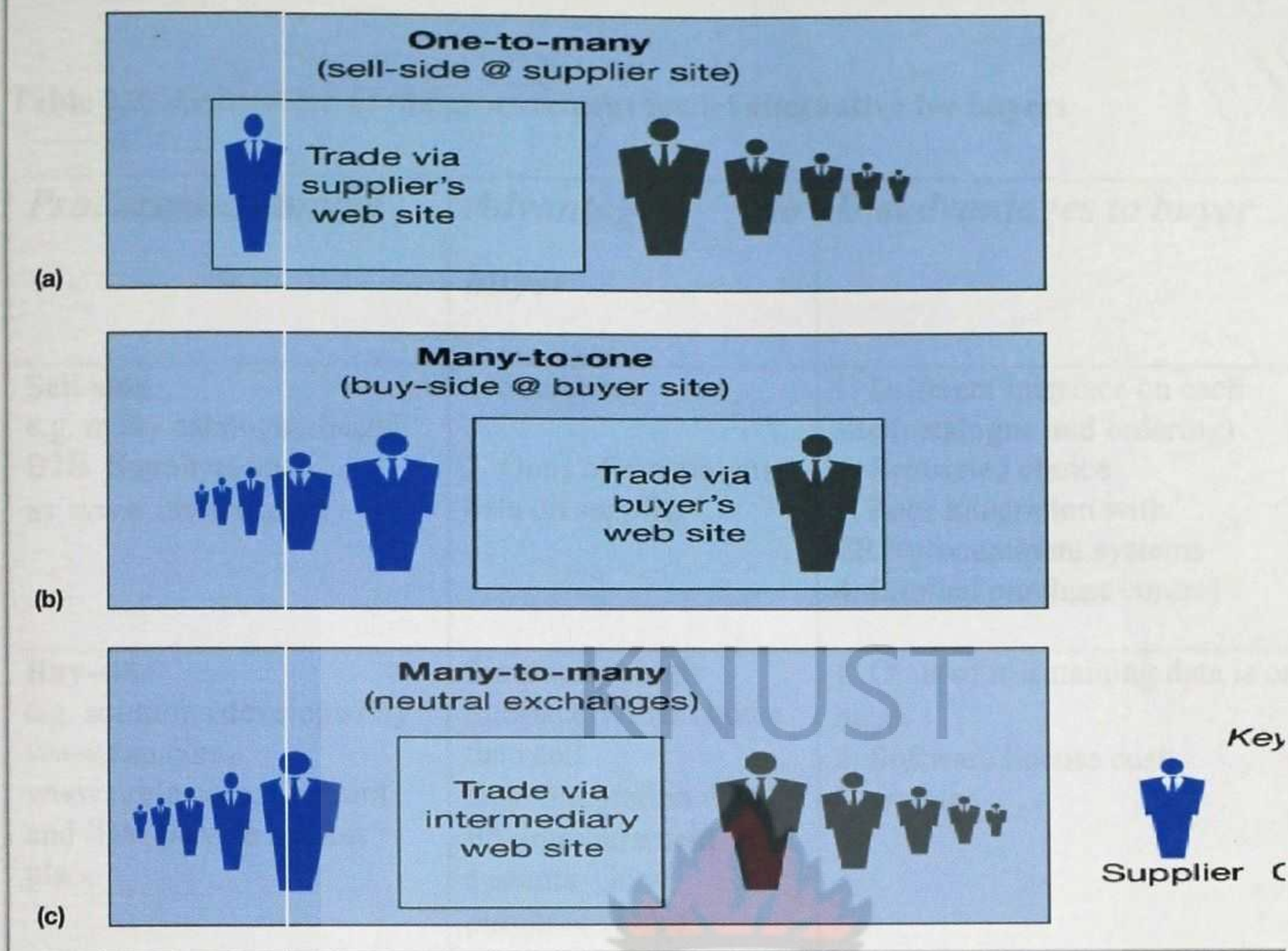


Figure 2.1: The three main e-procurement model alternative for buyers (Source: Chaffey, 2004)

The electronic procurement takes place in an electronic marketplace (that is defined as marketplaces that are implemented by using telemetric, that is the goods and services market-typical mechanisms, which is supporting transaction's phases (Schmidt, 1993). Also it can be taken place in between of two firms and the software which by using Internet technologies can automate the process of purchasing. Requisitions may have access to the system through one standard browser in which they are internally or externally connected to the approved catalogues of the company (De Burca et al;2005).

Table 2.2: Assessment of the procurement model alternative for buyers

<i>Procurement model</i>	<i>Advantages to buyer</i>	<i>Disadvantages to buyer</i>
Sell-side e.g. many catalogue-based B2B Suppliers such as www.rswww.com	1. Searching 2. Onus of maintaining data on supplier	1. Different interface on each site (catalogue and ordering) 2. Restricted choice 3. Poor integration with ERP/procurement systems 4. Limited purchase control
Buy-side e.g. solutions developed by www.sap.com , www.arbia.com , Covisint and IBM private market place	Simplicity-single interface Wider choice than sell side Integration with ERP/procurement systems Good purchase control	1. Onus of maintaining data is on buyer 2. Software license costs Retraining
Independent marketplace e.g. www.sciquest.com www.barclaysb2b.com	1. Simplicity-single interface 2. Potentially widest choice of suppliers, products and prices 3. Often unified terms and conditions and order forms	1. Difficult to know which marketplace to choose (horizontal and vertical) 2. Poor purchase controls Uncertainty on service levels from unfamiliar suppliers 3. Interfacing with marketplace data format 4. Relatively poor integration with ERP

Source: De Burca, Fynes and Marshall, 2005

2.4.3.2 Various forms of e-Procurement

Using the definition provided earlier, a large number of forms of EP can be distinguished. Some of these forms have received a lot of attention already and they are by now quite well defined and relatively well developed. Other forms of EP are still quite young and immature. Some of them will mature; others may never reach that state. We focus on the forms of EP that seem quite well defined and relatively well developed.

These forms could be categorized as follows:

- e-MRO
- Web-based ERP
- e-Sourcing
- e-Tendering
- e-Reverse Auctioning
- e-Informing

Both *e-MRO* and *web-based ERP* refer to the process of creating and approving purchasing requisitions, placing purchase orders and receiving goods and services by using a software system based on Internet technology. In the case of e-MRO, the goods and services ordered are maintenance, repair and operating (MRO) supplies (i.e., non-product related). The supporting software system (an ordering catalogue system) is used by all employees of an organization. However, in the case of web-based ERP (enterprise resource planning), the goods and services ordered are product related. Usually, only the employees of the purchasing department (or the planning department) are using the supporting software system (the web-based ERP system) (De Boer et al; 2002).

E-sourcing refers to the process of identifying new suppliers for a specific category of purchasing requirements using Internet technology (usually the Internet itself). By identifying new suppliers, a purchaser can increase the competitiveness in the tendering process for this purchasing category. E- Sourcing is also a way of decreasing the supply risk associated with this purchasing category. For example, new back-up suppliers can be identified more quickly in case the existing supplier fails to deliver and/or a more profound evaluation of the existing set of potential suppliers may be facilitated (De Boer, et al; 2002).

E-tendering concerns the process of sending requests for information and prices to suppliers and receiving the responses of suppliers using Internet technology. Sometimes, e-tendering also includes the analysis and comparison of responses. E-tendering does not include closing the deal with a supplier. It smoothen a large part of the tactical purchasing process without focusing on the specific content of that process (De Boer et al; 2002).

In practice, an auction enables a supplier to sell goods and services to a number of known or unknown buying organizations. During a relatively short time frame the buying organizations involved submit bids for the goods and services that are auctioned. The auction operates with an upward price mechanism (an English auction with several bids) or a downward price mechanism (a Dutch auction with one bid only). A reversed (English) auction is the opposite: it enables a purchaser to buy goods and services needed from a number of known or unknown suppliers.

E-reverse auctioning is the Internet technology based equivalent of reverse auction. Usually, e-reverse auctioning focuses on the price of the goods and services auctioned (Teich, et al; 1999). In most cases, other criteria are neglected during the reverse auction. Of course, other criteria can be used in a previous phase in order to determine which suppliers should be invited to join the e-reverse auction. Alternatively, multiple criteria may be used in the auction process itself (Bichler, 2000).

Unlike the previous forms, **e-informing** is a form of EP that is not directly associated with a step in the basic purchasing cycle-like contracting or ordering. E-informing is the process of gathering and distributing purchasing information both from and to internal and external parties using Internet technology. For example, publishing purchasing management information on an extranet that can be accessed by internal clients and suppliers as a way of e-informing (De Boer et al; 2002).

Note that we consider each form of EP as part of a process that is to say a collection of activities that has to be executed by one or more employees. The Internet technology that is needed in these processes can be offered to the employees in several ways via:

- **Electronic (public) market places:** market places are specific websites on the Internet (aimed at, for example, an industry or a commodity) that aim to bring buyers and sellers together in order to facilitate the application of various forms of EP and more general e-commerce (which can be defined as doing business using Internet technology).
- **Intranets:** intranets can be seen as a collection of websites with information and applications that support one or more EP forms. An intranet can only be accessed by employees of an organization. For example, Siemens has an intranet running with a SIS Supplier Information System that is available for employees of Siemens only.
- **Extranets:** extranets can be seen as a collection of websites with information and applications that support one or more EP forms.

An extranet can only be accessed by employees of a specified set of organizations. For example, The Purchasing Extranet (managed by WIZNet) enables employees of subscribed organizations to access it (De Boer et al; 2002).

2.4.3.3 Adopting an E-procurement System

According to e-Business watch sector Report (July 2003), e-marketplaces has jointed to daily business takes in automotive industry, although there are a number of disappointments online procurement together electronic marketplace. Based on research on procurement in automobile industry, catalogue systems and auctions are improved by the efficiency by using e-procurement. Besides companies found some new subject such as e-sourcing along the supply chain have had an acceptable effects in case of communication and purchasing process quality and increasing the transparency. Contrary to primary expectations, these were more important benefits than direct material cost reduction or the bundling of purchases (Croom S. R., 2005).

One of the most important electronic revolutions among car manufacturers is done by Ford and General Motors (Klein & Krcmar, 2005). On November 2, 1999, they announced, they would transfer their purchasing operations to the web for achieving to this target Ford made a joint venture named AutoXchange with Oracle (to connect ford to his own suppliers(material parts)) via net. Also GM with joint of Commerce One for increasing the efficiency of supply chain ran a marketplace to connect suppliers, business partners and customers on a single platform. 20% saving on inventory and procurement for Ford is the result of AutoXchange applying. Microsoft's car point, launched in 1995 joined forces with Ford Direct, a joint venture between Ford Motor Co and its Ford Division Dealer's. Consequently, this innovation stressed on customer side of the automakers operation and it is going to manufacture based on built-to-orders cars. Just now GM connecting with suppliers and also sharing demand and data forecasting is improving the quality of products and also the responsiveness, also reducing the costs. GM forecasts that by 2004, about 68% of the procurement of direct materials to be done over the internet (Benko & McFarlen, 2003). E-procurement has got off a slow start, although the vendors of such systems, has promised its potentials. One study which is done by (Eyholzer & Hunziker, 2000) has shown that 18 percent of companies in Swiss are using electronic product catalogues, auctions or requests for quotations in procurement and with the results of such study, many companies planned to use e-procurement system. And some of the studies show the same proportions in other companies (Wyld, 2002).

There are other reports that show 50% of American companies are using e-procurement (Croom S. R., 2005). In recent years, the use of e-procurement has increased a lot, but it has emerged some challenges regarding its invent and use. One of the challenges is that the companies only use single e-procurement functions. The other one is that although the evidences show the benefits of e-procurement, old systems e.g. EDI are also available and they use it in e-procurement bases of the company (Croom S. R., 2001).

Covisint, which is a digital marketplace launched by the traditional "Big Three" of Detroit, Renault and Nissan, showed how far the collaboration can extend in industry. The industry is now integrating and eliminating the process of developing point-to-point connections by connecting a system which is based on open standards. Representatives of entire volume network are the members of Covisint. One year later in 2001, GM auctioned around \$100 billion via Covisint (Benko & McFarlen, 2003). And from European suppliers and manufacturers of automotive industry only 23.2% of them use e-procurement (Fricke etal; 2002).

Direct products procurement is determined by standards (e.g. xCBL) and special software applications (buy-side solutions) which is needed to access the supplier system (sell-side solutions) and also barriers (for example, permanence of a business relation), but indirect items procurement is much less complex, that is when there is no need any software application and so the purchasing process can be done with a web-browser. And also the indirect procurement is not so much restrictive. Moreover, many steps, which were done for e-business procurement with the aim of establishment of industry-wide standards, failed. Opposite to what was expected at the beginning, online marketplaces were not accepted by firms functioning in automotive industry. The important reasons are supplier's concerns related to security, the disputes of customers, suppliers and operators of e-marketplaces on power and the preference of carmakers over wide platforms of industry. As a result, electronic marketplaces weren't used in this section much. Many companies used their established suppliers or Internet to operate their e-procurement system (E-Business Sector, 2005). Some years ago, e-procurement was seen as the solution for the industry cumbersome and the complexity of purchasing process by the managers of automotive industry. Some public marketplaces naming, Supply One and Covisint and also other OEM-specific marketplaces to name, Toyota's WARP and VW Group's Supply.com were made with this expectation that a high percent of purchasing of the industry (especially commodities) from such channels would flow. And the e-procurement has been adopted in industry at a very low rate than was expected. The main reason for this low rate is the systems and components are not fitted for online bidding.

Actually, the parts, which are clearly defined in drawing and specification and that, need very little or even no interaction among engineers of supplier and OEM can be emerged via online bidding. And as the IT systems that is using nowadays for purchasing have a little compatibility in online marketplaces, then we will face a considerable danger in the adoption of e-procurement (Dietzet al; 2004).

2.4.3.4 E-procurement must be considered by whom?

Medium firms and governmental organizations usually buy their products from some small number of firms which are very good candidates for e-procurement. Many firms use e-procurement in order to control, simplify and automate the product and service purchasing from so many suppliers. The most important thing is to find the best supplier and so the best products at the best time and also with the best price, with being sure enough of the responsiveness and the services they made according to the needs of the business we run. Sometimes a company, which currently has its customers, finds itself suitable in order to encourage other firms to join them on-line as their business is proven. At the same time, that company which sees its clients are growing decides to capitalize its benefits as its savings and efficiencies has become obvious. As the e-procurement models grow, it will include more than the supplies and goods that are in the office which needs maintenance and repairing. So it will include goods and services which are raw materials, parts and components. There are many ways that sellers and suppliers are taking in order to manage supplier relationships in the process of e-procurement (EPR, 2010).

There are catalogues and e-procurement products and also those which support the management strategy of supplier-relationships, requiring / needing integration with third party products. Some will look at it from the asset management point with a shift to maintenance and the operations related to repairing. These schedules and the system of tracking of availability of products and assets have shown the benefits of e-procurement. Some other supply chain sellers provided some more complex systems for manufacturing and assembling. But in real e-procurement, which is one of the most important parts of supply chain needs more partners' commitment in management of more sophisticated business-to-business relationships which also needs more technology and capabilities. This needs joining of purchasing process with the information, which is in inventory systems, logistics systems and supplier back- end systems, and it usually needs customizing. The best e-procurement systems can locate sellers, evaluate the offerings and so make the comparisons among them. It must also require that the best contractual terms are included for the orders (EPR, 2010).

2.4.3.5 An example of one of the best Practice Case Studies

Rolls-Royce Uses e-Procurement to Transform Procurement Business Challenge

Rolls-Royce is a leading producer of power systems for use on land, at sea, and in the air. Rolls-Royce operates in four global markets – civil aerospace, defense aerospace, marine, and energy. The company's broad customer base includes 500 airlines, 4,000 corporate and utility aircraft and helicopter operators, 160 armed forces, and more than 2,000 marine customers, including the naval forces of 70 nations. Rolls-Royce currently has a total of 54,000 gas turbines in service. The huge installed customer base generates strong demand for services. Key to the company's business strategy is maximizing revenues from services, which have increased 60% over the past five years and makes up 55% of the company's \$10.44 billion in annual sales. Purchasing at Rolls-Royce was tasked with removing all non-value-added purchasing activities and reducing inventory levels. The company needed better visibility into its annual spend of around \$100 million for low-value, high-volume indirect goods and services (AberdeenGroup, 2005).

It also wanted to consolidate its supplier base, achieve better control of maverick spending, and improve efficiency by reducing the volume of paperwork associated with buying these goods. Prior to 2003, the 120-strong Purchasing group at Rolls-Royce that bought low-value, high-volume indirect goods and services used a manual, paper-based purchasing process. The process was supported by an archaic, internally developed database, was labor-intensive, and prone to errors resulting from manual key entry. The department had essentially become a bottleneck for processing orders, which encouraged unauthorized buying throughout the organization and increases in inventory levels by internal business units to offset the complex ordering process. Spend information was difficult to collect and analyze, and internal customers had a poor perception of the process (Ibid).

2.4.3.5.1 E-Procurement Strategy

Rolls-Royce examined solutions that would help purchasing become more strategic in indirect spend. It decided to implement a decentralized industry standard, web-based catalog-ordering system that would allow end users to order commodities online instead of through the purchasing department (AberdeenGroup, 2005).

2.4.3.5.2 Solution Selection and Deployment

The goal was to remove all non-value-added purchasing activities associated with low-value, high volume buy. The e-procurement system helped achieve this goal by:

- Providing spend and supply information that enabled the supply base to be rationalized from in excess of 5,000 suppliers to less than 100;
- Developing strategic business relationships and close contract management of first-tier Suppliers;
- Implementing an industry-standard consumables catalog order placement system that connected Rolls-Royce requisitioners with suppliers via the Internet;
- Reducing inventory stock value levels; and
- Using procurement cards for supplier payments, with accounting data fed directly into the company's ERP system.

The e-procurement system is deployed across the entire Rolls-Royce enterprise, and includes all processes from requisition to automated invoicing and payment. A total of 1,700 Rolls-Royce personnel use the system and all suppliers (less than 100) of low-value, high-volume goods and services are enabled. Exostar hosts the system for Rolls-Royce, in an On-Demand delivery model. Suppliers are enabled and catalog content is managed by Exostar via punch-out. Eighty-five percent of the low-value, high-volume indirect spends now goes through the system; this took only 90 days to implement (Aberdeen Group, 2005).

2.4.3.5.3 Results

The e-procurement implementation has produced a number of quantitative and qualitative benefits, Including:

- Reduction in cost of goods of up to 20%
- Reduction in inventory value levels from \$43.5 million to \$8.7 million;
- Reduction in errors due to the elimination of manual re-keying of buying data;
- Reduced cycle time, in some cases by up to 80%
- Near-elimination of paper and fax processes.

- Improved relations with suppliers, who have benefited from reduced transaction costs and improved efficiency (Aberdeen Group, 2005).

2.4.3.5.4 Lessons Learned

Rolls-Royce learned some valuable lessons during implementation and use of the company's e-procurement system. Some of the more important lessons were:

- Change management is the single biggest challenge. People naturally resist change, so senior management buy-in and active support is needed to accelerate system adoption by end users. Also, ensuring that the e-procurement system is easy to use will speed acceptance and use.
- Examine and "fix" existing business processes before automating them. Ensure that process development efforts are accepted by all stakeholders. Selection and deployment of technology will be easier if processes are well-defined and made as efficient as possible before automation efforts start.
- Breaking down local cultures is difficult but essential. Enterprise-wide e-procurement will likely result in the elimination of many suppliers that are "local favorites."
- Engage suppliers, early and often. Selling the benefits of e-procurement to all entities in the supply chain is very important.
- Training and education of end users takes a lot of time and effort. Many enterprises underestimate the time needed to educate both internal users and suppliers (Aberdeen Group, 2005).

2.4.3.5.5 Future Outlook

The e-procurement system implementation has allowed Rolls-Royce to have more control over its spending, including pricing levels, through process discipline. By reducing waste and creating more efficient processes, the system has produced a true "lean" procurement process, which is central to Rolls-Royce's overall business strategy (Aberdeen Group, 2005).

2.4.3.5.6. Aberdeen Conclusions

By focusing on a particular spend category – low-value, high-volume indirect goods and services – purchasing at Rolls-Royce has successfully reengineered an archaic process to one that has produced various savings and benefits, both internally and with suppliers.

The Rolls-Royce example shows that e procurement can produce major benefits relatively quickly, especially in indirect spend (Aberdeen Group, 2005).

2.5 E-PROCUREMENT PROCESS

The following 5 steps are going to illustrate the process re-engineering, which are strongly connected process simplification, from previous accomplished researches:

2.5.1 Awareness of technology opportunities

The literature shows that the process of e-procurement in many firms and organizations with their sellers / vendors has several arrangements. First, these processes have to be reengineered, uniformed, and incorporated to collaborative processes, and which will then enable successful e-procurement and, in turn, giving access to the data in a time when the partners need them (Active Media, 2000; Athabasca University, 2002; Chan & Swatman, 1999; European Commission, 2000; Kalakota & Robinson, 2001; Lindeman & Schmidt, 1998-99; Ody, 2001; Ody, 2001; Podlogar, 2001). Growing technology opportunities, with an emphasis on technology and process complexity and compatibility, are the most important issues in organizing e-procurement (Chan & Swatman, 1999). Organizations that are healthier in a sense of information technology also have better-organized e-procurement (Gebauer, Beametal;1998).

2.5.2 Having power to gain effectiveness of the process

It is important to achieve better control and process tracking of the whole procurement process (European Commission, 2000). Organizations spend billions of dollars of additional costs annually to improve e-procurement effectiveness (Kalakota & Robinson, 2001; Ody, 2001). Implementing process reengineering requires removing processes that contribute no added value. It is also important to choose software and hardware that would offer effective support to enhanced business processes (Lesnicar, 2002; Sterle, 2001).

2.5.3 Readiness for e-procurement collaboration

Organizations want to have e-procurement, because they can improve process effectiveness by collaborating closely with all supply chain business partners. Collaboration is improved, especially by e-commerce and process reengineering. In addition is the reviewing of an organization's internal processes, which includes including processes review of activities outside its borders.

Implementing collaborative e-processes requires endeavors to increase inputs to improve organization and business development, and to perform e-procurement (European Commission, 2000). Process reengineering is necessary for achieving process simplification. Following are some process simplifying factors (FarajiJalal, 2007).

Table 2.3: Business Preparation Simplifying Factors

Business Process Preparation Simplifying Factors	The Level of Importance of Factors in %					
	Does not Significantly Simplify		No Impact		Significantly Simplifies	No Answer
	1	2	3	4	5	0
X1 Possible Supplier's Requisition Request Simplifying	2.4	4.0	8.1	26.6	51.6	7.3
X2 Replacement of Supplier Simplifying	2.4	8.1	6.5	16.1	53.2	13.7
X3 Bidding Simplifying	0.0	2.4	5.6	20.2	54.8	16.9
X4 Access to Suppliers' Goods or Catalogues Simplifying	6.5	9.7	4.0	14.5	45.2	20.2
X5 Access to Suppliers' Inventory Data Simplifying	10.5	10.5	12.9	8.9	46.0	11.3
X9 Order Tracking Simplifying	0.0	3.2	16.1	24.2	45.2	11.3
X10 Search for Transporters Simplifying	3.2	0.0	15.3	16.9	52.4	12.1
X11 Transport Ordering Simplifying	0.0	0.0	7.3	33.9	43.5	15.3
X12 Receiving of Delivery Data Announcement Simplifying	0.0	3.2	6.5	17.7	64.5	8.1

Source: Sara Faraji Jalal, 2007

2.5.4 Satisfaction and positive e-procurement experiences sharing

If the e-procurement system provides a pleasant service, the buyer will take the view that the experience was positive and simple to use. Benefits and simple e-procurement contribute to a positive perception of e-procurement, which will gradually lead to actual use (Chen, 2000). Successful organizations in practice are the ones that succeed process simplification with the help of suppliers. It is also important to savings that are resulted from improvement, with suppliers (win-win situation). This kind of business leads to closer and longer connections with business partners (Komp Leonard, 1999).

2.5.5 Environment changing response

Process simplification leads to a great deal of e-procurement opportunities especially because organizations have to react quickly to a changing environment (such as demand variability) and goods and process changes (European Commission, 2000).

- ❖ E-procurement process type; for the buyer it is most important to simplify the following processes: goods availability (goods need to be at hand when a buyer needs them), order cycle, data retrieval, order adaptability, goods receiving, order mistakes dismissing, damaged goods returning, reserved parts availability and technical support (Komp Leonard, 1999).
- ❖ E-procurement participants and its accessibility; e-procurement processes allow participants to easily change rules and eliminate some business partners through the whole supply chain, by for example undertaking direct e-procurement from supplier without other partners, thereby simplifying the whole e-procurement. Generally speaking, however, it is difficult to say if the total number of participants in the whole supply chain decreases (Mesenbourg, 2002).
- ❖ In 2004 a case study concerning the analysis of the Greek governmental purchasing process carried out by (Panayiotou et al; 2004) a set of performance indicators was defined including mean cycle times, transaction volumes (quantities, values, number of requests and tenders) and organizational units' capacities. The results of the analysis guided to the reengineering suggestions in three levels of changes and to the design of the new process with use of process charts. The functional specifications definitions were based on the new system design and the overall findings of the analysis. Usually, public sector organizations are faced with challenges differing from challenges for private firms.

They have to meet multiple, often conflicting goals, and they are subject to constraints of financial, legal, contractual, personnel and institutional nature (Cilek, et al;2001). Normally these constraints are much more binding than they are in private sector. For example, there might be no possibility to reduce the staff according to a new situation due to legislative constraints (Kock Jr. & McQueen, 1996; Luck & Peabody, 2000). The radical process-focused change in public sector organizations can only be achieved with deep changes in their bureaucratic practices. This, in turn, normally cannot be achieved without either change in the law or privatization (Jensen, 1991; Mechling, 1994).

2.6 BENEFITS AND BARRIERS OF E-PROCUREMENT

2.6.1 The Benefits / Drivers

An increasing number of companies are interested in using an online e-auction as one of their purchasing tools. Consequently, we sought to identify the major drivers that influence buyers and/or the sellers in their decision to implement e-procurement. These drivers include:

- E-procurement as a cost-cutting tool
- The opportunity for real-time bidding and response
- The auction process is transparent
- It reduces cycle time
- It increases geographical outreach

2.6.1.1 Cost-cutting tool

Since e-procurement can achieve gross savings of 5% to 40% (Tully, 2000) with a typical average of 15% to 20% gross savings (Cohn, 2000), small firms gain a 15–25% reduction in prices in online marketplaces compared with those negotiated by the business itself (Ash & Burn, 2006; Lichtenthal & Eliaz, 2003). E-procurement systems are commonly used by senior managers to gauge the success of cost-cutting initiatives designed to maximize shareholder value (Child, 2002; Goldsby & Eckert, 2003).

Companies use e-procurement to reduce original procurement costs by approximately 5–10% through reverse auction and increased efficiency, which improves contract compliance, reduces cycle time, minimizes human errors, and results in better supply chain management.

World Bank PREM notes state that e-procurement has generated numerous benefits, including enhanced transparency and public trust, and increased managerial efficiency (PremNotes, 2004). Some key factors for the successful adoption of e-procurement are clear commodity specifications, large purchase lots sufficient to justify the involvement of a number of suppliers, appropriate supply market conditions, and an existing organizational infrastructure (Smeltzer & Carr, 2002; Subramaniam & Shaw, 2004). The e-procurement system opens doors to purchasing networks for suppliers and buyers, expands the selection of products, and makes information more easily obtainable. E-Procurement also links a vast network of connections, and makes searching and contacting much more convenient.

2.6.1.2 Real-time bidding and response

To achieve a reduction in the cost of goods and services, e-procurement is seen as both a price-cutting tool for purchasing, and a system that allows repetitive and real-time bidding by multiple suppliers, which ultimately reduces purchasing cycle time. Carter et al; (2004) describe buyers who have used e-procurement, and most agree that it increases levels of trust, provides greater access to supplier data, and decreases cycle times for suppliers. It strengthens connections in supply chain management, as everything is sorted out by computer, price benefits are efficiently decreased, and companies avoid unnecessary inventory (Smeltzer & Carr, 2002; Carter, 2004; Emiliani & Stec, 2002). It also helps negotiate better prices with suppliers, resulting in an average 5–12% price reduction and as much as a 20% reduction in costs (Smeltzer & Carr, 2002). Benefits are also realized by suppliers, including reductions in ordering and processing costs, reduced paperwork, improved cash flow, and reduced cost for credit control.

2.6.1.3 Transparent auction process

With dynamic pricing, sellers and buyers can immediately see competitors' prices (Smeltzer & Carr, 2002; Emiliani & Stec, 2002; Ginunipero & Sawchuk, 2000). A transparent transaction process is a key driver for e-procurement. For example, companies that have private B2B supplier software, integrated with a supplier's order fulfillment system or linked to their product catalog on the website of the supplier's platform, will be able to reduce administrative tasks, accelerate processes, provide more paperwork accuracy, and improve transparency in the collaboration with its suppliers. A fair and transparent auction process allows the buyer and seller to make their decisions effectively. The process and steps of every e-procurement action is observed and recorded in the system.

2.6.1.4 Reduced cycle time

Process efficiencies play a major role in simplifying and automating procurement. Our survey results found that e-procurement forces buyers to structure their bid before the bidding event, standardize the procurement process, and develop a strategy for purchasing, and those factors have the effect of shortening cycle times (Carter, et al; 2004). Companies also use electronic catalogs and search engines as part of their e-procurement process, and these are helpful for providing a quick overview of the purchasing process and identifying the correct product in a shorter period (Subramanian & Shaw, 2004; Eakins, 2003). E-procurement automatically routes the product request and reduces cycle time to the responsible personnel faster and more effectively than traditional methods.

E-procurement is not only a cost-cutting tool but it also eliminates paperwork, improves data accuracy, and Companies collaborate more effectively with suppliers and reduces the time between auction close and announcement of results. The results of decision making can be implemented in a timelier manner, which in turn lowers costs and reduces approval time if done through a carefully calculated assessment (Schwartz, 2004; Shawnee, 2003; Shaw M. , 2004).

2.6.1.5 Geographical proximity

E-procurement easily increases the supply and spending bases with a supplier. This suggests that using e-procurement can exert complex relational effects on the supply base. In traditional markets, small manufacturers may be left out of channels that offer economies of scale advantages to larger manufacturers as well as exclusive distribution contracts (Rohm, et al; 2004). We observed that companies in Taiwan need to become more visible in foreign markets, and e-procurement is one to accomplish this. We found that Taiwanese companies considerably increase their level of competition with foreign companies by using e-procurement systems. E-procurement should increase a company's efficiency and establish Internet distribution channels that will enhance the competitiveness of Taiwan's high-tech industry because of the existence of reduced barriers of entry.

2.6.2 The Barriers / drawbacks

It is important to understand the barriers to e-procurement that make it difficult for certain companies to adopt and use the process. Even though the use of e-procurement has grown rapidly in recent years, there are some challenges associated with it. Critics argue that the anticipated savings from e-procurement systems are hard to measure. Some suppliers refuse to participate in e-procurement bidding, believing it will result in less profit and more work. Since e-procurement reverses the traditional way of doing business, some suppliers believe it might jeopardize their profit-making abilities.

Listed below are some of the possible drawbacks:

They are; Lack of system standards, Negative impacts on trust, loyalty and commitment Availability of resources, Price pressures, Ethical issues, unforeseen fees and Barriers to implementation.

2.6.2.1 Lack of system standards

Even though e-procurement offers a way to cut costs and improve efficiency when procuring products, the lack of standards may be a problem, especially when the ordering system is integrated with other corporate programs, or for the accessibility of the electronic catalog. When implementing an e-procurement system, most companies are concerned with having a standardized system, accuracy of data transfer, data consistency, cost, Internet security, and certification. For example, XML was used to obviate the need to reconfigure proprietary ordering systems when changing suppliers (Rohm et al; 2004). Product specification is another concern; when putting bids online, some suppliers complained about misleading product specifications and were concerned about their ability to realize a profit.

2.6.2.2 Negative impact on trust, loyalty, and commitment

In many instances, e-procurement alters the relationship between the buyer and seller. As the purchase decision is usually based on the lowest price, the buyer no longer feels loyal to the seller, and there may be a corresponding decrease in trust between the parties (Carter et al; 2004; Shawn & Nath, 2005). Indeed, it is possible that buyers may destroy their sellers' trust (Jap, 2000; Reed, 2005). Reverse e-auctions also have the potential to hurt a buyer's long-term performance by sowing distrust among suppliers (Beldona & Raisinghani, 2004; Gengatharen et al; 2005; Jap, 2003). Losing a buyer's commitment may result in a supplier's willingness to further invest on staff training and specialized tooling (Goldsby & Eckert, 2003; Carter et al; 2004). At the same time, employees using this system may fear being replaced if they are perceived as unqualified and/or unreceptive to the e-procurement tool.

With the advent of e-procurement, long- time partnerships may be damaged or destroyed.

2.6.2.3 Availability of resources

The availability of resources cannot be guaranteed until contracts are finalized; making it difficult for firms to coordinate negotiations between their various input resources and their production outputs. This may lead to uncertainties about the value of the object being auctioned. (Laffont, 1997; Nair, 2005)

2.6.2.4 Price pressures

Although pricing plays a major role in e-procurement, quality, payment terms, and on-time delivery are other important factors to consider when choosing suppliers. Unforeseen costs involved in switching to a new partner should be included, as the new supplier may not be able to deliver the product efficiently or meet specific requirements. This reinforces the importance of prior consensus by both parties. When buyers focus only on reducing costs, it is difficult for sellers to recognize the benefits of E-procurement. Even though price may be the primary concern for the buyer, quality delivery, technical capability, and other factors may influence the buyer's willingness to use e-procurement (Shaw, 2004). Suppliers may also face difficulties when, in an attempt to gain business, they may bid emotionally, which produce an under-cost could bid (Smeltzer & Carr, 2002; Tassabehji et al; 2006; Van Tulder & Mol, 2002). When the purchase of goods is based on competitive prices, relationships with previous supplier may be destroyed.

2.6.2.5 Ethical issues

In a study by Carter et al., phantom bidding (buyers place fake bids trying to reduce the bid price, or they use unqualified suppliers to stimulate competition) is one unethical issue facing users of an e-procurement system. This not only damages the firm's reputation but also lowers suppliers' incentive to further participate in another auction (Carter et al; 2004).

2.6.2.6 Unforeseen fees

Putting the business online in order to participate in e-procurement is a high-tech innovation, but it often has negative results when price-only selection is involved. According to Emiliani and Stec (2002), administrative fees must be considered, because either the vendor or the winning bidder must pay an administrative fee or a percentage of the contract value, which will have an impact on the final cost. For example, in a GE case study (Emiliani, 2000), the company's cost-savings disappeared because of factors such as errors in supplier data, post-auction negotiations, and changes in specifications and quantities. These results highlight the need for higher levels of human intervention in the form of supplier identification, product selection, approvals, and order generation. Although the use of an e-procurement system may increase the number of suppliers, the switching costs involved in adding new suppliers can be unpredictable, including transportation, qualifications, tooling, training, first-article inspection, alignment of information systems, and so forth. While e-procurement may appear to be a high-tech innovation, it has the potential to propagate negative results with low-bid, price-only selections.

2.6.3 Barriers to a Successful E-Procurement Implementation

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, p. 1) The development and implementation of e-Procurement has not been as easy as some of the solution providers have suggested, nor has it necessarily brought the anticipated savings. Furthermore, engaging suppliers in the process - especially smaller organizations - is also proving 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).

Difficulties also seem to stem from the tension between Buy Local policies designed to promote a local economy, and the efficiencies to be achieved through volume purchasing from large suppliers (AGV, 2003). Although a number of public sector agencies are actively pursuing e-Procurement, evidence from business press reveals that many of the efforts are not meeting original expectations. In fact, implementation rate of public procurement systems has been slow and many government agencies tend to overstate the degree to which they are involved in e-Procurement (MacManus, 2002). Despite the benefits that can be achieved from a successful e-procurement implementation in the public sector, the business press has reported a number of failures of e-Procurement initiatives in a number of public sector agencies in the USA, UK and New Zealand in recent years. As observed by Heywood (2002), e-procurement will result in large investments of time and money, without absolute certainty that its full potential will be achieved every time.

These views are supported by a number of cases reported in the business press. The US Government's General Services Administration had been criticized following embarrassing revelations that it was unreliable and error prone (KableNet, 2002), while the British government decided not to extend its pilot e-procurement system across Whitehall (KableNet, 2002). In a similar vein, Bell (2003), Doesburg (2003), and Gifford (2003) report that the New Zealand Government's procure e-procurement system has proved more complex to develop than expected, while the UK Ministry of Defense is yet to achieve savings three years after its e-Procurement service first started running (KableNet, 2003). According to Garson (2004), the State of South Carolina abandoned its e-Procurement system in June 2002 and pilot projects were shut down in 2002 in Massachusetts, Indiana, and Michigan. The Virginia state auditor reported only 1.5 percent of the state's business was transacted through its state-of-the-art \$USD14.9 million system (Garson, 2004).

There is, however, a view that the rumors of e-procurement demise have been greatly exaggerated (Harris, 2002). For example, Davila, Gupta and Palmer (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. Similarly, Barua (2001) identified e-procurement as the element of e-business most contributory towards the e-Business operational excellence of large corporations.

Such success and failure stories imply that there is a need for a much better understanding of CSFs in regards to the e-procurement implementations and use in the public sector. Tonkin (2003, p. 13) provides a succinct summary of this sector's relationship with e-procurement: public sector cannot afford to uncritically follow the latest fads and fashions; it can, however, form a strong base of self-knowledge, confidence and with an eye to the future becomes an innovator in this.

2.6.4 E-Procurement Success Factors

There are various success factors to be considered for the realization of e-procurement. However, only critical ones would be carefully reviewed for the purpose of this research.

2.6.4.1 End-User 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 (WB, 2003).

End-users can realize the immediate benefits of the e-procurement system once they understand the operational functionalities (CGEC, 2002). This means that training should be given a high priority, alongside the need for public sector agencies to identify the skills required by all those engaged in procurement (ECOM, 2002).

As technology alone does not ensure successful adoption, the success of a public sector e-procurement initiative depends on users and buyers making use of the new process and system. The solution must attract end users to view e-procurement as the preferred means by which to purchase goods and services (KPMG, 2001). The success of the project also depends on communication to the users (Birks, Bond, & Radford, 2001).

According to the CGEC (2002), the two major obstacles to increasing support among users are their level of technological awareness and acceptance, and their willingness to change long established internal business processes. As the implementation process develops, periodic user satisfaction surveys may identify the possible need for additional training (OSD, 2001).

2.6.4.2 Supplier Adoption

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 such as various options in developing and maintaining supplier catalogues (Birks et al., 2001). According to the OSD (2001), providing opportunities for suppliers to offer their feedback will allow the public procurement department to monitor areas for improvement and adjust practices accordingly. Because many suppliers may be unwilling to conduct business electronically with public sector agencies because they are unclear about the benefits to be gained, they might see e-procurement as a means by which public sector agencies will simply attempt to force down prices (ECOM, 2002). Suppliers, therefore, should be educated on the e-procurement benefits that can be provided to them through a process of consultation as early as possible in the project. The degree to which the success of an e-procurement initiative can be realized may well be related to the level of readiness of suppliers, and appropriate communication with suppliers is therefore important (AOT, 2003).

2.6.4.3 Compliance with Best Practice for Business Case/Project Management

E-procurement initiatives only deliver the planned benefits if the users and buyers make changes to the way they work, which requires championing the project and senior management sponsorship. Specifically important, but also challenging, is ensuring (Birks et al., 2001). Birks et al. (2001) suggest that the business case processes for e-procurement should include identifying drivers, understanding the starting point, benefits, approaches, affordability, risks, and benefit realization. To ensure achievement of the e-procurement objectives, the implementation project should proceed, as far as possible, in alignment with the business case.

2.6.4.4 System Integration

It is very important to determine the level of integration required between the e-procurement 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). It is also critical to link the e-procurement system to the financial management system in order to facilitate the process of online payment to suppliers (WB, 2003). It is necessary for purchase transactions carried out through an electronic ordering transaction support system to be reflected in an agency's Financial Management Systems and communicated to suppliers for fulfillment (DOF, 2001).

2.6.4.5 Security and Authentication

Because of the sensitivity of the government data and the legal nature of orders, procuring and payments, security of data is critical in e-procurement systems. The system must have mechanisms for identifying and authenticating the user who procures for a project so that the tender knows it is safe to submit its bid. In an e-procurement environment, Birks et al (2001) relate the security requirements at the e-procurement stage to authentication, arguing that e-Purchasing systems and processes need protection because they involve a financial transaction and may be vulnerable to fraud. Stenning and Associates (2003) highlight the need for transactions between different systems to be exchanged in secure ways with absolute assurances regarding the identities of the buyers and suppliers. 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.

2.6.4.6 Re-engineering the Process

E-procurement should be viewed as an enabling mechanism to make the process of procurement more efficient in terms of cost, time, and achievement of value for money (ECOM, 2002). Where existing procurement practices and procedures may contradict the goals and objectives of the new initiative, the implementation of e-procurement will require the re-engineering of existing purchasing processes (KPMG, 2001). Birks, et al (2001) note that roles and responsibilities might change substantially with the new process which requires staff to adapt according to these.

According to the Stenning and Associates Report (2003), as a significant proportion of the benefits to be gained from implementing e-procurement initiatives are related to the changes made through process re-engineering rather than the implementation of the e-Procurement initiatives themselves,

existing processes for dealing with procurement will need to be revised. Birks et al. (2001) suggest that the process of reengineering should not only address process but also supplier relationships and all the internal groups affected by procurement.

2.6.4.7 Performance Measurement

The continuous measurement of the key benefits 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). Establishing goals and baselines is very important. According to CGEC (2002), a general lack of measurement capability ensures management has only limited tools for assessing organizational progress. It is important to define key performance indicators (KPIs) early in the process to enable successful benefits tracking and distil the business case into measurable KPIs. These KPIs should then be monitored throughout the project.

2.6.4.8 Top Management Support

There is little doubt that senior management leadership is critical to the success of an e-procurement implementation (AGV, 2003). The top management team (steering committee) must involve the project manager, any consultants working with the committee, and agency staff to develop an implementation strategy (ECOM, 2002). In this regard, considerable attention and support need to be provided by senior management to ensure that the procurement reform has been well understood in the agency (S&A, 2003). Furthermore, the executive management team is responsible for setting the vision and goals, bringing about collective commitment for change in process and organizational structures, and formulating the policies and strategies necessary to put an e-procurement initiative in place (WB, 2003).

2.6.4.9 Change Management Program

Changes required supporting business processes are directly related to the speed of adoption of e-procurement. With change management issues seeming to become more substantial as stakeholder needs increase (CGEC, 2002). The OGC (2002) recommends that increasing change in underlying processes requires more learning and effort on the part of users. Consequently, the OGC suggest more attention should be given to change management issues, citing three ways to achieve successful change management for e-procurement: consultation, communication, and issue resolution (OGC, 2002).

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

2.6.4.10 Communication Standards

E-procurement requires various tenders systems to exchange information and electronic documents. This requires common standards. It seems that there is agreement emerging on the adoption of extensible Markup Language (XML) as the basis for standards (S&A, 2003). The XML standard defines the content in communication and in the selection of general data formats (KPMG, 2001). In defining e-procurement requirements, Birks et al., (2001) claim a key concern is the standard for formatting electronic catalogues. 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.

2.7 STATE OF THE ART OF E-PROCUREMENT IN VARIOUS COUNTRIES

The current table below provides the background analysis on the information gathered from various States that eventually led to the adoption of e-procurement practices. The study considered some systems from some European countries. The analysis of the Member States e-Procurement programs and their existing systems is performed through an established evaluation methodology, which standardizes the way they are examined.

2.7.1 Belgium

The Federal Public Services of Information and Communication Technologies (FedICT) is the Belgian public organization responsible for defining the e-Procurement federal recommendations. These recommendations are applicable in all three economically autonomous regions of the country (Brussels-Capital Region, Flemish Region, and the Walloon Region). In particular, the role of FedICT is summarized below:

- ❖ develop a common Belgian strategy for e-Government projects
- ❖ establish uniform IT standards, including technical architecture and implementation methodology
- ❖ assist federal public departments to implement the strategy

❖ monitor the execution of e-Government projects and services Drawing on the laws and regulations sponsored by the FedICT, the Service Public Fédéral (SPF) of the Ministry of Defense (MoD) took the lead for the initial development and deployment of the first building bricks of the federal e-tendering initiative. This resulted in the deployment of a total of three portals. The Belgian MoD operates the first portal, whereas the second is implemented for all Pouvoirs Adjudicateurs du Niveau Fédéral (amongst other SPFs and equivalent federal bodies) under a wide FedICT's sponsorship. The third portal comes under the Bulletin of the Adjudications (BDA), a federal entity responsible for the publication of RFPs for all Belgian public entities, has a special role for hosting and providing an e-meeting place for all federal e-Notifications. Currently, there is a common distributed government-wide portal named JEPP based on the integrated JEPP application. In the context of this report, the approach to e-Procurement followed by the Belgian MoD was reviewed and an analysis of the JEPP system was carried out. This was based on technical documentation and filled questionnaire provided by the Belgian MoD. Furthermore, an on-line demonstration of the platform was attended during a mission to the Belgian MoD, where discussion was carried out about its technical capabilities, the experiences gained through its operation, and the steps forward. The JEPP platform provides a standardized toolbox for developing and hosting organization- specific e-Procurement portals. Through this platform, public organizations are enabled to establish a gateway to e-Procurement, without significant upfront investments (software and/or hardware costs) using a "buy a little, test a little, yield a little" iterative strategy (European Communities, 2004).

Table 2.4 Belgium Federal e-Procurement approach

Feature	Description
Administration involved	Ministry of Defense (MoD)
Project (s)	<p>JEPP</p> <p>Objectives:</p> <ul style="list-style-type: none"> ❖ Replace paper-based public purchasing procedures ❖ Accelerate the traditional procurement processes
Technology Provider	Unisys Consulting
System(s)	<p>JEPP launched during the last quarter of 2002</p> <ul style="list-style-type: none"> ❖ Common platform capable of hosting several e-Notification portals ❖ FedICT, MoD and BDA portals currently hosted ❖ Web-based approach ❖ Microsoft Technologies utilised ❖ Current version supports: <ul style="list-style-type: none"> – electronic publication of notices and invitations to tenderers – re-organisation of back-office processes
Step Forward	<p>Further developments comprise:</p> <ul style="list-style-type: none"> ❖ Electronic submission of tenders ❖ Secure opening, evaluation and ranking of tenders ❖ E-Catalogues ❖ e-Payment (referred as “e-Payable”)

Source: State of Art Volume II

The following table provides an overview of the most important features of the JEPP platform.

Table 2.5 European Communities 2004

System feature	System Implementation details
Functionality overview	<ol style="list-style-type: none"> 1. Tools for online preparation and publication of call for tenders notices 2. Publication of call for tenders notices and periodical schedules of procurement needs 3. Management of the terms of references and other related documents (e.g. answers to particular questions received by fax or email)
Exploitation model	<ul style="list-style-type: none"> • Hosted service • Contracting authorities: two models: <p><u>Hosted Application Service Provider (ASP):</u></p> <ol style="list-style-type: none"> 1. Portal hosted by Unisys Consulting's facilities and infrastructure 2. Based on an annual subscription and maintenance fee 3. Fees may be related to the utilization of the system resources provided by the hosting authority 4. For small administrations publishing very few tenders per year, the possibility of paying per publication could be offered <p>This model was chosen by the FedICT</p> <p><u>Self-supporting ASP:</u></p> <ul style="list-style-type: none"> - Portal hosted under the contracting authority's own facilities and infrastructure - Administrations are responsible for hardware and software costs, the licensing and maintenance of the application - This model was chosen and explored by the MoD <p><u>Suppliers:</u> No cost</p>

Technology used	<ul style="list-style-type: none"> - Microsoft .NET technology utilized - XML could be used as the communication interface between the BDA portal and the different public sector portals (ministries, regional, and municipal governments) - JEPP portals uses mainly Microsoft Windows 2000 and Microsoft SQL Server 2000
Security policy	<ul style="list-style-type: none"> - Authentication is performed through the use of user credentials (username and password) - A central user authentication module associates users with roles and access/privilege rights - Only authorised users can gain access to restricted system resources , based on their role/access rights - Exchange of information between the different portals and the common portal is achieved using SQL synchronization mechanism
Means of communication	<ul style="list-style-type: none"> - Email is the primary communication mean between the system and the suppliers (building on Extended SMTP protocol) - XML on ESMTP will be the main data exchange mean between OJEU, BDA and the JEPP system. - All users have access to a notification engine, for retrieving existing or new opportunities, either within a single portal or across all portals. This could be done through web-browsing or through tailored e-mail notification with appropriate URL links
Document treatment	<ul style="list-style-type: none"> - System supports mainly two document standards: Microsoft Office Suite and PDF - Call documentation is published in the two official languages of Belgium - Supports CPV and NUTS (Nomenclature des Unités Territoriales Statistiques)
Actors	<ul style="list-style-type: none"> - <u>Procurement officer (UA)</u>: accredited users - <u>Supplier (NUA)</u> : not accredited users - <u>Local management cell (CP)</u>: responsible for the management of local users - <u>System management cell (CPP)</u>: responsible for the management of every possible federal contracting authority - <u>Statistical users</u>: responsible for e-Notification

2.7.1.1 JEPP state-of-the-art features assessment

The following table presents an assessment of JEPP features against the state-of-the-art, as required by the new legislative framework, or identified during the analysis of the current project. The upper part of the table presents all functional aspects in terms of the e-Procurement lifecycle, while the lower part demonstrates overall technical qualities of the system.

Table 2.6:JEPP coverage of the new legislature framework on e-procurement.

e-Procurement lifecycle	Required Functional Details	System Implementation Details
e-Notification support	Documentation preparation	Tool for preparing call documentation online
	Contract Notification	Suppliers can download published call documentation
	Integration to OJEU	Automated publication to OJEU(ongoing)
e-Tendering support	Request to participate	Through email provided by supplier for downloading tender documentation
	Short listing of tenderers	Not Currently Supported
	Invitation to tender	
	Tender Submission	
	Updating of tenders	
e-Awarding support	Locking of tenders	Not Currently Supported
	Tender opening	
	Tender evaluation	
	e-Auctions	
	Contract Award	
Back Office support	Award Notification	Pre-defined reports for competition
	Pre-defined reports	
	Monitoring of logs	
Legislative principles	Statistical analysis	Create reports using system logs
		Performed through statistical user profile
Legislative principles	Required Functional Details	System Implementation Details

Equal amount of information	Automated notification	Achieved through email
	Questions and Answers	Answers provided within call supported documentation
Pan-European standards	International Coding	Achieved through email
	Document standards	MS Office and PDF formats currently used
Unrestricted access to information	Full competition documentation	Competition details are included in the published notices
Interoperability	System accessibility	Web-based system
	No software/hardware requirements	Only an Internet-enabled PC is required
	Multilingualism support	System is in Dutch, French, English and German Support for all European languages
	Localiation parameterization	Only customisation of logo Parameterization is supported by the system, but currently not used
Confidential nature of data	User profile	Users authentication is performed through the use of username and password. User profile defines what data
	N/A Locking of supplier	e-tendering
	N/A Encryption when tenders are stored	
Four eyes principle	N/A Two officials to open tenders	
Authentication	N/A Authentication of tenders	

Source: European Communities 2004

2.7.1.2 Description of JEPP platform functionality

The following table summarizes the functionality supported by JEPP system

Table 2.7: JEPP Functionality

Activity	Actor	Description
Creation of call for tenders notice	Procurement officer	Online preparation of call documentation using a form filling tool. Online forms compatible with the definition provided by OJEU. Notices created in French and Dutch (Belgium’s official languages).
Terms of Reference & other call related documents	Procurement officer	Uploaded in the two official languages by authorised users Documents uploaded in two formats DOC and PDF
Publishing of a call for tenders notice	Local management cell	Call documentation can be scheduled for publication by authorised users using the scheduler tool
Notification during call publication	System	1. Supplier defines a set of multiple criteria (e.g. market activities and preferences) 2. An algorithm matches published business opportunities (i.e. calls) with criteria pre-defined by suppliers
Browsing call for tenders notices & Downloading terms of reference	Supplier	1. Perform quick or advanced search on a specific JEPP portal or on all available JEPP portals 2. For calls of tenders under the open procedure, documentation is available to all users (public and registered). Provision of email allows for the downloading of call documentation. 3. For calls under the restricted procedure, a secret code is communicated to participating suppliers, to be used for downloading tender documentation 4. System facilitates the use of notifications, in case of modifications on call documentation
Updating call documentation	Procurement officer	Published notices and documentation is locked by the system Call documentation can only be modified by authorised users only by use of a corrective notice Suppliers that have selected the automated notification option are notified by e-mail

Registration of Procurement Agency	Procurement officer	Performed by BDA's CPP personnel
Supplier Registration & User Preferences	Supplier	Required information comprises login name, family name, company name, preferred market activities, and industrial preferences/ specialties User profile stored on common portal
Procurement Officer Authentication & Authorisation	Procurement officer	Authorisation performed at the portal level, authentication is performed at the application level Access to resources is granted based on user identity (access rights)
Supplier Authentication & Authorisation	Supplier	Optional central authorization and authentication performed at the common portal (application level) Suppliers can access all JEPP portals freely and at no-cost

Source: European Communities 2004

2.7.2 United Kingdom (Scotland)

Acting as the administrative arm of the Government of Scotland since its establishment, in 1999, the Scottish Executive is involved in different public sector management activities, comprising health, justice, education, rural affairs, and transport. The Ministry for Finance and Public Services of the Scottish Executive is responsible for the public spending in Scotland, as well as, for establishing the procurement policy applied for all public sector procurement.

In November 2001, the Scottish Executive launched the e-Procurement Scotland (ePS) project, with main objective to provide contracting authorities with all necessary services for performing electronically their procurement activities. The following table presents an overview of the ePS project.

Table 2.8: Scottish Executive e-procurement approach

Feature	Description
Administration involved	Scottish Executive
Project (s)	<p>ePS launched in 2001</p> <p>Objectives:</p> <p>Develop an open e-Procurement platform accessible to all public sector buyers and suppliers</p> <p>Cover all the phases of e-Procurement lifecycle</p> <p>Supports a Supplier Adoption initiative: a methodology to assist suppliers convert their business procurement operations to electronic processes</p> <p>Applies set-up and subscription costs for participating contracting authorities</p>
Technology Provider	<ul style="list-style-type: none"> ○ Cap Gemini Ernst & Young ○ Elcom
System(s)	<p>Dynamic Trade Centre (DTC) □ Currently supports procurement of individual contracts</p> <p>PECOS</p> <p>A repetitive purchases system that currently supports purchases under framework agreements</p> <p>Supplier Adoption Database</p> <p>An application for assisting the adoption of suppliers to e-Procurement following an established methodology</p> <p>e-Catalogues converter</p> <p>An application used for transforming electronic catalogues maintained by suppliers into PECOS format</p>
Step Forward	<p>Further enhance the functionality supported by DTC:</p> <ul style="list-style-type: none"> ➤ preparation of PINs ➤ Web Forms for PQQ and bid submission ➤ Automated scoring

Source: European Communities 2004

2.7.2.1 DTC – Scottish Executive (UK/Scotland)

The Dynamic Trade Centre (DTC) offered by the Scottish Executive is an e-Procurement system currently covering the phases of e-Notification and e-Tendering. DTC fully supports the processes of negotiated competitions with/without notification, the submission, and the opening of tenders for individual contracts. DTC is an “off-the-shelf” system (Elcom’s eRFx), configured according to the workflows of the Scottish regulations on e-Procurement. The system offers built-in functionality for automatically evaluating tenders and organizing e-Auctions. However, this functionality is not activated at the moment. The following table presents an overview of the most important features of the DTC system.

Table 2.9: DTC system overview

System feature	System Implementation details
Functionality overview	Negotiated with/without notification competitions Submission of tenders Opening of tenders Online evaluation of tenders (not currently activated) eAuctions (not currently activated)
Exploitation model	<ul style="list-style-type: none">▪ Subscription fees for contracting authorities▪ <u>Contracting authorities:</u><ul style="list-style-type: none">➤ Set -up fee of about £80.000➤ Annual subscription is £60.000 in the first year, gradually reduced to £45.000 for the sixth year➤ Fees include analysis of estimating expected savings, due to the Utilisation of the system➤ Fees also include the usage of PECOS and other ePS secondary applications <u>Suppliers:</u> No cost
Actors	Buyer: responsible for the: Creation of tender documentation Notification of supplier base for upcoming competition Answering to supplier questions <u>Supplier:</u> responsible for the: Downloading of the Pre-Qualification Questionnaire (PQQ) and Invitation to Tender (ITT) Uploading of the completed PQQ and bidding documentation
Technology used	Hosted service developed based on Java technologies

Security policy	<p>Authentication is performed through the use of user credentials (username and password)</p> <ul style="list-style-type: none"> - Use of SSL for secure communication - No use of digital signatures
Means of communication	<p>Email is the primary communication medium used for;</p> <p>Reporting the stage of each competition (i.e. updated documents, new questions and/or answers, etc), but not for exchanging documents with sensitive information.</p> <p>Each supplier has a functional “inbox” within the system, allowing for the:</p> <p>trailing of all previous communications</p> <p>monitoring email communications that have not been read</p>
Document treatment	<p>System treats documents as attachments, which can be of any type.</p> <p>Call documentation and tenders are prepared offline utilising commercial programs.</p> <p>No technical solutions for virus infected or corrupted offers</p>
Tender box	<p>Submitted tenders are stored in a “tender box”, which is used for the:</p> <p>Secure locking of tenders</p> <p>Denial of access to users, until pre-defined tender opening time</p> <p>Tenders are not encrypted while locked by the tender box.</p> <p>Automatic opening of tenders</p> <p>Stored tender documents are not encrypted</p> <ul style="list-style-type: none"> - Tenders open automatically, not following the four eye principle
Offline activities	<ul style="list-style-type: none"> - Both online and offline activities are supported during the tendering period - Suppliers can choose to download the call documentation online and then submit the tender offline, and vice-versa.
Multilingualism	<p>Uploaded call documentation can be in any language</p> <ul style="list-style-type: none"> - The GUI of the system is provided only in English

Source: European Communities 2004

2.7.2.2 DTC state-of-the-art features assessment

The following table presents an assessment of DTC features against the state-of-the-art, as required by the new legislative framework, or identified during the analysis of the current project. The upper part of the table presents all functional aspects in terms of the e-Procurement lifecycle, while the lower part demonstrates overall technical qualities of the system.

Table 2.10: Scottish State of the Art

e-Procurement lifecycle	Required Functional Details	System Implementation Details
e-Notification support	Documentation preparation	<ul style="list-style-type: none">➤ Documents prepared offline➤ No workflow support➤ Document templates assist users to (compose the PIN
	Contract Notification	Suppliers are notified via email Suppliers can download the tender (documentation from the relevant section No build-in publication board
	Integration to OJEU	Suppliers can prepare an RTP offline and then upload it on the designated upload section
e-Tendering support	Request to participate	Through email provided by supplier for downloading tender documentation
	Short listing of tenders	Short-listing is performed offline . The system can support automated evaluation of Web Forms, which is in the (future plans of enrolment
	Invitation to tender	Achieved via email
	Tender Submission	Suppliers can prepare tender documentation offline and then upload it on the designated upload section Suppliers can update their tender documentation offline and then upload it on the designated upload section. The previous version of the tender documentation is automatically deleted
	Updating of tenders	“Tender box” functionality locks the tenders Tenders remain inaccessible by system (users, until the tender opening time Tenders are not encrypted - they can be (accessed only by

	Locking of tenders	<p>system administrators</p> <p>“Tender box” functionality opens tenders automatically, when the tender opening time arrives</p> <p>Tender opening time can be modified by the buyer</p> <p>The Four Eyes Principle is not supported.</p> <p>The opening of technical and financial (offers in two phases is not supported</p>
	Tender evaluation	<p>Evaluation is performed offline</p> <p>The system can support automated (evaluation if Web Forms are used, which is in the future plans of enrolment</p>
E-Awarding	e-Auctions	Not supported
	Contract Award	Not supported
	Tender evaluation	Performed manually and published on the bulletin board
	Award Notification	
Back Office support	Pre-defined reports	Pre-defined reports for competition
	Monitoring of logs	Create reports using system logs
	Statistical analysis	Performed through statistical user profile
Equal amount of information	Automated notification	Achieved through email
	Questions and Answers	System supports a bulletin board for Q&A sessions
Pan-European standards	International Coding	Notifications abide to CPV standards
	Document standards	MS Office and PDF format s currently used
Unrestricted access to information	Full competition documentation	<p>Competition details are published in the e-Notification phase</p> <p>Training and user manuals are available for educating suppliers on how to use the system</p>
Confidential nature of data	User profiles	<p>User authentication is performed through the use of username and password</p> <p>User profiles define what data each user has access to</p>

Interoperability	System accessibility	Web-based system Only an Internet-enabled PC is required
	No software/hardware requirements	
	Multilingualism support	System is in English Call documentation and tenders can be in (any language (currently in English))
	Localisation parameterization	Does not support Localisation of GUI
Restricted access to tenders	Locking of supplier tenders	"Tender box" locks tenders as soon as they are uploaded by suppliers
	Encryption when tenders are stored	Tenders are not encrypted
Four eyes principle	Two officials to open tenders	Tenders are unlocked automatically when the tender opening time is reached
Authentication	Authentication of tenders	Through the use of credentials
Call for Tenders specifications	Compliant with call for tenders specification	Tenders are free-text documents and there is no automated mechanism to ensure compliance with call for tenders specifications
Security	Usage of SSL	Enabled
	Data encryption	Not supported
	Digital Signature	Not supported

European Communities 2004Source:

2.7.2.3 Analysis of DTC system functionality

This section presents in a systematic manner the functionality supported by DTC. The functionality is presented under a workflow of activities, from the creation of call documentation to tender opening, for the Buyer and the Supplier actors supported by the system.

Table 2.11: DTC functionality Overview

Activity	Actor	Description
Creation of call for tenders notice	Buyer	<ul style="list-style-type: none"> ➤ Call documentation is currently created offline, usually in PDF files and then uploaded onto the system ➤ No workflow support for assisting the user to create the required documentation ➤ No workflow for the hierarchical approval of documentation ➤ Pre-defined templates can guide the buyer into completing the (required notification documents) ➤ DTC supports the online creation of call documentation and tenders, (utilising customizable Web Forms (not currently used)) ➤ Web Forms will be considered as a future enhancement and will occur in a phased approach ➤ Web Forms will allow the automated evaluation of tenders and Pre-qualification questionnaires (PQQs)
Notification for Negotiated with advertisement Procedure	Buyer	<ul style="list-style-type: none"> ➤ Notification of suppliers achieved via email ➤ Buyer needs to input all email addresses of the required suppliers ➤ System emails the selected suppliers with details on how to register
Registration	Supplier	<ul style="list-style-type: none"> ➤ Once receiving an email, a supplier can register into the system ➤ Registration does not require any complicated information on behalf (of the supplier). ➤ No costs are involved
Browsing Questions and Answers / Posting Questions	Supplier	<ul style="list-style-type: none"> ➤ System supports Q&A sessions by providing the functionality of a standardised bulletin board, moderated by staff of the buyers ➤ Supplier can browse through the Q&A session and gain access to all published questions and answers ➤ Supplier can post a question to the bulletin board ➤ All questions are moderated by the buyer (if a question is not approved by the buyer, it is not accessible by suppliers)
Answering Questions	Buyer	<ul style="list-style-type: none"> ➤ Buyer needs to validate (approve or modify) a question, as posed by a supplier before providing an answer (for ensuring confidentiality) ➤ As soon as a question is replied by the buyer, it is visible by all suppliers, thus ensuring equal treatment

Updating call documentation	Buyer	When call documentation is modified, all participating suppliers are notified via email, as the system is aware of all suppliers that downloaded previous versions
Tender submission	Supplier	<ul style="list-style-type: none"> ➤ Tenders are prepared offline and then uploaded to the system ➤ Tender documentation is usually prepared in PDF format but system (can accept any file format ➤ Once a tender is uploaded onto the system, it is locked and inaccessible until the tender submission deadline and the opening of tenders
Updating tender documentation	Supplier	<ul style="list-style-type: none"> ➤ Tender documentation can be updated by the supplier any time before the tender submission deadline ➤ System automatically disregards previous versions of tenders and considers the latest version as the only valid one
Tender submission deadline extension	Supplier	<ul style="list-style-type: none"> ➤ Tender submission deadline can be extended by the buyer at any time, during the submission period ➤ All participating suppliers are automatically notified via email for any extension of submission deadline, as their email addresses are available to the system
Procurement Officer Authentication & Authorisation	Procurement officer	<ul style="list-style-type: none"> ➤ Authorisation performed at the portal level, authentication is performed at the application level ➤ Access to resources is granted based on user identity (access rights)
Tender opening	System	<ul style="list-style-type: none"> ➤ Uploaded tenders are locked into the system and are inaccessible until the tender submission deadline is reached ➤ When the tender submission deadline is reached, all tenders are opened automatically and made available to the contracting authorities staff ➤ The system allows for the setting of different times for tender submission deadline and tender opening date/time, the former being the deadline for system accepting tenders and the latter being the exact time when all tenders are opened (this functionality is not currently activated)

Source: European Communities 2004

2.8 E-PROCUREMENT IMPLEMENTATION PERSPECTIVES AND OBSERVATION

E-procurement solutions are seen as a way to address many public sector procurement requirements. It has become apparent that the more the procurement process is supported by Internet technology, the easier it will become to develop and implement e-procurement. The e-procurement infrastructure and procedures can facilitate the achievement of the principles including transparency and accountability requirements of the public offices while enhancing efficiency, effectiveness, and flexibility in the procurement process (DOFA, 2002). E-procurement has the potential to promote operating efficiency in public sector procurement and provide significant cost savings (OCIO, 2000). One of key logical advantages of electronic transaction management is that it frees procurement staff for procurement evaluation and contract management roles. Furthermore, management information can be extracted from the e-procurement system using standard reporting software (OGC, 2002). The transparent management information provided by e-procurement also permits the monitoring of compliance with service level agreements and measurement of many other elements of supplier performance (OSD, 2001).

The implementation of e-procurement initiatives should be seen as an effort to improve the procurement goals, which normally include quality; timeliness; cost; minimizing business, financial and technical risks; maximizing competition; and maintaining integrity (Thai, 2001). In a similar vein, CGEC (2002) has identified cost, quality, program management progress measures (on time, on budget, and issue management), process performance factors, and Return on Investment as the most relevant measurements. There remains, however, the challenge of controlling the range of variables required to reap the benefits of e-procurement implementation. It should be remembered that because an e-procurement initiative is expensive, demanding upon staff, and time consuming, it may take several years for public sector agencies to fully reap the strategic and operational benefits of e-procurement.

2.9 CONCLUSIONS

A survey on a number of issues on e-procurement initiatives in the UK (Scotland), Belgium, France, Australian etc. public sectors are readily available to practitioners and decision makers. The survey was a conceptual model showing a number of unique factors regarded as instrumental in the success of public sector e-procurement implementation. For example, it was found that e-procurement projects have a greater reach and scope than traditional tendering projects. Security and controls, and standards and interfaces emerged as more important requirements than those in other IT projects.

Key differences in the approach to the development of e-procurement projects were also noted during the study. Interestingly, the legal and legislative issues did not emerge as SFs, although factors such as top management support and performance measurement were found to be critical projects.

Another key difference was that e-procurement projects tend to be more incremental and component driven and thus rely less on traditional systems development life cycle (SDLC) methods. Instead, developing business cases and undertaking pilot projects were found to be more common practices in e-procurement projects. As the management of e-procurement projects includes the involvement of a significant number of internal and external stakeholders (i.e., buyers, end-users, suppliers, service providers, consultants, an individual seller, and sponsors), the importance of stakeholder involvement cannot be under-estimated. This conclusion is drawn from the findings of various Thesis that user uptake and training turned out to be the most important factor followed by supplier adoption.

This paper also discussed some measures for the success of an e-procurement implementation initiative to be determined by measuring user and supplier satisfaction. It became apparent from the literature that public sector e-procurement initiatives must also focus on interoperability, transparency, and accountability issues.

Although the introduction of e-procurement has created a lot of enthusiasm in the press, many studies indicate that many public sector agencies are still at an early stage of implementation. Evidence in relation to the implementation of e-procurement initiatives indicates that this transition is turning out to be a major challenge for many public sector agencies at a time when governments worldwide are focusing on e-procurement as part of their e-Government agenda. Once the SFs are selected, it is critical to identify the measures of their success. Given the assertion that both human and technological factors play a more important role in the successful implementation of e-procurement initiatives, the findings of this study may assist senior procurement professionals and e-procurement project managers in the public sector to establish a system of progress assessment and decision-making in regards to their e-procurement initiatives. A focus on reliable SFs can help reduce the time required for e-procurement implementation and result in economic benefits for an organization in line with its strategic and operational objectives.

CHAPTER THREE

METHODOLOGY

3.1 INTRODUCTION

This chapter presents information related to the research strategy, research design, data collection method, description of the population and sampling employed.

3.2 RESEARCH STRATEGY

In the previous chapter, many concepts were applied based on the research question. To follow and understand the study of this research, the researcher used both quantitative and qualitative approach in this research.

3.3 RESEARCH DESIGN

There is no single blueprint for planning a research. The research design is governed by the notion of “fitness of purpose”. As such, there are five prominent research designs in conducting research, namely;

1. Experimental and related designs (such as the quasi-experiment);
2. Cross-sectional design, the most common form of which is the survey research;
3. Longitudinal design and its various forms, such as the panel study and the cohort study;
4. Case design;
5. Comparative design

Bryman (2008) as cited by Afriyie (2010)

For the purpose of this research, a cross sectional survey type of research design was employed. A questionnaire was used to obtain information from a population comprising both Procurement Officers and MMDs Engineers in Central Region.

3.4 SAMPLING TECHNIQUE

There are Sixteen (16) MMDAs in Central Region. As a result of this, the researcher decided to use a convenient sample size of thirty two (32). Sixteen (16) from Procurement Officers and Sixteen (16) from MMDAs Engineers. The sampling technique employed was the snowball technique, as the distribution of the questioners was not restricted to a particular group of Engineers and Procurement Officers. The researcher with the help of Supervisor was able to send out questionnaires to the various MMDAs in Central Region.

3.5 DATA COLLECTION

Data was collected mainly using the administration of questionnaires, as that helped the researcher gain proper data and in depth knowledge on things worth being noted. The questionnaires for this survey were entirely hand-delivered and received from the respondents. The response was taken from both Engineers and Procurement Officers at the MMDAs in Central Region. This is because procurement process and all associated activities are mainly managed and controlled by these officers at the various MMDAs.

According to Saunders (2007), questionnaire is used for explanatory research, which will enable the study to examine and explain relationships between variables, in particular cause-and-effect relationships. In all, 32 questionnaires were sent out for this study and out of this figure, 16 were given to procurement Officers and the rest of the 16 given to the Engineers. All the respondents answered the questionnaires. The questionnaire consisted of closed ended questions, based on the objectives of the research and can be found in the appendices.

3.6 PRE-TEST

In order to test the reliability and validity of the data collection instrument, pre-test was carried out. There was a reconnaissance study in order to pre-test the instruments. This stage revealed the suitability of the methods and instruments that were employed in the study. This consequently led to early detection of errors and distortions in the questionnaire, which were corrected in the process. This helped the researcher to familiarize himself with the research environment and also offered the opportunity to practice research in real situation before the main study began.

3.7 RESEARCH INSTRUMENT

The questionnaire consisted of 6 main sections. Section 1 sought background information on the respondents; the name of organization, designation and their addresses. The purpose was to obtain respondent information that could be used as moderating variables. Section 2 also sought to find out the MMDAs belong to and the respondent's level of involvement with e-procurement. Section 3 was designed to determine the current practice of E-Procurement by the various MMDAs in Central Region on a 5-point likert scale. Section 4 also sought the opinions of respondents concerning the MMDAs capacities of handling e-procurement and the implementers of e-procurement. This section also sought to establish the readiness of MMDAs level of attainment of e-procurement. Section 5 assessed the opinion of respondents on the benefits of using e-procurement by using a likertscale ranging from "Strongly Agree" to "Strongly Disagree". Section 6 assessed the opinion of

respondents on the constraints of using e-procurement by using a likertscale ranging from “Strongly Agree” to “Strongly Disagree”. Section 7 asked respondents to make recommendations on how to make e-procurement a vital part of the Ghanaian procurement system.

3.8 SOURCE OF DATA AND DATA ANALYSIS

For the purpose of this research, the main source of secondary information was acquired from available literature; online and research articles from the library. Primary data were obtained from the questionnaires administered and the responds were analysed using the IBM SPSS statistics 19 software and presented as tables and charts in chapter four of the research document. All information collected from the survey were checked for accuracy and the data analysed to obtain the frequencies and percentages, using the statistical descriptive analysis. For sections 5 and 6 of the questionnaire that was based on the likert scale as a means of ranking variables, the responses were analysed using the mean score as it avoids neutral answers that do not provide any idea whether a variable is important or not. The mean score for each factor was calculated using the formula:

$$MS = \frac{\sum(f \times S)}{N}$$

Where **MS** is the mean score, *f* is the frequency of the responses to each rating, *S* is the score given to each variable by the respondents and *N* is the total number of responses concerning the factor. The mean responses were then ranked using Microsoft Excel and the results presented in a form of table.

CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION

4.1 INTRODUCTION

This chapter mainly deals with the interpretation of raw data and findings with respect to the project topic under study. The results of the survey have been analyzed using the SPSS software and presented in tables, figures and text forms. In all, thirty two (32) questionnaires were sent out for this study and out of this figure, 16 were given to procurement Officers and 16 were given to the Engineers. All the questionnaires were retrieved.

This chapter has been sectioned out with respect to respondents profile, general e-tendering questions, opportunities to using e-tendering in Ghana, advantages to using e-tendering and the disadvantages to using e-tendering in Ghana.

4.2 DEMOGRAPHY

Questions were posed to respondents using the questionnaire to find out basic information on matters such as; years of experience with organisation, designation at the organisation, place of work etc.

4.2.1 Years of Experience with Organisation

The first question sought to find out the years of experience with organisation, with the idea that the years of experience could affect his level of awareness of the e-procurement system and how effectively, he would be able to use the system if he should be aware. All the respondents answered the questions.

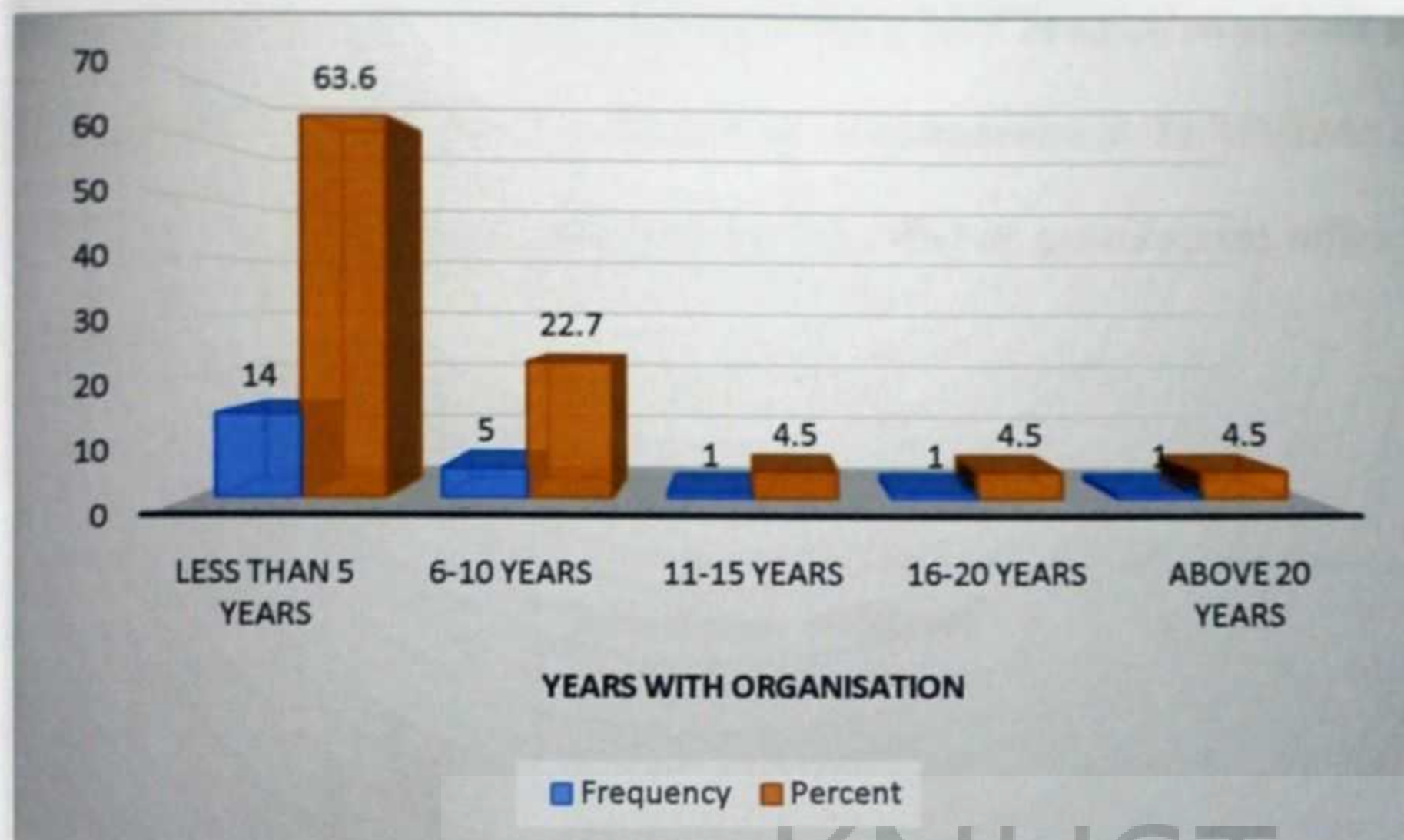


Figure: 4.1 Years of experience with organisation

The results showed that the largest group of professionals both the procurement officers and engineers who participated in this survey had working experience of not more than 5 years making a total of 63.6% of respondents in the range of 1-5 years working experience from the above figure, followed by (22.7%) being respondents from professionals within six(6) years but less than ten (10) years experience as the second highest. Those within 11-15 years (4.5%) 16-20 years (4.5%) and above 20 years (4.5%) of working experience followed respectively. This trend clearly shows that, most engineers and procurement officers at the MMDAs have had some experience to e-procurement. And since e-procurement in Ghana itself is at infant level, such a percentage of experience is encouraging.

4.3 ACTORS OF IMPLEMENTING E-PROCUREMENT.

The respondents went on to give the researcher a brief description of their place of work.

The majority of the actors of implementing e-procurement at the MMDAs are engineers representing (72.7%) of the respondents, followed by (18.20%) as procurement officers and (9.1%) as quantity surveyors.

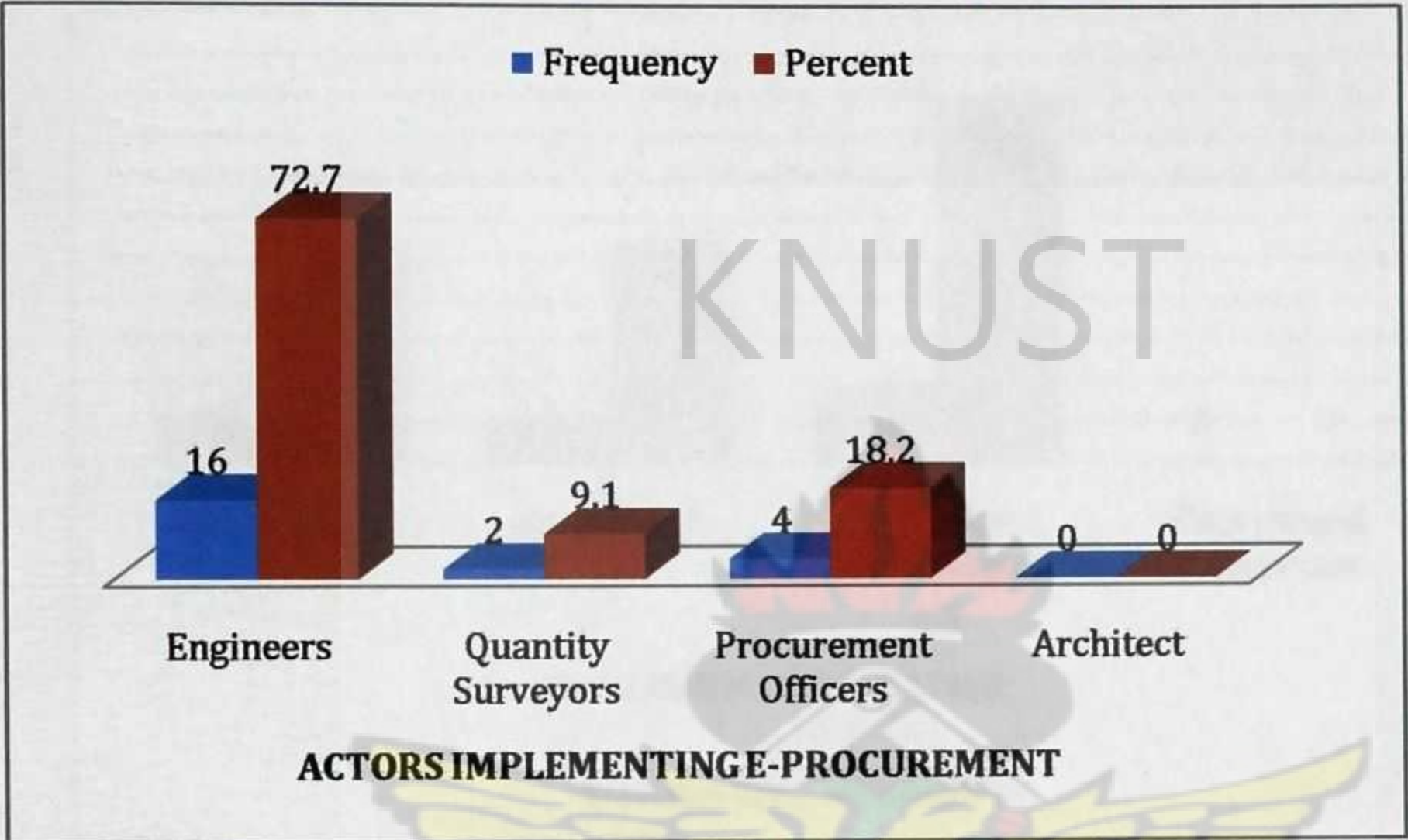


Figure 4.2 Actors of the implementation of e-procurement

This part is importance to the researcher, since from observation and literature it could be said that most MMDAs have less procurement professionals who will solely be responsible in the procurement implementation processes rather than overburden the engineers. The figures clearly show that procurement itself is not mostly handled by professionals at the various MMDAs.

4.4 PROCUREMENT PARTNERS

Questions were posed to respondents to ascertain the sought of organisation(s) they have been dealing with in their quest to procure goods, works and services.

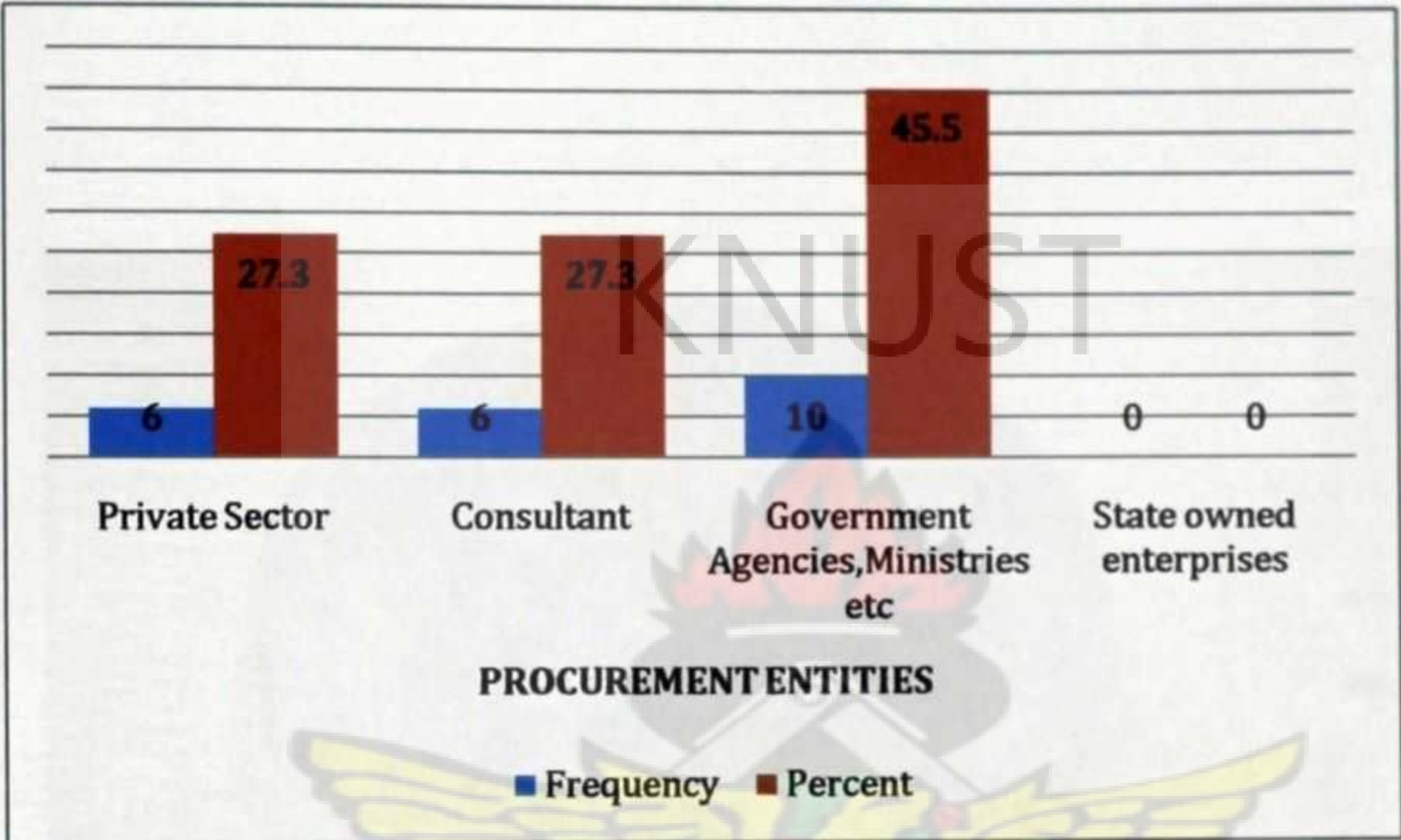


Figure 4.3 Percentage of procurement partners dealing with MMDAs

It is observed that about half (45.5%) of the transaction partners that MMDAs deal with are government agencies, with consultant and private sector sharing (27.3%) respectively. This statistics means that e-procurement can easily be implemented, as the various agencies are about to implement e-procurement on pilot basis. This means that the logistics and human resources needed to implement e-procurement would not be a problem when the MMDAs are ready to implement it.

4.5 AWARENESS OF E-PROCUREMENT

Fundamental questions were posed to respondents to ascertain their knowledge on the electronic system of procurement and to find out from those who are aware if they have used this system of procurement in any of the business transactions.

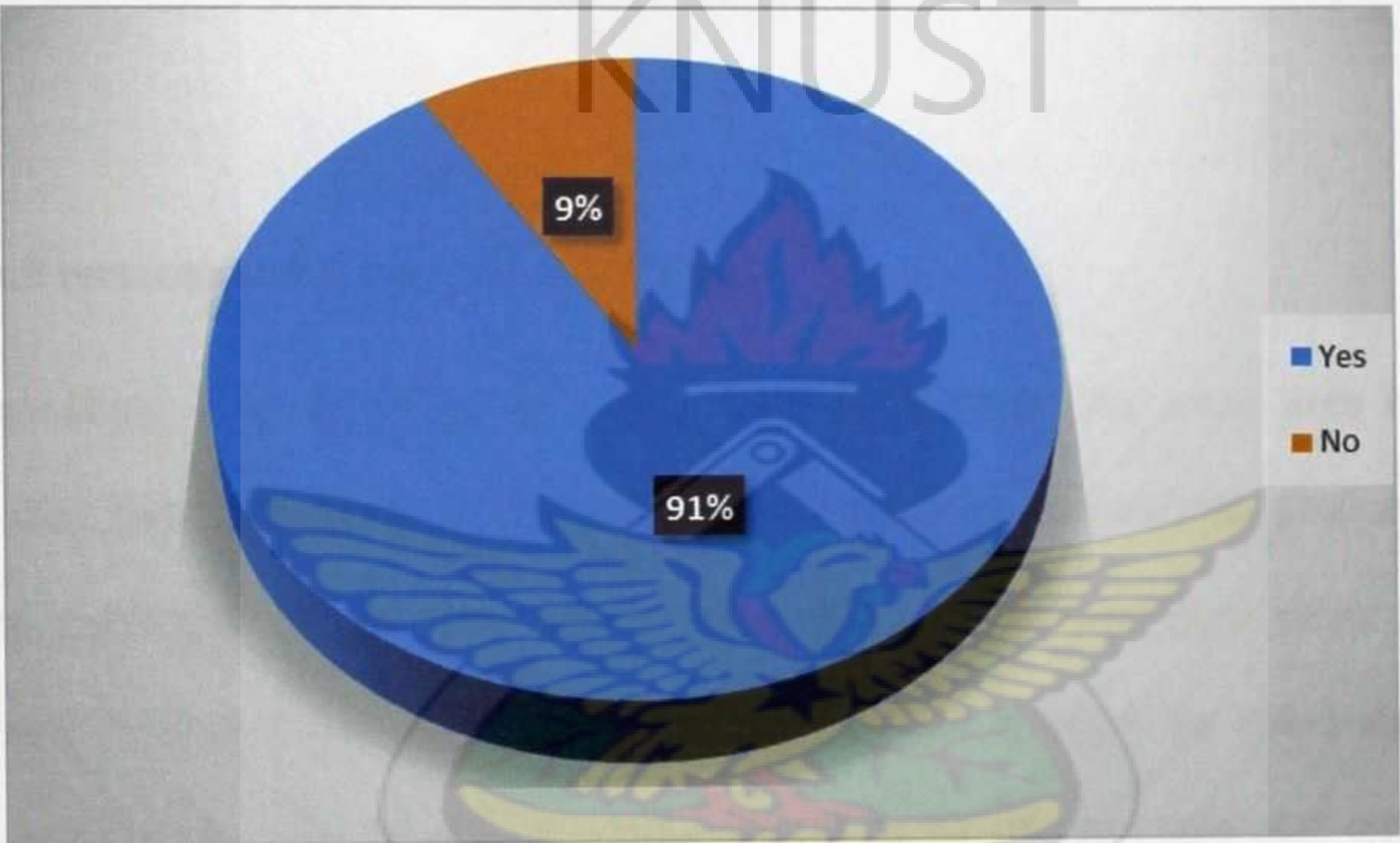


Figure 4.4 Level of awareness of e-procurement

It is observed from the above that about (91%) of the respondents were aware of the electronic system of procurement as at the time of administering the questionnaire. This shows that e-procurement is well known and its adaption and implementation would be well received by management of MMDAs.

4.6 IMPLEMENTATION OF E-PROCUREMENT

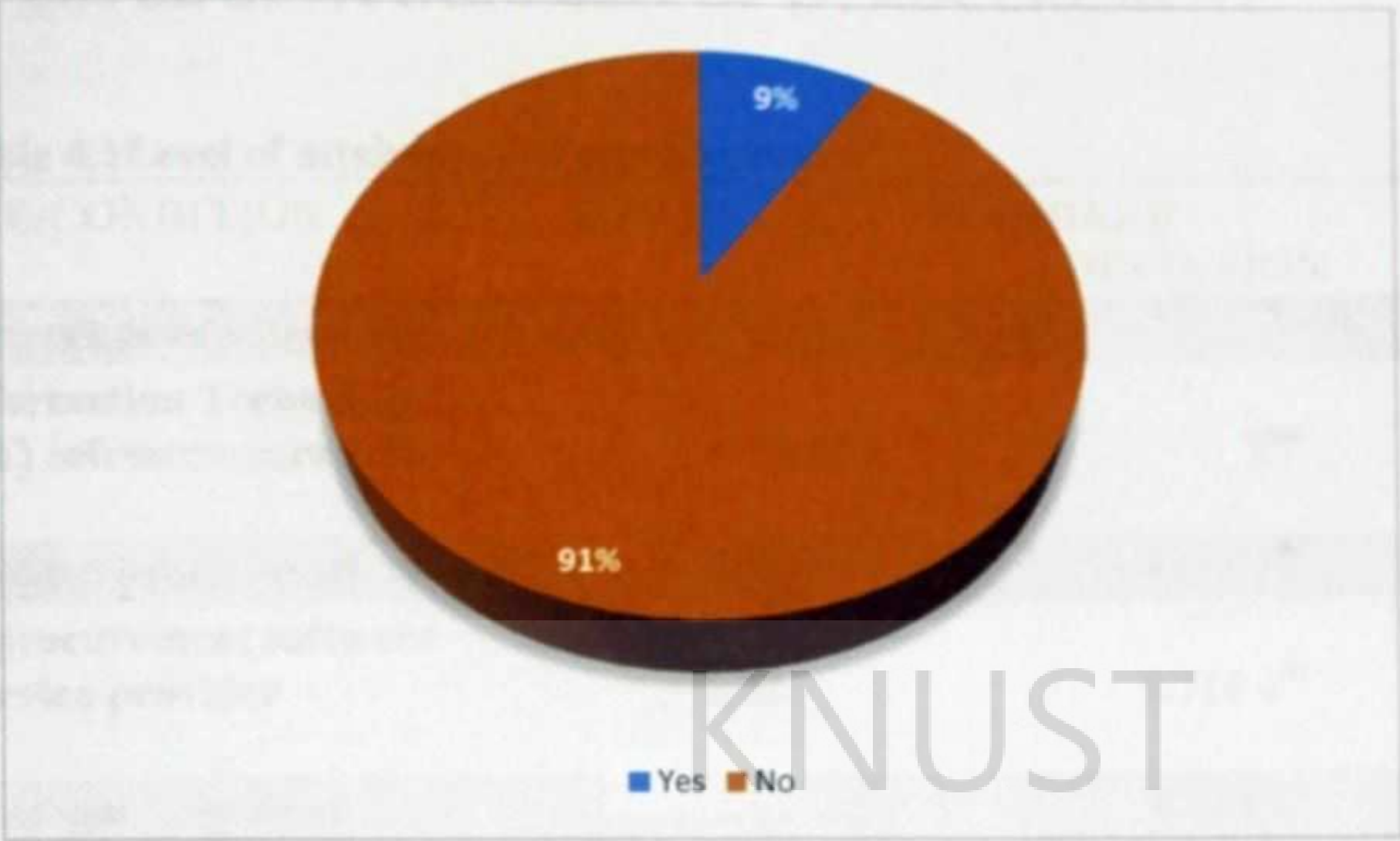


Figure 4.5 Implementation of e-procurement

The respondents, who agreed to have heard of e-procurement for some time now, were asked whether they have implemented e-procurement before during any of their procurement processes. Only 9% responded in the yes, whilst 91% of the respondents have never implemented e-procurement. This is a clear indication that e-procurement is not at its infant stage and this also means that MMDAs must be well resourced enough to be able to implement e-procurement even though some MMDAs have attempted to make use of the system.

4.3 PERCEIVED BENEFITS OF E-PROCUREMENT

4.7 LEVEL OF ATTAINMENT OF E-PROCUREMENT

Table 4.1Level of attainment of e-procurement

PRE-CONDITION	MEAN	STANDARD DEVIATION	RANKS
Internet connection2.05	0.653	1 st	
Information Technology (IT) infrastructure 1.95	0.575	2 nd	
Trained professional	1.95	0.575 2 nd	
E-procurement software service provider	1.32	0.716 4 th	
Electronic signature	1.09	0.294 5 th	

The results in table 4.1shows that e-procurement would be most practical and attained if there is always internet connection as the most important factor chosen by the respondents, followed by both Information Technology Infrastructure and Training of Professional as second most important, fourth most important were “e-procurement software service provider and Electronic signature being fifth on the table. These views suggest that most MMDAs are operating without Internet connection. In the same vein, the most of them are under resourced which makes it difficult to implement e-procurement, although most of the MMDAs have tried to implement it.

4.8 PERCEIVED BENEFITS OF E-PROCUREMENT

Six benefits were submitted to the respondents to rate using a likert scale of ranking from strongly agree (2) to strongly disagree (-2) and the results were analysed using mean score on the SPSS software. The results are shown in the table below.

Table 4.2 Perceived Benefits of E-Procurement

BENEFITS	MEAN	STANDARD DEVIATION	RANKS
E-procurement reduces cost of procurement process as compared to the traditional methods	3.73	0.456	1 st
E-procurement could reduce procurement cycle time	3.14	0.710	2 nd
E-procurement decrease transaction and administrative expenditure	3.09	0.426	3 rd
E-procurement would also enhance transparency in the procurement process	3.00	1.024	4 th
E-procurement could help in rapid procurement decision making	2.77	0.922	5 th
E-procurement would reduce corruption in the public sector	2.05	1.090	6 th

The results shown from Table 4.2, indicates that respondents rated “electronic procurement reduces cost of procurement process as compared to the traditional methods” as the first and most important advantage of electronic procurement. “E-procurement could reduce procurement cycle time” came second, whilst “e-procurement decrease transaction and administrative expenditure (printing, copying and distribution) came third, as e-procurement would also enhance transparency in the procurement process, came fourth, whilst “e-procurement could help in rapid procurement decision making and e-procurement would reduce corruption in the public sector” came fifth and sixth on the ranking scale respectively. From the above observations one could say that most perceived importance of e-procurement by the respondents is far away from what is demonstrated in most literature as the importance of e-tendering. Which is a good thing, although most MMDAs are not implementing

electronic procurement, their response, however, show that they are very aware and well abreast with what would be the benefits if they are able to implement e-procurement. It is also observed that most of the professionals think corruption cannot be dealt with holistically even with the introduction of electronic procurement.

4.9 PERCEIVED CONSTRAINTS OF E-PROCUREMENT

Table 4.3 Perceived Constraints of E-Procurement

CONSTRAINTS	MEAN	STANDARD DEVIATION	RANKS
The adoption of e-procurement can only be achieved when top management support it.	3.45	1.011	1 st
There is the need to train end-users and staff to oversee the use of e-procurement in your institution	3.36	1.177	2 nd
E-procurement needs strong security in order to be trusted and adopted in your institution	3.32	1.177	3 rd
The adoption of e-procurement would re-engineer the existing procurement process	3.27	0.985	4 th
Does your institution have enough resources to implement e-procurement	2.82	1.140	5 th
The implementation of e-procurement poses a problem of system integration	2.68	0.716	6 th
Is there any authentication or password from the bidder before any bid is automatically opened	2.23	1.412	7 th
Does e-procurement waste time and money	2.09	0.684	8 th
Lack of Legal Backing support e-procurement	1.64	1.255	9 th
Have you experience fake bid which tries to reduce bid price when using e-procurement	1.59	1.182	10 th
The involvement of suppliers in the e-procurement process had been easy	1.59	1.098	11 th
Has the suppliers understood e-procurement enough in order to transact business	1.55	1.224	12 th

The majority of procurement professionals (Engineers & Procurement Officers) at the various MMDAs considered “The adoption of e-procurement can only be achieved when top management support it” as the greatest barrier to using electronic tendering in Ghana. “Need to

train end-users and staff to oversee the use of e-procurement in your institution” the second challenge perceived by the respondent whilst “ security of files being exchanged, in terms of network reliability, backup of documents and trust of documents not being tempered with” came third, whilst “suppliers understood e-procurement enough in order to transact business” came last. But MMDAs professionals have indicated their willingness to use e-procurement in the future given that all or most of their considered barriers are addressed. Considering the fact that cyber attack/hacking has grown by a high magnitude, most professionals are reluctant to enter into such an uncertain new way of procurement. Although it appeared 8th on the ranking, electronic procurement in a long run if implemented saves money and time.

4.10 DEMAND OF E-PROCUREMENT BY CLIENTS

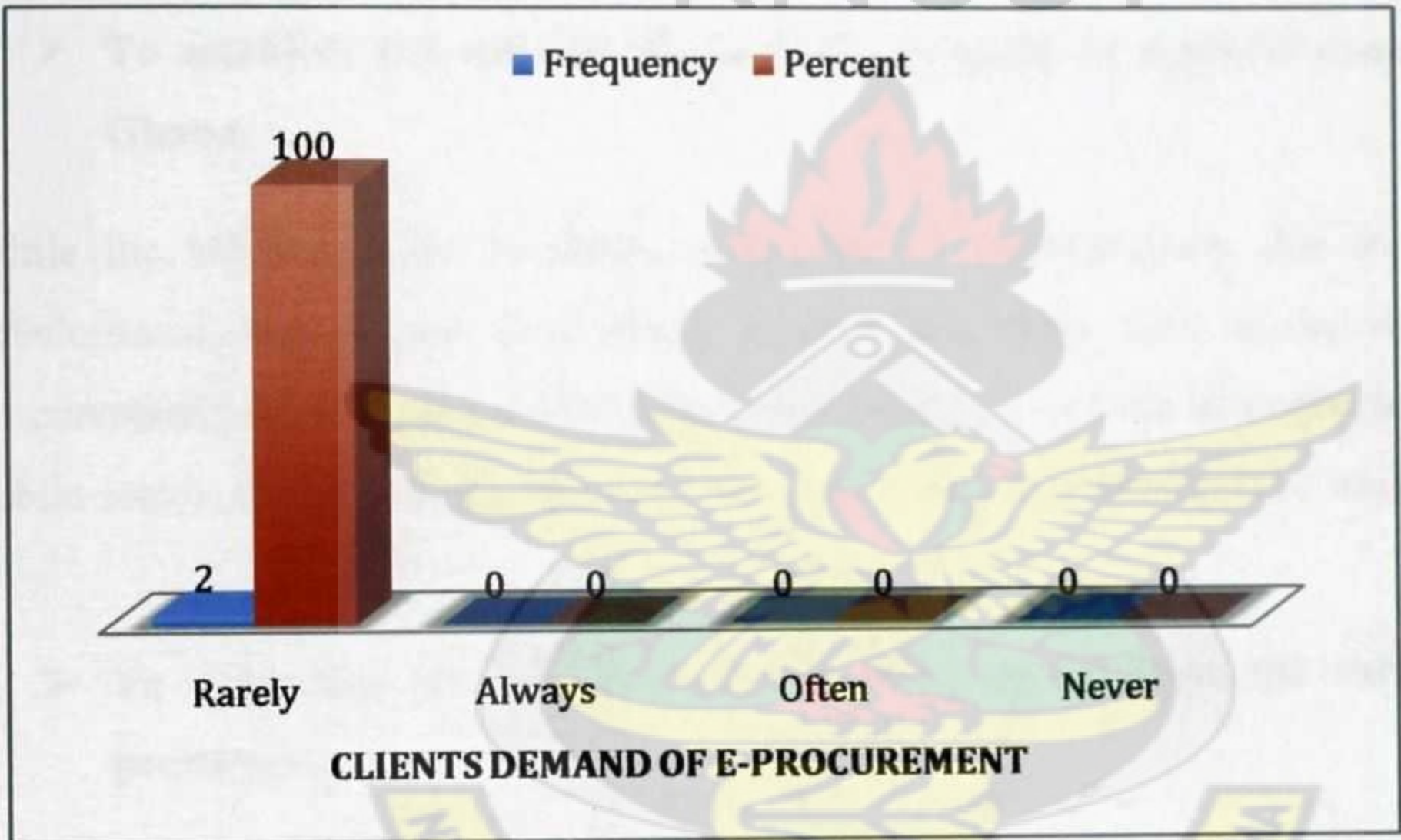


Figure 4.6 Demand of e-procurement by clients

From figure 4.6 above, majority of the respondents had never been asked by the client to use the electronic system in their procurement process. This could be due to either lack of resources to execute electronic procurement or lack of trust on the part of the clients towards this system of procurement. However, with proper education clients may fully appreciate the possibilities inherent in controlling the data formats in which procurement are carried out and also clients would grow to accept this system since it has immense benefits.

CHAPTER FIVE

SUMMARY OF FINDINGS, RECOMMENDATION AND CONCLUSION

5.1 INTRODUCTION

This chapter sums up introduction on information gathered from the questionnaires, makes recommendations to address the problem identified on the field and concludes the study.

5.2 SUMMARY OF FINDINGS

This research aimed to explore the successful adoption of e-procurement by MMDAs in Ghana. Its main objectives were to;

- **To establish the state-of –the-art with regards to e-procurement among MMDAs in Ghana.**

While the MMDAs have shortfalls in the use of e-procurement due to lack of infrastructural development, Information Technology, Internet etc., most were of the view that, the use of e-procurement presents many opportunities they stand to gain from its implementation in the Ghanaian public sector, although many have expressed their skepticism towards its implementation.

- **To determine the benefits MMDAs stand to get from the successful adoption of e-procurement.**

Many of the professionals considered that the relative reduction of cost, the general reduction of time in the procurement process, the decrease transaction and administrative expenditure and the enhancement of the transparency in the procurement process and with all as advantages of this system of procurement to the MMDAs.

- **To determine the likely constraints to the implementation of e-procurement by MMDAs.**

The fact that electronic procurement can only be achieved when top management supports it was a great source of concern to the professionals. Even though, it has numerous benefits, top managers are reluctant to venture into it. End-user and staff training to handle e-procurement were also a major problem to most of the professionals. It was observed that the various MMDAs were lacking professionals to handle electronic procurement. The increased level of fraudulent activities as well as

corruption and dishonesty in the country has lead to some casting doubt or the transparency and credibility of the system and to proliferate political favoritism to some firms, since one could never tell who is behind the system.

➤ **To determine the infrastructure requirements for the successful adoption of e-procurement by MMDAs.**

Most of the respondents considered Internet connection as the most important infrastructural need due to the fact that internet is the vehicle to the successful implementation of e-procurement. Followed by information technology infrastructure like computers, optic fibers. Thirdly, they also considered training of the professionals as one of the major requirement towards the implementation of electronic procurement.

5.3 RECOMMENDATIONS FROM STUDIES

The objective of this research was to make recommendations as to how the knowledge of e-tendering could be advanced and also how to make e-tendering a meaningful part of the procurement system in Ghana.

During the field survey, respondents were asked to give some recommendations to this effect and those collected have been discussed below;

- Respondents were of the view that E-tendering should be considered by the GhIS, by encouraging that at least 50% of all projects of members to be tendered electronically. They should also hold seminars and training sessions to educate their members on how to use the various medium of e-tendering and how to ensure a secure and safe process even with this system of tendering
- An educational scheme should be started to educate people on the usefulness of e-tendering. Both the private and public sector should be educated in the scheme to encourage them to adopt this system of procurement. The scheme should be added to the school syllabus and taught in the various universities, polytechnics and technical schools within the country. Seminars on the subject matter for a targeted few would also be encouraged.
- Strict legal framework must be incorporated into the procurement law that would make it a mandatory requirement for the use of e-tendering (Act 663). There should be amendments to the Act 663 to accept and enforce the e-tendering system, as well as a legal backing of this system to be used in the resolution of disputes should any arise.
- People should be trained in this line of operation and made aware of the benefits of this system. Workshops and training sessions should be organized for professional in the industry.

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- People should be trained in this line of operation and made aware of the benefits of this system. Workshops and training sessions should be organized for professional in the industry.

- All construction companies should be encouraged to incorporate it into their system of procurement. By provided their procurement departments with the necessary logistics and training to effectively use the electronic system of tendering. Clients and consultants should be encouraged to adopt the electronic system of tendering in their procurement processes.
- Introduction of a code of e-tendering should be provided to guide all bidders in Ghana. In existence is the RICS guide for e-tendering and it could be used as bases to develop one for the Ghanaian construction industry. This would serve as a guide to anyone who would want to use this system of procurement.
- Also there are international legal acts to guide electronic transactions such as the Electronic transactions Act SNWT 2011, c13 (Swanson 2011) which could be used as a guide in forming Ghana's own electronic tractions act capturing electronic tendering to make it a safe system and convenient system of procurement.

5.4 RECOMMENDATION FOR FUTURE STUDIES

- The research suggests that future studies be carried out on existing laws of the land to determine if there are any to laws on electronic transactions in Ghana especially, e-tendering.
- Studies should also be carried out to assess the art of electronic tendering in Ghana, involving all industry participants.
- Further studies should be made on the web portal system of e-tendering as to how the industry participants have come to accept it, as well as the legalities associated with it.

5.5 CONCLUSION

The results of the research have established that the awareness of industry professionals is on the high side but their level of involvement with the system of tendering is rather low.

A great number of participants have expressed their interest as well as fear in the system. The research also found out that the knowledge on the subject matter of most respondents was rather elementary thus has made some few suggestions as to improve the knowledge and involvement of participants in e-tendering.

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KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY



**COLLEGE OF ARCHITECTURE AND PLANNING
DEPARTMENT OF BUILDING TECHNOLOGY**

Dear Sir/Madam

**QUESTIONNAIRE SURVEY-AN EXPLORATORY STUDY INTO THE SUCCESSFUL
ADOPTION OF E-PROCUREMENT BY MMDAs IN GHANA: A CASE STUDY OF
CENTRAL REGION**

This research is part of a Masters Thesis being conducted in the Department of Building Technology, Kwame Nkrumah University of Science and Technology, KNUST, Kumasi. The study is based on a selected sample in Central Region, so your participation is important. The outcome of this study will enhance knowledge on E-procurement in the public sector.

I am a student of Kwame Nkrumah University of Science and Technology currently studying for MSc. degree in Procurement Management in the Department of Building Technology. In partial fulfillment of my degree requirements, I am currently undertaking a research into Exploring into the Successful Adoption of E-Procurement by MMDAs in Ghana.

Participation in this study is voluntary, and all who participate will remain anonymous. Your name is not needed. All information offered will be treated confidentially, and the results will be presented in such a way that no individuals may be recognized.

A summary of the findings will be made available to you upon request.

Thank you very much for your participation in the survey.

Yours sincerely,

QUESTIONNAIRE

Dr. Emmanuel Adinyira
(Research Supervisor, Department of Building Technology, KNUST)
Email: rasadii@yahoo.com

Mr. Rashid Tahiru
(Research Student)
MSc. Procurement Management.
KNUST

If you have any questions, please contact me at

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QUESTIONNAIRE

AN EXPLORATORY STUDY INTO THE SUCCESSFUL ADOPTION OF E-PROCUREMENT BY MMDAs IN GHANA: A CASE STUDY OF CAPE COAST MUNICIPAL ASSEMBLY

There are **Seven sections** of the questionnaire:

Part I: Particulars of Respondent

Part II: General Information

Part III: Current Practice of E-Procurement

Part IV: System Description of E-Procurement

Part V: Benefits of E-Procurement

Part VI: Constraints of E-Procurement

Part VII: Infrastructural Requirement for E-Procurement

Part VIII: Recommendation

PART I: PARTICULARS OF RESPONDENT (OPTIONAL)

Please provide the correct information by ticking in the appropriate box and fill in the blank where necessary

1.Name of Organization.....

2.Designation.....

3.How long have you been with your organization?

[] Less than 5years [] 6-10years [] 11-15 [] 16-20years [] Above 20ears

4.Address:.....

..... ☐

5.E-Mail.....

6.Tel.....Fax.....

PART II: GENERAL INFORMATION (PLEASE TICK)

☐ 1. Your organisation belongs to: Please tick

- Metropolitan Assembly []
- Municipal Assembly []
- District Assembly []

2. Which procurement entities does your entity usually deal with? Tick as many as applicable

☐ State owned enterprises

☐ Private Sector

☐ Consultant

☐ Government Agencies, Ministries etc.

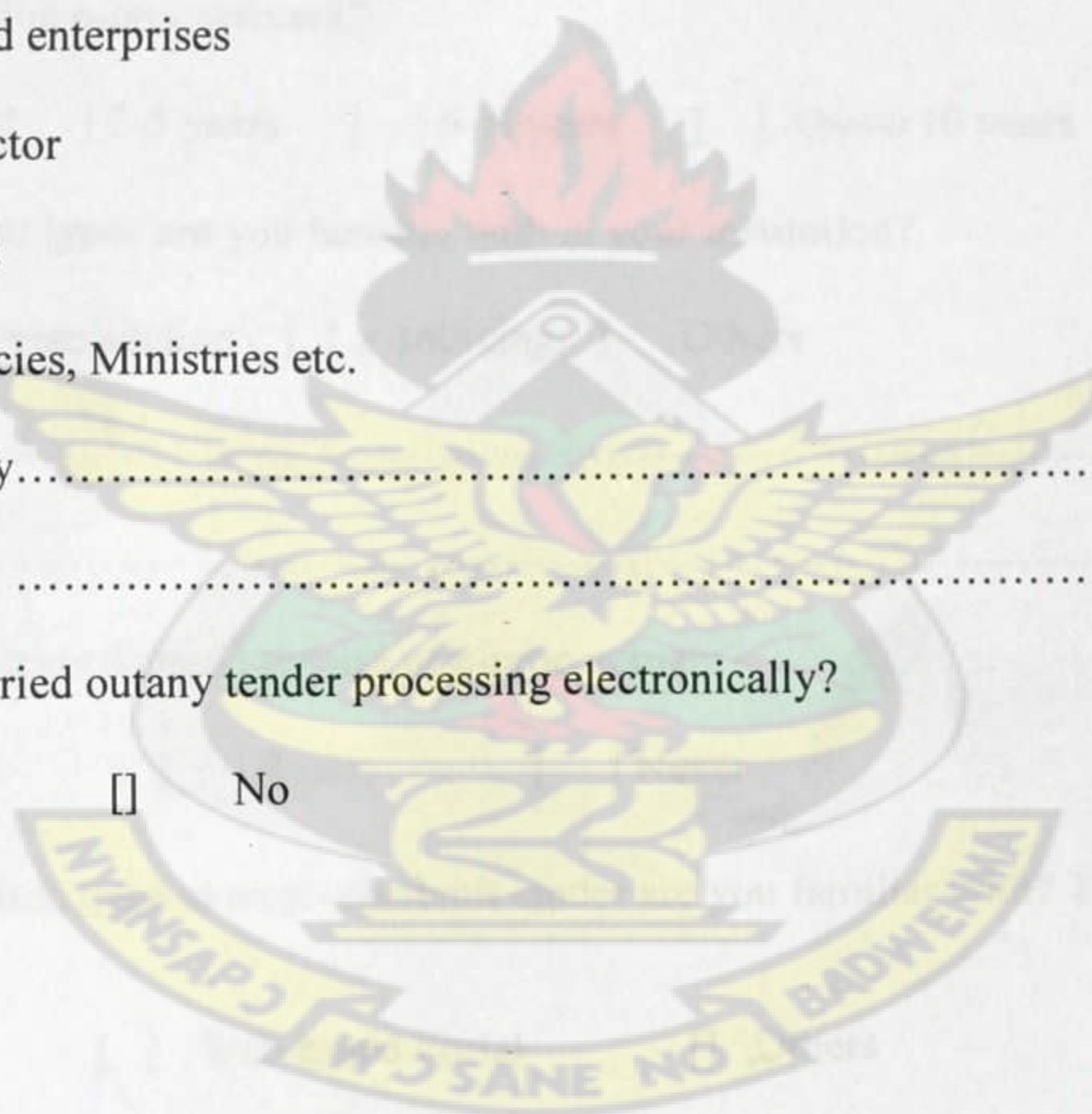
Others, Please Specify.....

.....

3. Has your entity receives/carried out any tender processing electronically?

☐ Yes

☐ No



PART III: CURRENT PRACTICE OF E-PROCUREMENT (PLEASE TICK)

Please we would like to ask few questions about your institution. Please Tick

1. Have you heard anything about e-procurement?

☐ Yes ☐ No

2. Have you ever implemented any of the e-procurement types in your institution?

☐ Yes ☐ No

If Yes, answer questions in all the parts, If No jump to Part V-Part VII

3. How long have you been using e-procurement?

☐ Less than 1 year ☐ 2-5 years ☐ 6-10 years ☐ Above 10 years

4. Which of the e-procurement types are you familiar with in your institution?

☐ E-tendering ☐ reverse auction ☐ e-sourcing ☐ Others

If others, Please Specify.....

.....

5. How often do any of your clients demand the use of e-procurement?

☐ Always ☐ Often ☐ Rarely ☐ Never

6. Which e-procurement medium used to receive/submit tender are you familiar with? Tick as many as applicable.

☐ E-mail ☐ CDs ☐ Web based Portal ☐ Others

If Others, Please state.....

.....

Is there any Legal framework on which the system is operating?

☐ Yes ☐ No

6. What are procured in your system? Please Tick.

☐ Goods ☐ Services ☐ Works ☐ Others

If others, please specify

.....

7. What Procurement procedure does your system support? Please Tick

☐ Open Procedure ☐ Restricted Procedure ☐ Negotiated Procedure ☐ Others

If others, please state,.....

.....

8. Which of the following networking/internet connection are you connected to?

☐ Local Area Network ☐ VSAT ☐ Radio ☐ Dial up Network ☐ Others

If others, please specify.....

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.....



PART IV: SYSTEM DESCRIPTION OF E-PROCUREMENT

1. Does your system have the capacity to implement E-Procurement?

☐ Yes

☐ No

2. Who are the actors in implementing E-procurement at your institution? Please Tick as many as possible

☐ Engineers

☐ Quantity Surveyors

☐ Architect

☐ Procurement Officers

3. Do you have any response service system in times of critical software defects?

☐ Yes

☐ No

4. What type of electronic document is used within your organisation for supporting e-procurement procedures?

☐ Postscript Document (PDF)

☐ HTML

☐ XML

☐ MS Office

5. Has the system been reliable in since its operation

☐ Yes

☐ No

6. How is electronic procurement document in your organisation protected?

☐ Password

☐ Authentication

☐ Phone call

☐ Others

If Others, please specify.....

7. What security technologies within your institution are used?

☐ Firewall

☐ Encryption

☐ Digital Certificates

☐ SSL

8. Please are there pre-conditions towards implementing E-procurement?

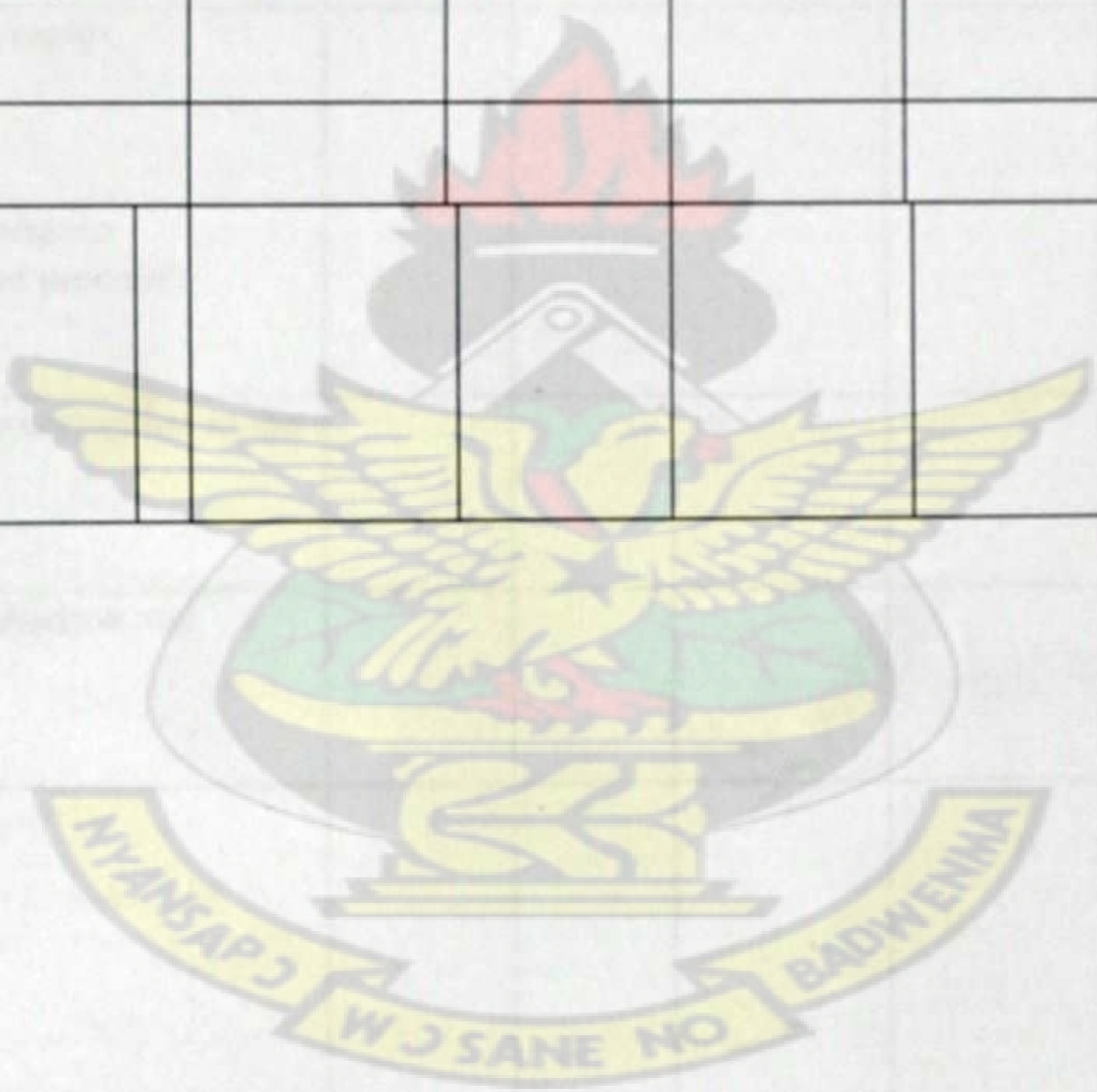
☐ Yes

☐ No

9. If yes, please rank the following pre-conditions if applicable in your institution by ticking

Level of attainment of the ff. in your organisation

PRE-CONDITIONS	OPTIONS			
	Not	Partial	Wholly	Comments
1.Information Technology (IT) infrastructure				
2. Internet connection				
3. Trained professionals				
4. E-procurement software service provider.				
5. Electronic signature.				
<u>Others</u>				
6.				
7.				
8.				



PART V: BENEFITS OF E-PROCUREMENT

Please choose the option in the table below that best suit your institution by marking

BENEFITS	OPTIONS					
	Strongly Agree	Agree	Disagree	Uncertain	Strongly Disagree	Comment
1.Do you think e-procurement can reduce cost of procurement process as compared to the traditional method?						
2.E-Procurement could reduce procurement cycle time?						
3.E-Procurement could help in rapid procurement decision making						
4.E-Procurement would also enhance transparency in the procurement process?						
5.E-Procurement would reduce corruption in the public sector?						
6.E-Procurement decrease transaction and administrative expenditure?						
<u>Others</u>						
7.						
8.						
9.						
10.						

PART VI: CONSTRAINTS OF E-PROCUREMENT

Please choose the option in the table below that best suit your institution by marking

CONSTRAINTS/CHALLENGES	OPTIONS					
	Strongly Agree	Agree	Disagree	Uncertain	Strongly Disagree	Comment
1.The involvement of suppliers in the e-procurement process has been easy?						
2. The implementation of e-procurement poses a problem of system integration?						
3.Does your institution have enough resources to implement e-procurement?						
4.Have you experience fake bid which tries to reduce bid price when using e-procurement?						
5.Does e-procurement waste time and money?						
6.There is the need to train end-user and staff to oversee the use of e-procurement in your institution.						
7.Has the suppliers understood e-procurement enough in order to transact business?						
8.E-procurement needs strong security in order to be trusted and adopted in your institution.						
9.Is there any authentication or password from the bidder before any bid is automatically opened?						
10.The adoption of e-procurement would re-engineer the existing procurement process.						
11.The adoption of e-procurement can only be achieved when top management supports it.						
12.Lack of Legal Backing to support e-procurement						

Others

- 13.
- 14.
- 15.

PART VII: RECOMMENDATIONS

Please let me know if you have any recommendations on how to make E-procurement can effectively be adopted in your institution

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KNUST

Thank you for your co-operation in completing this questionnaire. Am confident that the information you provided will greatly assist me in my research.

Once again thanks you for your support.

