

www.udsspace.uds.edu.gh

ASSESSING THE EFFECTS OF ELECTRONIC PROCUREMENT ADOPTION ON
SUPPLY CHAIN MANAGEMENT WITHIN PUBLIC HOSPITALS IN GHANA
UNDER A REGULATORY ENVIRONMENT
(THE STUDY OF TAMALE TEACHING HOSPITAL).

UNIVERSITY FOR DEVELOPMENT STUDIES

NKAYI KWASI



NOVEMBER, 2021

UNIVERSITY FOR DEVELOPMENT STUDIES

ASSESSING THE EFFECTS OF ELECTRONIC PROCUREMENT ADOPTION ON
SUPPLY CHAIN MANAGEMENT WITHIN PUBLIC HOSPITALS IN GHANA
UNDER A REGULATORY ENVIRONMENT
(THE STUDY OF TAMALE TEACHING HOSPITAL).

BY

NKAYI KWASI

(UDS/MCM/0022/18)

UNIVERSITY FOR DEVELOPMENT STUDIES

THESIS SUBMITTED TO THE DEPARTMENT OF PROCUREMENT AND
MARKETING, SCHOOL OF BUSINESS AND LAW, UNIVERSITY FOR
DEVELOPMENT STUDIES, IN PARTIAL FULFILMENT OF THE REQUIREMENTS
FOR THE AWARD OF MASTER OF COMMERCE DEGREE IN PROCUREMENT
AND SUPPLY CHAIN MANAGEMENT

NOVEMBER, 2021



DECLARATION

I hereby declare that the outcome of this thesis is my own handwork and that it does not contain any material presented for another University degree elsewhere or in this university, except where due acknowledgement has been made in the script.



Candidate 's Signature: ----- Date: -----19/06/2021

Name: Kwasi Nkayi (UDS/MCM/0022/2018)



CERTIFICATION

This study was supervised in accordance with University procedures, which I hereby certify.

Supervisor's Signature:



Date: -----21/06/2021

Name: Dr. Gordon Terkpeh Sabutey



ABSTRACT

E-procurement adoption can be a successful concept for any organization's performance if it is well practiced. It paves way for better procurement processes, brings about effective monitoring, improved communication that increases the ability to coordinate remote processes, help save cost and time through effective and efficient procurement procedure. This research analyzed the effects of e-procurement adoption on supply chain management with specific focus on Tamale Teaching Hospital (TTH). This research is a cross-sectional study and employed quantitative research strategy and deductive research approach due to its design. Data was collected through questionnaires on a five-point Likert scale. A survey was then carried out and 70 responses were received and the main variables were prepared and processed with SmartPLS 3.2.3. The findings of the study indicate, e-procurement and supply chain management have a positive relationship. However, e-procurement adoption is a difficult journey because it involves overcoming numerous barriers, and the costs of adoption limit overall organizational success. Nonetheless, the regulatory environment could be of help to companies that wants to achieve the overall benefits of an e-procurement approach by reducing setbacks caused by end users' lack of technological literacy. Basically, the study can support policymakers to understand the effects of e-procurement adoption on supply chain management. Therefore, a facelift should be given to e-procurement scheme as well as procurement experts and policymakers should be empowered to make sure that regulatory environment is enhanced to reap the benefits of e-procurement adoption in Ghana's public hospital. Government and other regulatory agencies should provide support to



public hospitals to implement e-procurement system to enjoy the high benefits it comes with.

DEDICATION

I dedicate this work to my entire family for their support throughout my studies and to my late father, I am most grateful for you giving me education.



ACKNOWLEDGEMENT

My greatest appreciation goes to the Almighty God for He has been the overseer of my life throughout my stay at the University for Development Studies, and He made it possible for me to finish this programme successfully.

I would also wish to extremely extend my profound gratitude to Dr. Gordon Terkpeh. Sabutey my supervisor for his immense contributions, valued criticisms and guidance throughout this study. God bless you abundantly.

I am greatly indebted to my entire family; God richly bless you all the days of your lives. Your encouragement has brought me this far.

I would also acknowledge Dr. Ibrahim Osman Adam for his contribution towards the completion of this study.

Special thanks go to Mr. Sato Gariba for his invaluable succor and encouragement throughout the programme.

All I have to say to all the respondents who agreed to take part in this study is a big thank you and remain blessed.



TABLE OF CONTENT

DECLARATION..... i

CERTIFICATION ii

ABSTRACT iii

DEDICATION iv

ACKNOWLEDGEMENT v

TABLE OF CONTENT vi

LIST OF FIGURES xiii

LIST OF TABLES xiv

LIST OF ABBREVIATIONS xv

CHAPTER ONE..... 1

INTRODUCTION 1

 1.1 Background of Study..... 1

 1.2 Statement of The Problem 2

 1.3 General Objective..... 5

 1.3.1 Specific Objectives..... 5

 1.3.2 Research Questions 6

 1.4 Justification of the Study 6

 1.4.1 Theoretical importance 6





1.4.2 Practical importance 7

1.5 Scope of the Study 7

1.6 Limitations 8

1.7 Organisation of the Study 8

CHAPTER TWO..... 10

LITERATURE REVIEW 10

2.1 Introduction 10

2.2 Definition of key concepts 10

2.3 Background to E-Procurement (EP)..... 11

2.3.1 Adoption of Electronic Procurement..... 16

2.4 Paper / Traditional Based Procurement Problems 17

2.5 E-Procurement Systems in Ghana..... 18

2.6 Types of E-Procurement..... 21

2.5.1. E-Ordering/E-Maintenance Repair Operate (MRO) 21

2.5.2. Web-Based Enterprise Resource Planning (ERP)..... 22

2.5.3. E-Sourcing 22

2.5.6. E-Informing..... 23

2.7. Benefits of E-procurement..... 24

2.7.1 Transactional Benefits 27



2.7.2 Compliance Benefits	27
2.7.3 Management Information Benefits.....	28
2.7.4 Price Benefits	28
2.7.5 Payment Benefits	29
2.7.6 Reduced manpower	29
2.8 Factors Affecting E-procurement.....	29
2.9. Supply Chain Management (SCM)	31
2.9.1 Supply Chain in the Health Sector	34
2.9.2 The Purchasing Process	35
2.10 Public Procurement	37
2.11 Procurement Requirements of Public Sector	38
2.11.1 Transparency	39
2.11.2 Accountability	39
2.11.3 Efficiency	40
2.11.4 Value for money (VFM).....	41
2.11.5 Effectiveness	41
2.11.6 Legal and Regulatory Framework.....	42
2.12 Public Procurement in Ghana	43
2.12.1 Brief History of Ghana’s Public Procurement Law	44

2.12.2 Public Procurement in the Public Health Sector	45
2.13 The Relationship Between E-procurement and Supply Chain Management	46
2.14. How E-Procurement Reduces Cost and Creates Value in the Supply Chain	48
2.15 Regulatory Bodies	49
2.16 Conceptual model.....	51
Conceptual model and Hypothesis.....	51
CHAPTER THREE	53
METHODOLOGY	53
3.1 Introduction.....	53
3.2 Research Design.....	53
3.3 Research Approach	54
3.3.1. Deductive	54
3.3.2 Justification for using deductive	55
3.4 Research strategy	55
3.4.1 Justification for using quantitative	56
3.5. Research philosophy.....	57
3.5.1. Epistemology	57
3.5.1.1 Positivism.....	58
3.5.1.2 Realism	58



3.5.1.3 Interpretivism 59

3.5.2 Justification for adopting Positivism 59

3.6 Research Time horizon..... 60

3.7 Study Population 60

3.8 Sample design and Sampling Techniques 62

3.9 Data Collection Process..... 66

3.9.1 Tools for the Research..... 66

3.9.2 Data Collection Procedure 67

3.9.3 Methods of Data Collection 68

3.10 Pilot Testing of Data Collection Instruments 68

3.11 Validity and Reliability 69

3.12 Data Analysis 69

3.12.1 Partial Least Square in Structural Equation Modeling 70

3.13 Ethical Issues 71

CHAPTER FOUR 73

RESULTS AND DISCUSSION 73

4.1 Introduction..... 73

4.2 Assessment of Measurement Model 74

4.3 Indicator Reliability..... 75



4.4 Internal Consistency Reliability.....	80
4.5 Convergent Validity	84
4.6 Discriminant Validity	87
4.7 Structural Model Assessment	94
4.8 Assessing Structural Model for Multicollinearity Issues	95
4.9 Assessing Structural Model for the Significance of Path Coefficient.....	95
4.11 Coefficient of Determination (R ² Value).....	99
4.12 Goodness-of-fit test for outer model	101
4.13 Reliability test for outer model.	102
4.14 Goodness-of-fit test for inner model.....	102
CHAPTER FIVE.....	103
SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS	103
5.1 Introduction.....	103
5.2.1 Potential Benefits of E-procurement in TTH.....	104
5.2.2 Potential Factors Affecting E-Procurement Adoption in Public Procurement Entities.....	105
5.2.3 Evaluating the potential benefits and Challenges of E-procurement in order to determine whether or not the implementation will be successful.....	106
5.2.4 Potential Value and Cost Benefits of E-procurement	106



5.2.5 Potential Factors Effecting E-procurement 107

5.3 The Association between E-procurement(EP) and Supply Chain Management(SCM)..... 108

5.4 Relationship between E-procurement (EP) and Regulatory Environment(RE) 110

5.6 Relationship between Regulatory Environment and Supply Chain Management (SCM)..... 110

5.7 Conclusion to the Study..... 111

5.8 Recommendations 112

5.9 Directions for Further Research..... 113

REFERENCES..... 114



LIST OF FIGURES

Figure 2.1 Conceptual model.....48

Figure 4.1 Model 2 Conceptual Model.....73

Figure 4.2 Results before Deletion of Indicators less than 0.708.....74

Figure 4.3 Results after Deletion of Indicators less than 0.708.....75

Figure 4.4 Model 4 Hypotheses Testing for Direct Effect.....91



LIST OF TABLES

Table 3.1 Constructs and the number of items used in this study.....57

Table 3.2 Distribution of Population58

Table 3.3 Sample Frame for the Study61

Table 4.1 Measurement Model Construct Reliability78

Table 4.2 Indicator Item Cross Loading83

Table 4.3 Discriminant Validity (Fornell-Larcker Criterion)84

Table 4.4 Discriminant Validity - Heterotrait-Monotrait Ratio (HTMT)85

Table 4.5 Discriminant Validity: Bootstrapping for Heterotrait-Monotrait
Ratio (HTMT)87

Table 4.6 Multicollinearity Statistics (Inner VIF)89

Table 4.7 Direct relationship for Hypothesis Testing92

Table 4.8 R²95



LIST OF ABBREVIATIONS

AVE - Average Variance Extracted

B2B - Business to Business

BMC - Budget and Management Center

CIPS - Chartered Institute of Purchasing and Supply

CPB - Central Procurement Bodies

EDI - Electronic Data Interchange

EP- Electronic Procurement

ERP- Enterprise Resource Planning

ETC - Entity Tender Committee

FMCG - Fast- moving Consumer Goods

GII - Ghana Integrity Initiative

GOF - Goodness of Fit

HTMT - Heterotrait-Monotrait Ratio

JIT-Just -in –Time

MOH - Ministry of Health

MRO - E- ordering/E-maintenance Repair Operate



MRP - Manufacturing Resource Planning

OCDS - Open Contracting Data Standards

OECD - Organization for Economic Co-operation and Development

PLS-SEM-Partial Least Squares-Structural Equation Modeling

PPA - Public Procurement Authority

PPB - Public Procurement Board

RE - Regulatory Environment

SCM - Supply Chain Management

SEM - Structural Equation Modeling

TRB -Tender Review Board

TTH - Tamale Teaching Hospital

VFM – Value for Money

VIF -Variance Inflation Factor



CHAPTER ONE

INTRODUCTION

1.1 Background of Study

Historically, procurement was conducted by visiting a shop, following the procedures for placing an order, or by viewing catalogues and making a phone call. This method has historically involved physical processes and management of procurement transactions have at some stage, been through relaxed centralized processes (Barngetuny and Kimutai 2015). Procurement's primary objective is to acquire the appropriate products or services at the appropriate time and place, in the appropriate condition, and at the appropriate price, in order to efficiently and effectively complete the purchasing process (Calipinar and Soysal 2012). E-Procurement is the process of completing a single or all steps of the procurement process using an internet-based method, such as searching, buying, negotiating, ordering, receipt, and post-purchase review (Barngetuny and Kimutai, 2015).

E-procurement is based on the traditional procurement system. With the advent of the internet and technological advances, businesses began to shift their procurement practices to the internet, realizing that if all procurement procedures are completed properly and accurately, they can save a lot of money (Brandon-Jones and Kauppi 2018). Electronic procurement, according to Johnson, (2011), is an effective tool for increasing transparency, accountability, efficiency, and value for money in the procurement of goods, services, and construction of projects. Ghana is still in the early stages of



electronic procurement adoption and use, especially in the public sector. The introduction of the internet as a forum for business systems has revolutionized the operation and status of organizational procurement (Johnson, 2011). In today's business world, Information Technologies have altered the way businesses and governments work.

E-Procurement is the process of completing a single or all steps of the procurement process using an internet-based method, such as searching, buying, negotiating, ordering, receipt, and post-purchase review (Barngetuny & Kimutai, 2015).

According to Kademaunga and Phiri, (2019) today's market climate is dynamic and internationally competitive; as a result, technology-based operations are no longer a choice for both public and private organisations; they are a necessity. With innovative concepts and strategies, companies have learned to make available to their customers a cost-effective overall solution that increases customer loyalty.

Owing to the advent of information and communication technology, businesses have redirected their efforts to transform their processes from the old ways to the e-Procurement, e-Business, and e-Supply Chain paradigms (ICT). In recent years, both private and public sector organisations, most notably the Ghana Health Service, have used information technology to restructure and automate their buying and other processes (Koorn, Smith, and Müller 2001; Ofori and Fuseini 2020).

1.2 Statement of The Problem

Most developing countries, including Ghana, are increasingly adopting and promoting e-procurement in healthcare delivery. Despite its rapid adoption, e-procurement remains a



vastly underdeveloped field in the public sector, especially in the health sector. Hospitals and health centres in Ghana lack well trained procurement staff, rendering financial oversight of healthcare procurement processes insignificant. Similarly, as seen in the study conducted by Mawenya, (2008), there is substantial inefficiency in the government's procurement processes, which hinders the effective use of the government's economic resources in infrastructure procurement in getting a better value for money.

To better understand this, Mawenya, (2008) explains that the most common types of corruption are unjustified personal enrichment and various forms of bids being bought out with money, ineffective work and deliberate deceit when personal information is compromised, incompetence, documents being overvalued, dubious schemes, and illicit means of procurement by participants. Musanzikwa, (2013) research report confirmed some of the challenges connected with procurement. His results indicate that, majority of those charged with procuring capital are inept. Due to these challenges, the e-procurement process was developed, to make sure that all procurement processes are completed electronically, eliminating the need for any manual intervention. Electronic procurement according to Johnson, (2011) is a useful tool for promoting accountability, productivity, transparency, and value for money in the purchase of goods, services, utilities, and works.

The traditional procurement system in the public sector in Ghana has been characterized by delays and long procurement processes, less transparency, lack of professionalism, significant human interference, state interference and prejudicial treatment in the



selection and award of, especially, government contracts (Rotchanakitumnuai 2013b). Ghana's procurement practices have gone through many stages of development, with the goal of eliminating or at the very least reducing corruption in public procurement, looking up to value for money, improving efficiency and procurement processes, among other things (Nawi et al. 2017).

The Public Procurement Act (Act 663) was enacted in 2003, and the new Public Procurement Amendment Act (Act 914), which was amended in 2016, were both significant amendments. The practice of Act 663 has reduced the costs for buying supplies for various businesses and institutions in the country, adding sanity to the procurement environment and has compelled some procurement professionals to call for the country's first e-Procurement legislation (PPA, 2010). However, the primary aim of the Public Procurement Act of 2003 (Act 663) is to accomplish a prudent, economical, and effective use of state resources in public procurement, as well as to make sure that public procurement is carried-out fairly, transparently, non-discriminatorily and in a competitive manner.

The bottlenecks mentioned above have heightened the interest of academics and procurement professionals alike to examine how public bodies are responsible for Public Procurement Act 2003 (Act 663) implementation. In addition, many scholars assessed the importance and challenges of the public e-procurement framework and argued that it provides an innovative way to mitigate the many challenges of Ghana's traditional procurement system (Abagna Azanlerigu and Akay 2015). However, less has been researched on the effects of electronic procurement adoption on supply chain



management within public hospitals in Ghana under a regulatory environment. The few works done on Ghana's case are Electronic procurement adoption barriers in retrospect (Sarpong et al., 2017), Electronic Government Procurement Adoption in Ghana (Ofori & Fuseini, 2020) and e-procurement: is Ghana ready? (Bulletin, 2010), as a result of the scanty literature in this subject, this study focuses on investigating e-procurement (EP) adoption effects on supply chain management (SCM), at the Tamale Teaching Hospital of Ghana.

1.3 General Objective

The key objective of the study was to assess the effects of e-procurement (EP) adoption on supply chain management (SCM) in Tamale Teaching Hospital.

1.3.1 Specific Objectives

To achieve the main objective of the research, the following specific objectives are set:

1. To discover and analyze the major prospects and challenges associated with the e-procurement system in the Tamale Teaching Hospital.
2. To identify and analyze the value and cost benefits of e-procurement in the Tamale Teaching Hospital.
3. To explore the factors that affect the e-procurement system in the Tamale Teaching Hospital.



1.3.2 Research Questions

The main research questions that are used for the purpose of the inquiry are:

1. What are the major prospects and challenges associated with the e-procurement system in the Tamale Teaching Hospital?
2. What are the values and cost-benefits of the e-procurement system in the Health Sector of Ghana?
3. What factors hinder e-procurement in the Tamale Teaching Hospital?

1.4 Justification of the Study

In order to improve the procurement system in the public hospitals in Ghana and to ensure that proper administration and institutional arrangements are made, many studies have been conducted on the public procurement Act 663 and on the effects of e-procurement adoption but not much has been done on how e-procurement (EP) adoption affects supply chain management (SCM) within public hospitals in Ghana under a regulatory environment. This study therefore is important as it sought to unearth the potential effects of e-procurement (EP) adoption on supply chain management (SCM) within public hospitals in Ghana under a regulatory environment.

1.4.1 Theoretical importance

For those who are interested and involved in the field of science, the current study is considered a significant guide. The outcome of the study will help identify the influence of regulatory environment in ensuring that public institutions implement e-procurement



and also assess the potential effects of the adaptation of electronic procurement on supply chain management.

1.4.2 Practical importance

The current study allows individuals involved in procurement processes in TTH to recognize the advantages and challenges of e-procurement. This study will also allow us understand the factors that influence user acceptance of e-procurement and contributions it comes with as e-procurement increases efficiency and productivity and leads to better utilization of public fund.

The relevance of this study also stems from the problem that it discusses, which is very important for other organizations interested in the e-procurement implementation. In addition, the study provides ideas for government institutions on how to maximize the use of e-procurement to improve supply chain management that will lead to value for money. The thesis will also help to add to the already current scientific knowledge on the study variables, and will be valuable for future research.

1.5 Scope of the Study

The research is confined to Tamale Teaching Hospital, Ghana. The study focused on the value and cost benefits of e-procurement (EP) that Tamale Teaching Hospital stand to gain, as well as the challenges that come along with its implementation.

The hospital is one of the autonomous entities in Ghana that is required to use the e-procurement system; therefore, it is expected that procurement officers or professionals in



the hospital have some considerable knowledge on e-procurement, and the data collected from the study gives a fair evaluation of the study objectives, hence the choice of the study area.

1.6 Limitations

Due to time constraints and the impact of covid-19, the researcher narrowed the scope of the study to the Tamale Teaching Hospital, one of the six teaching hospitals in Ghana. It is important to note that the study results are not generalizable since they are specific to the Tamale Teaching Hospital and may not be representative of all public health institutions in Ghana. Since electronic procurement is a new area for most of the respondents at the Tamale Teaching Hospital, it is likely that they will not fully understand how it works throughout the research period. The sample size used in the analysis was also a constraint. Despite the fact that the sample size provided adequate data for the study, the seventy (70) respondents were chosen due to time constraints.

1.7 Organisation of the Study

There are five chapters in this thesis. The study background, the problem statement at hand, research questions, the study objectives, the justification of the study, the scope of the study, and the organisation of the study are all included in the first chapter, which is the introductory chapter. The literature review is presented in chapter two; chapter three points out the study area, the methods applied in collecting the data required for this study and chapter four spells out how the data is analysed and the results of the study are discussed to address the research questions, and key issues related to literature used in the



analysis.

A summary of the major findings, conclusions and recommendations is also considered in chapter five.



CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter summarizes the current literature on the advantages of e-procurement for supply chain management. The analysis provides an overview of key principles, the history of e-procurement, the essence of e-procurement systems in Ghana, the various forms of e-procurement, public procurement in Ghana, supply chain management, and the regulatory landscape in Ghana, as well as how e-procurement lowers costs and adds value to the supply chain.

2.2 Definition of key concepts

Public Procurement: Public Procurement explains the process of efficiently, effectively, and economically buying goods, services, jobs and works by government agencies to obtain value for money. This process involves leasing, purchasing, hiring and other means of contract involving the supplier in providing public services (Ngatia and Kenyatta 2016).

E-procurement: E-procurement encompasses all stages of the purchasing process, from demand identification to tendering, payment, and possibly contract administration using the internet (Smith and Flanegin 2014).



Supply chain management: Supply chain management concerns the movement and storage from upstream to downstream of raw materials, produce, manufactured products and work-to-process inventory (Bakker et al. 2008).

Regulatory Environment: When talking about legal and regulatory framework for public procurement, we are referring to the collection of laws, regulations, and policies that control the implementation of the procedures and processes necessary for public sector entities to buy goods, works, and services. The legal framework for public procurement explicitly defines the scope of public procurement, all stages of the procurement process, procurement procedures, ethics, and transparency (Rotchanakitumnuai 2013a).

2.3 Background to E-Procurement (EP)

The use of internet technologies in the buying process is known as e-procurement. It is worth noting that this concept is limited in that it does not include applications such as ordering by phone or fax. This concept, on the other hand, is a little more expansive, since it encompasses not just the usage of the internet in the purchasing process, but the use of internet and extranet software. Rotchanakitumnuai, (2013a) mentioned that e-procurement, for instance, could take the form of ordering office supplies from a supplier's complete list of products on a website.

The internet is used in e-procurement to handle the transactional aspects of inviting, accepting, ordering, obtaining, and paying for necessary services or products (Chartered institute of purchasing and supply (CIPS), 2010).



E-procurement, according to (Rotich and Okello 2015), is the use of electronic approaches to perform transactions between awarding authorities and suppliers, usually over the internet. Public e-procurement refers to the use of information and communication technologies, like the internet, by governments or their departments in their procurement relationships with bidders for the procurement of public goods, works, and services (Davila, Gupta, and Palmer 2003).

Johnson, (2011) similarly defined e-procurement as "the use of electronic methods in every stage of the buying process from identification of a requirement through to payment, and potentially to contract management." It is also a term used to describe how government agencies handle electronic correspondence and transaction processing while purchasing products and services or bidding on public works (Ibem, Aduwo, and Ayo-Vaughan 2017).

According to the Business Dictionary (2014), e-procurement is defined as the practice of purchasing goods and services via the internet or a company's intranet. Meanwhile, it is believed that electronic procurement processes would reorganize all facets of the purchasing process, enabling more detailed and direct oversight over spending and product tastes.

E-procurement is the practice of purchasing goods and services for routine commercial transactions electronically and accepting the whole transaction in order to reduce costs (Cholette, Clark, and Özlük 2019; Walker and Harland 2008). According to Desmond et al., (2019); Žukauskas et al., (2018) e-procurement however, is not just limited to a method for making online purchases; it links businesses and their business processes in a



straight line with suppliers while handling all collaborations when properly handled.

E-commerce for business to business (B2B) transactions focused heavily on e-procurement. Online business-to-business e-commerce improves integration and inter-organizational coordination, resulting in reduced acquisition rates and more efficient sourcing options for businesses purchasing goods and services. E-procurement is not only a competitive player in the value chain, but also a driver of supply chain network expansion (Hardy and Williams 2008; Hawking et al. 2004).

The primary objective of e-procurement strategy is to engage the end-user in the process, and to resolve loop holes in the distribution network by developing an electronic multi-vendor catalogue and creating partnerships with suppliers (Neef 2001; Zsidisin 2002).

E-procurement, according to Nasrun Mohd Nawi et al., (2017), is the management of supply chains in the procurement of indirect products using internet information systems and e-markets.

Vaidyanathan and Devaraj, (2008) identified five significant improvements in the supply chain that e-procurement allowed associate managers to monitor their budgets by maintaining robust process performance with less delays, significantly increased transparency and usability throughout the whole process, enhanced management awareness, improved user compliance and system stability and process compliance.

Electronic procurement was initiated in the early 1980s with the advent of electronic data interchange (EDI). Customers and vendors, the majority of whom were in the fast-moving consumer goods (FMCG) industry, were able to send and receive orders and



invoices through secure store and call forward networks. These EDI systems allowed companies to share and harmonize the main data files containing information about their goods, costs, requirements, and positions and trade practices (CIPS, 2013). The widespread availability of internet technologies in the 1990s prompted tech providers to develop buyer-managed electronic catalogues for vendors to use.

As a result of miscommunication between customers and retailers (salespeople and buyers), tech providers started customizing, managing, and hosting specific catalogues, effectively acting as "intermediaries between the buyer's hub and the seller spokes" and vice versa. When cataloguing was outsourced, tech companies started selling the same cataloguing to a number of clients (CIPS, 2013).

The use of the internet on business has skyrocketed over the last decade, and the change has occurred rapidly. In only a few years, the internet has evolved as a medium of mass communication, a worldwide distribution outlet, a collaboration network, and a key component of corporate strategy. The concept of a 'global enterprise,' which eliminates assets and relies on technology to connect a dispersed network of vendors, producers, and distributors, is now a reality (Asare, Evelyn Nsiah and Prempeh 2017). E-Procurement has transformed the way Procurement and Supply Chain Management (P&SCM) roles are conducted, putting a stronger focus on information management, for example. It is predicted that e-procurement would alter an organization's P&SCM ethos, resulting in a stronger focus on expense and prices (CIPS, 2013).

According to the Asian Development Bank (2013), governments and other public bodies that have adopted electronic procurement have reaped a variety of direct benefits





including increased transparency, online request submission, contract award notification, and enhanced tenderer participation as a result of better knowledge and access to opportunities. Such benefits include an online recruitment system, an elimination of physical copies of unnecessary paperwork, resulting in better administrative procedures for dealing with graft and corruption, and an all-paperless record-keeping system. Because of the procedures in the public sector, the length of the tender, paper-based collection, and subjective materiality, the conventional procurement has presented a question of undue delay, human interactions, and a subjective view of treatment, and suspicion ways still plays a part in many of the elements of the procurement cycle (Desmond et al. 2019). Nasrun Mohd Nawi et al. (2017), added that, the development of an e-procurement operation is supposed to help overcome the majority of the undue obstacles that both contractors and suppliers face in their efforts to obtain bids for contracts. According to the authors, there a system in place to counter any unethical or corrupt practices that arise as a result of the human interface in the procurement processes. Embezzlement, improper interference in the needs appraisal, coercion by public authorities taking part in the award process, or deception in proposal evaluation, invoices, or contract commitments are all examples of unethical actions, according to the Organisation for Economic Co-operation and Development (OECD) (2015). A greater number of the procurement professionals in Ghana from the donor agencies, according to Mawenya, (2008), have lamented on the massive corruption that remains in the county's procurement processes and sees electronic procurement as only acceptable antidote to help fix it or almost reduce to barest minimum.

2.3.1 Adoption of Electronic Procurement

Many public sector organisations throughout the world have identified e-procurement as a critical component of the government plan, with some already adopting it and others thinking of doing so. According to OGC (2005), the UK public sector has begun evaluating and implementing electronic procurement in recent years. Additionally, the inquiry discovered that the government of UK has been encouraging the implementation of e-commerce across the public sector since 1998, with electronic procurement being a critical component of this. Over the years, businesses, particularly in the private sector, have automated and streamlined their procurement and other processes via the use of information technology (IT) platforms.

Meanwhile, there has been controversy concerning the evolution of electronic procurement; but there is little question that the use of the internet in e-procurement provides some advantages as compared to the old procurement approach (Gunasekaran and Ngai 2008).

Electronic procurement technology, unequivocally may improve process efficiency and transparency while preserving competition (Offei, Kissi, and Badu 2016; Smith and Flanegin 2014).

E-procurement has the promise of lowering costs and streamlining administrative procedures in both developing and developed economies as a result of technological advancements.

As Mahdillou and Akbary, (2014) have noted, Brazil has implemented the promising new



method centred on electronic procurement, which has apparently resulted in a significant rise in accountability and transparency, as well as cost savings for public procurement organisations.

In addition, the statement was subsequently found to be valid when it was mentioned in Mitchell, (2018) study that e - procurement as whole phenomena have to involve the formation of strategic initiatives which may be used to re-organize the overall procurement process.

Once an organisation has implemented a system that enables electronic procurement to link the processes of business and the organisation, they can be certain that a properly implemented system of electronic procurement will enable them to link their suppliers to each other, and thus take charge of all business and operational interactions (Brandon-Jones and Kauppi 2018). According to the study of Cholette et al, (2019), electronic procurement initiatives is considered an absolute necessity for procurement departments who mostly aim to reduce costs, improve timeliness, guarantee quality, preserve integrity, maximize competition, and minimise financial and technical risks, some administrators believe that implementing these initiatives could result in significant failure.

2.4 Paper / Traditional Based Procurement Problems

Current procurement has shown itself to be problematic in many literatures. These problems were looked at and broadly grouped into three, technology, compliance and people (Smith and Flanegin 2014). Contrary to today, where technology powers any aspect of procurement, the primary approach to the procurement process was



conventional procurement, which was met with several problems lack of harmonization and poor continuity of information. Process-related issues identified: error management; slow transaction and manual processing; large amounts of produced paper; complex procedures; bureaucratic procedures; budget management problems; insufficient government intervention; inadequate product normalization; and poor centralization of controls. Human-related challenges in conventional procurement have also had an overwhelming effect on the performance of any programme of procurement on technology and process issues. As a result, low internal complaints regarding procurement and resistance to change are listed as issues (Puschmann and Alt 2005). The question of enforcement is the inability to take strategic procurement into account (Dixit et al. 2019; Mahdillou and Akbary 2014; Sahu 2016), which relates to the fact that procurement agencies can not comply with procurement strategies but instead engage in maverick spending. This question provides the basis for the Public Procurement Act of 2003 (Act 663) to examine the problems involved.

2.5 E-Procurement Systems in Ghana

According to PPA, (2019), “the e-procurement system is designed to address corruption in procurement procedures by minimising human face-to-face interaction, and increase productivity for both Procurement Officers and Service Providers as all manual procurement process and procedures are automated.”

E-procurement systems, according to Business Dictionary (2014) is purposely used to restructure all parts of the purchasing process while applying stricter and more open





regulation over spending and product or item choices. According to PPA (2010), Ghana's public sector, especially the health sector, is now putting steps in place through the e-Ghana project to ensure the use of technology in government's transactions with the public. As a result, to ensure the effective execution of this initiative, the e-procurement practice is one of the basic tools that must be integrated into the scheme in order to improve openness, non-discrimination, fair competition, accountability, and process safety in the procurement process. However, implementing e-procurement will necessitate changes to many aspects that affect the procurement landscape, such as regulations, technology, and the new Public Procurement Amendment Act (Act 914), which does not consider electronic transactions in the procurement process. It does, however, request that a part of Act 914 be amended to provide for electronic transactions. This initiative has allowed numerous bodies to advertise their tenders online, vendors to apply their bids online, and the contract award process to be conducted online (Koorn et al., 2001). It has also been noted that any effective e-procurement procedure necessitates strategic planning to resolve the appropriate processes involved. At any stage of the transition process, government leadership is often critical at the bureaucratic and policy levels. Despite the fact that the country is not yet ready or prepared to adopt this scheme, data suggests that the government is working to prepare the country for this new procurement revolution. Among these initiatives are the e-Ghana project, which aims to develop internet connectivity for all government offices in the country; the Ministry of Communications' establishment of Community Information Centers to facilitate convenient public access to the internet; and the World Bank's budgetary funding of two

million US dollars for the establishment of e-Procurement under the e-Ghana project (PPA, 2010).

Sustainable public procurement, according to the African Development Bank (2012), is a mechanism that encourages policymakers to use public investment of 15 to 25% of GDP to support the country's environmental, social and economic policies (UNEP, 2012). Ghana's procurement processes and practices have progressed over time, with the primary goal of minimising or, at the very least, removing corruption in public procurement, achieving value for money, and improving procurement quality, among other things. The passage of the Procurement Act (Act663) in 2003 was a significant step. Act 663 clearly defined a high degree of sanity in the procurement environment when it was first implemented. While it is completely manual, some procurement professionals have called for the country to implement e-procurement (PPA Module 2007).

According to the Public Procurement Authority (PPA), Ghana is the foremost country in the West African sub-region to implement an electronic procurement scheme for the public sector in 2019. The e-procurement platforms were developed in accordance with international best practices, including the Open Contracting Data Standards (OCDS), which are used for reporting and displaying details at each level of the procurement process (PPA, 2019). This was done in phases. Phase 1 of the e-procurement scheme began with five government agencies—the Department of Feeder Roads, the Ghana Cocoa Board, the Ghana Health Service, Koforidua Technical University, and the Tema Metropolitan Assembly—with Phase II, which will include all 34 Ministries, Public Universities, Metropolitan Assemblies, and some selected Departments and Agencies,



scheduled to begin at the end of the year 2019.

2.6 Types of E-Procurement

When you look at e-procurement as a total solution, it may be considered as an end-to-end system that combines and automates numerous procurement operations throughout the company. The researchers (De Boer, Harink, and Heijboer 2002; McCusker and Gunaydin 2015) found the following systems to exist, each one of which has been created with a distinct goal in mind and utilizes a diverse range of functionality and attributes.

Bakker et al., (2008) in their research, stipulated that there are different forms of technologies suitable for different procurement activities. They basically classified e-procurement into six forms as discussed below.

2.5.1. E-Ordering/E-Maintenance Repair Operate (MRO)

Electronic catalogue-based procurement (e-Ordering) uses internet technology to enable customers with electronic access to product catalogues, enabling them to search for items through one or more catalogues and place a requisition or request for the products they like. Similar to Web-based ERP, but the goods and services purchased are MRO supplies that are not connected to products. There are no regulatory restrictions on the usage of electronic catalogues regulated by the awarding authority and used as a means to assist in the drawdown of products from a contract established between that awarding authority and a supplier (Koorn et al., 2001).



2.5.2. Web-Based Enterprise Resource Planning (ERP)

Enterprise Resource Planning (ERP) is an enterprise management framework that includes components that serve practical fields like planning, manufacturing, distribution, and e-business (Mahdillou and Akbary 2014). Web-based Enterprise Resource Planning (ERP) procurement modules uses a software interface based on internet technologies to generate and authorize buying requests, position purchase orders, and monitor the receipt of products and services (Koorn et al., 2001).

2.5.3. E-Sourcing

In their study, (Bakker et al.,2008) asserts that e-sourcing is the method of finding new suppliers for a given category of buying specifications across spatial boundaries using internet technologies. According to Chikwe & Obi, (2016), “The Sourcing process enabled with suitable web-enabled, collaborative technology to support the whole life-cycle of the procurement process for both buyers and suppliers.” Through the usage of a B2B sourcing platform, this frequently takes the shape of dynamic real-time discussions between a buyer and a number of pre-qualified suppliers, each vying against the other to win the buyer. The Internet, as in many other areas of online activity, brings suppliers and providers closer together, permitting lower prices, greater communication, and a more efficient process. This is one of the reasons why e-sourcing has become so popular (Ateto, Ondieki, and Okibo 2013).



2.5.4. E-Tendering

E-tendering, according to Calipinar and Soysal, (2012) is described as the process of submitting requests for quotation to suppliers and receiving the responses through the internet. This procedure enables a company to receive tender submissions from potential suppliers via electronic means. In addition, contracting authorities can use e-tendering to electronically open tenders/requests for participation, compile and distribute an opening report. Tenders/requests for participation can be submitted online and digitally signed (Ateto et al. 2013).

2.5.5. E-Reverse Auctioning/E-Auctioning

E-reverse Auctioning is described as, purchasing products and services from a variety of known and unknown suppliers through web-based technology (internet).

A seller lists an item for sale in a traditional auction; many buyers bid on the item, and the highest bidder purchases the items at a price decided by the bidding. A bidder makes an order for quotes to purchase a specific commodity in a reverse auction (Nawi et al. 2017).

2.5.6. E-Informing

E-informing, according to Koorn et al. (2001), is the method of collecting and disseminating purchasing information through the internet to both internal and external parties. However, unlike the others, E-informing is a kind of E-procurement that is not explicitly linked to a contract or sale. For instance, posting buying management



information on an extranet that internal clients and suppliers can access.

2.7. Benefits of E-procurement

E-procurement, according to Nasrun Mohd Nawi et al. (2017), has brought government a lot of benefits, and it has been seen as a way through which governments can reduce management cost and stay more competitive in the procurement of goods online. Smith & Flanegin (2004) in his study identified that the key advantages of e-procurement include cost savings, workflow re-organization, and increased contract fulfilment, among others. The authors added that e-procurement significantly save cost to the government as it reduces the expense and effort of handling the sales order as well as manufacturing costs and order delivery time.

Using an e-procurement method to purchase products online according to Nasrun Mohd Nawi et al., (2017) is more cost – saving. Cost such as administrative cost, order cost, the opportunity cost of capital and lead-time order cost are some four reduction costs among other costs identified by the author. The author went on to say that e-procurement offers quality bidding, efficient timeliness, cost savings, minimizes market efforts, reduces financial and technical costs, and increases innovation, all of which lower the cost of purchasing products or services at high prices. Because of the high confidentiality of details information that comes with electronic bidding, public sector bidding is one of the best environment for introducing e-procurement of goods and services (Chikwe & Obi, 2016). In fulfilment of the country's transition to a knowledge-based economy, the e-procurement system provides a more competitive and flexible procurement mechanism



(Dixit et al., 2019; Johnson, 2011). E-procurement provides the government with the most up-to-date quality details and prices, which is available online. The system is expected to be modern and provide the most up-to-date details to assist the customer in making a more accurate procurement decision.

Oxford College of procurement and supply chain in their book, indicated that though e-procurement has a lot of benefits, including transactional benefits, management information benefits, price benefits, compliance benefits, payment benefits among others, nevertheless, organizations or firms can only enjoy these benefits through the appropriate use of e-procurement. It must be stated clearly that such advantages would undoubtedly help to boost profitability, competitiveness, and reliability across the supply chain (Calipinar and Soysal 2012).

According to Eakin, (2003), businesses must consider the return on investment (ROI) in e-procurement in order to measure the benefits of e-procurement. The author explained how to measure e-procurement benefits using the following key metrics:

Hard Advantages (Directly Measurable): they are the tangible benefits necessary to increase shareholder value and get approval, such as price reductions and process cost reductions.

Soft Benefits (Indirect Benefits): which, though their direct influence on cash flow may be difficult to define precisely (e.g., individual time is better managed through more efficient procedures), are often suggestive of progress; and intangibles, which are beneficial but are not directly quantifiable in financial terms. It is critical not to



misclassify "soft" yet quantifiable advantages as intangible simply because quantification may be more challenging.

Intangibles include shifts culture, awareness of strategic sourcing as a longer-term competitive advantage, shifts in end-user attitudes, and the simplicity of the world-class internal procedures such as;

- a. E-platform: electronic procurement as a precursor to value-adding structures.
- b. Financial approval of all expenditures: the capacity to guarantee that all expenditures adhere to organizational standards; great visibility of supplier performance; and "live" feedback from end users to purchasers.

Additionally, electronic procurement provides both tangible and intangible benefits. The tangible benefits include cross-selling possibilities, cost savings, decreased inventory, and a faster order cycle time (Altayyar and Beaumont-Kerridge 2016). Among the intangible benefits according to (Altayyar and Beaumont-Kerridge 2016) are the following: improved product and company image communication.

Electronic procurement provides one billion dollars annually to the global economy and is advocated by advanced countries since it aligns with sustainable environment initiatives (Naude and Badenhorst-Weiss 2011).

Additionally, they advised organizations not to "double count" gains obtained through alternative methods such as procurement consolidation around an enterprise resource planning (ERP) system. According to Eakin, 2003), e-procurement is about cost reductions that should be distinguished from those realized through other procurement



best practices, and a measuring methodology should be established to distinguish between "business as usual" savings and those directly related to the adoption of the e-procurement system. For example, a well-defined strategic sourcing strategy will facilitate the achievement of e-procurement benefits by ensuring that appropriate contracts are in place for e-procurement use. As a result of this strategy, an e-procurement project should not be burdened with the cost of an ERP system with which it will almost likely interact via interfaces but which is not essential to perform efficient e-procurement.

2.7.1 Transactional Benefits

Clearly, e-procurement has shortened procurement transaction processes and opened the way for a variety of other benefits. E-procurement facilitates the online purchasing process by utilizing web-based transacting tools that allow items or products to be selected from pre-sourced supplier catalogues (Awadallah and Saad 2018).

Furthermore, as a result of global digital procedures, including best practice and the avoidance of trivial practices, electronic procurement facilitates partnerships with suppliers, accelerate procurement cycle times and enables supplier performance enhancements, and better data consistency, which reduces ordering inaccuracies and improves supplier performance (Nasrun Mohd Nawi et al., 2017).

2.7.2 Compliance Benefits

In many institutions, lack of awareness are the biggest issues of compliance and



autonomous spending. These issues can be addressed by the correct use of e-procurement tools such as catalogues and regular order management, as well as approval procedures. Compliance in an enterprise can be accomplished by the use of an easy and fast requisition to payment mechanism with interface which is “friendly” to the user and pre-sourced catalogues customized to meet the needs of each user. This basic strategic sourcing method with common tools and procurement procedures allow for information flow for effective electronic procurement system (Asare, Evelyn Nsiah and Prempeh 2017; Calipinar and Soysal 2012).

2.7.3 Management Information Benefits

Being able to maximize the financial gains and source strategically is highly important. Any company that effectively and adequately employs e-procurement has the opportunity to benefit from high quality comprehensive management details, thus neutralizing the requirements for quality, particularly in health care (Mahdillou and Akbary 2014).

2.7.4 Price Benefits

When a company is able to demonstrate to its suppliers that e-procurement is a useful tool that ensures that the final consumers honour their contract status, it will be able to negotiate down prices by better data collection, more reliable spending records, and improved trust in spending volumes due to increased system enforcement, and will agree to volume price breakdowns and discounts to be obtained (Mahdillou and Akbary 2014; Puschmann and Alt 2005).



2.7.5 Payment Benefits

The success and proper execution of the first four advantages listed above have a significant impact on electronic invoice payments. Electronic invoice payments improve cash flow management and allow efficient payment due to seamless procurement procedures that provide more timely and reliable details to the accounts payable department. In this situation, an organisation will reap the rewards of reduced labour and lower mailing and stationery costs. Also, suppliers are often guaranteed timely payment, and there are many opportunities associated with electronic invoicing that are either overlooked or undervalued (Mahdillou and Akbary 2014).

2.7.6 Reduced manpower

E-procurement decreases the amount of manpower hired, thus lowering the costs associated with retaining this manpower, such as wages, leases, stipends, health care, and even the space which they operate from (Mahdillou and Akbary 2014).

2.8 Factors Affecting E-procurement

Many governments have the will power to move their procurement practices towards e-procurement platforms; nonetheless, there is a scarcity of knowledgeable procurement professionals to make this an actual reality as government thinks that e-procurement is the gateway to reducing corruption in the public sector (Ilhan and Rahim 2017). The absence of easiness and confidence in e-procurement affects its usage and the writing of service level contracts, according to (Altayyar and Beaumont-Kerridge 2016). In an



effort to find obstacles to e-procurement, the European Commission (2002) uncovered several barriers, including: failure to develop leadership skills, economic inhibition, digital divides, restrictions on purchasing options, a shortage of coordination, inadequate workplace flexibility, mistrust, and bad technical design. Failures like these have a big influence on e-procurement purchasing contracting.

According to the World Bank (2004), e-procurement adoption is frequently hampered by a lack of awareness, comprehension, or ability about emerging technologies. Many researchers have made the point that there is a connection between foreign regulatory environments and e-procurement adoption. It has been noted that government agencies and corporations alike will have to go past current legislative, regulatory, and organizational impediments with a view to gain a foothold in e-procurement adoption (Jain, Abidi, and Bandyopadhyay 2018). There are a number of countries that have not incorporated e-procurement legislation into the country's legislative structure, including Ghana (European Union, 2012)

Even with its drawbacks of e-procurement is compromised by the difficulty of the digital gap (Davila et al. 2003; Moon et al. 2019). A significant percentage of suppliers are technologically illiterate and it takes them significantly longer to absorb the e-procurement operability, thereby reducing the number of suppliers that have equal access to internet knowledge (Reddick, 2004). With regards to e-procurement technology, suppliers' knowledge gaps might be a substantial disadvantage, which translates into a diminished inventory of catalogue options to meet the requirements of their clients (Davila et al. 2003; Moon et al. 2019).



Jain et al., (2018) also indicated in their research that, there are enormous benefits in e-procurement implementation. However, people who work in procurement offices must be skilled enough to manipulate the necessary applications of software coupled with management skills to ensure productivity and value for money.

Procurement entities, according to Jain et al., (2018) and Mahdillou & Akbary, (2014) do not have experienced human resources to manage procurement activities. As a result, few workers who are available do not have the requisite skills to offer true enforcement of quality standards, track e-procurement procedures, determine criteria, define procurement requirement, and perform supervisory roles which eventually result in budget constraints.

Also, Nasrun Mohd Nawi et al. (2017) in their studies further identified several factors leading to difficulties in the implementation of e-procurement in their studies. These factors include technology, facilities, regulation, and the environment.

This study agrees with Calipinar & Soysal, (2012) studies which equally identified these same factors; (technology, facilities and regulation, and the environment), as the challenging factors leading to ineffective implementation of e-procurement. The authors further argued that external factors from the industry, market, government and technological changes are not easy to be controlled by organizations and thus pose difficulty in e-procurement system. However, these challenges can be minimized or completely eliminated when they are looked at properly.

2.9. Supply Chain Management (SCM)

The history and source of SCM over 100 years ago has developed from labor-intensive



processes to the present management of global networks, which was known to have its origins in logistics management. In the earliest part of the years of the 1980s, because of development and increase in computer technology, SCM was recognised more (Kusi, Asante Antwi, et al. 2016). Supply chain management (SCM), according to Mathur et al., (2018) concerns the movement and storage from upstream to downstream of raw materials, produce, manufactured products and work-to-process inventory. Effective supply chain management has emerged as a key competitive advantage for businesses across a variety of sectors in recent years (Dixit, Routroy, and Dubey 2019). Several leading firms are distinguished from their competitors more by their supply chain management than by the products or services they deliver. Similar to supply chains in manufacturing and other sectors, the healthcare delivery system has grown so massive and complicated that no one people, or even single company, can comprehend all of its nuances (Kusi, Asante Antwi, et al. 2016). Material and logistical resources continue to be critical and often utilized in healthcare delivery; hence, their management is critical to the treatment of patients (Dixit et al. 2019). The majority of healthcare professionals prioritize cost-cutting while maintaining a good standard of service. To accomplish this goal, providers have concentrated their efforts on minimising waste in clinical operations.

According to Brandon-Jones and Kauppi, (2018), several businesses are experiencing supply chain disruptions as the manufacture and sale of machinery and supplies is halted due to a drop in demand caused by the global pandemic COVID-19 virus. Every healthcare industry's cornerstone is its supply chain management (SCM) (Dixit et al., 2019). The provision of medical supplies at the right time, in the right amounts, and of



the right quantity is a major factor in in the delivery of the quality of healthcare (Quayson and Akomah 2016). According to Dixit et al. (2019), health care providers in all countries are searching for opportunities to increase institutions productivities and lower expenses without compromising patient lives. Supply chain management (SCM), according to the Council of Supply Chain Management Professionals (CSCMP), encompasses the general supply planning and how supply activities are managed such as sourcing and procurement as well as distribution and all logistics management activities (CSCMP 2010). Furthermore, supply chain management entails coordinating, controlling, and collaborating with business partners such as vendors, third-party service providers, intermediaries, and customers.

The development of supply chain management (SCM) according to (Rotchanakitumnuai 2013a) is essential to solve functional problems that might arise between organizations. It is for instance clear that healthcare industry is interrelated in terms of operations. This means hospital must relate to another manufacturing industry and depend on the manufacturing process to ensure that there are proper production and delivery of the medical products (Rotchanakitumnuai 2013a).

Supply chain management (SCM) ensures that there is smooth delivery of products and services in different healthcare industries therefore networks and relationships are important in the supply chain (Rotchanakitumnuai 2013a). However, there is sometimes uncertainty and distraction in the supply chain. Uncertainties (including risks) that can arise at some stage within a global supply chain network are referred to as supply chain uncertainty (Awadallah and Saad 2018).



SCM (supply chain management) is an applied philosophy that controls the entire movement of products and services from the manufacturer to the end user. The whole idea of SCM is to satisfy the needs of the final customer by delivering the right commodity at the right time and at the right price (Smith and Flanegin 2014).

Last but not least, supply chain management can be described as a collection of methods and efforts that help manufacturers, retailers, and distributors work together efficiently. In essence, supply chain coordination ensures that, goods are manufactured and sold at the correct amount, at the right cost, at the right price, and in the right location in order to maximize customer satisfaction (Smith & Flanegin, 2014).

2.9.1 Supply Chain in the Health Sector

The complexities of COVID-19 outbreak have cause many havoc to healthcare industry management and has touch all aspect of the global economy including the supply chain. Coupled with that, the Coronaviruses have combined supply, demand, and uncertainty shocks that is detrimental to the actual economy, due to factory and office closures and travel restrictions (Tokar and Swink 2019). Similarly, this is evidenced by the fact that global supply chains have been disrupted as well as there has been a significant decline in demand for imported goods (Tokar and Swink 2019). In comparison to the SARS pandemic of 2003, COVID-19 has posed numerous obstacles to the highly connected economy (Tokar and Swink 2019). SCM development was aimed at resolving functional problems that can arise between organisations (Naude and Badenhorst-Weiss 2011). The primary role of SCM is to help maintain a seamless procedure between two or more firms



when distributing their products (Naude and Badenhorst-Weiss 2011).

The Central Medical Store, as well as a network of Regional Medical Stores in each Ghana's sixteen regions, manage the public sector's health commodity supply chain. The Central Medical Store is in charge of receiving, storing, and distributing all medical supplies purchased by the Ministry of Health. The supplies for health facilities are expected to come from the relevant Regional Medical Stores. The Regional Health Administration is the one who ensures that, Regional Medical Store offer the needed medical supplies and service to the health facilities within that region. After receiving approval from the Ministry of Health, Teaching Hospitals and Regional Hospitals may be able to purchase consumables directly from suppliers in some cases. All officials must ensure that adequate documentation is obtained, retained, and maintained to support the tasks for which they are accountable. Any transactions that senior officers approve or authorize must be accompanied by appropriate supporting documentation (Public Procurement Act, 663, 2003).

2.9.2 The Purchasing Process

There are series of definitions trying to explain purchasing. Purchasing according to (Musanzikwa 2013) is "buying the right materials, in the right quantity, at the right moment, at the right price and from the right supplier". Barngetuny & Kimutai, (2015) explained that purchasing goes through stages. The purchasing method, according to the authors, is described as obtaining all of the products and services necessary for sustaining and expanding direct and indirect production operations in the best possible conditions



from external sources. They divided this process into two parts: Tactical purchasing and Operational purchasing.

Tactical purchasing: is used to handle one-time purchases or acquisitions of products and services for a short-term demand. When conducting tactical procurement, the purchasing organisation must first establish the items and services to be acquired, as well as the suppliers and manufacturers who have a reasonable chance of delivering the goods and services adequately in all aspects of quality, timeliness, and cost.

Operational purchasing: is the acquisition of goods and services that are needed to maintain everyday production or commercial operations. To cut inventory holding costs, several companies outsource commodities that are needed on a daily or weekly basis.

The two parts have three distinct stages, making the six purchasing phases mentioned below:

Specification – This phase involves identification and stating the requirement of products and resources needed to sustain and expand direct and indirect manufacturing operations.

Selection of suppliers – This process entails identifying, evaluating, and choosing between various suppliers.

Contracting – In this phase, we negotiate the terms of the contract and ensure that these terms are also adhered to. The conditions of contract are clearly specified and provision made for any variation that may occur during the implementation and execution of the contract. This is where contract is concluded and prices are negotiated with the suppliers (Awadallah and Saad 2018).



Ordering – This is the stage at which products and services are well-ordered from the chosen vendors for which contracts have been completed with.

Monitoring – It is when the distribution of goods and services is regulated and must be in line with the contractual requirements.

Evaluation – The analysis of the buying process is performed at this final point.

2.10 Public Procurement

Public procurement according to Ghana Integrity Initiative (GII) (2007), "is the acquisition of, goods and services at best possible total cost of ownership, in the right quantity and quality, at the right time, in the right place for the direct benefit or use of governments, corporations, or individuals, generally via a contract." The buying of goods, services and works by public institutions and government are key concerns to be looked at critically. Procurement is said to have a huge effect on a country's economy because it is the basis upon which public policies are implemented (Ghana Integrity Initiative, 2007). As indicated by Rotchanakitumnuai, (2013), public procurement is the main tool that allows for efficiency in public resources management.

Public procurement according to United Nations report, is not just a system of government business; it is a mechanism of government procurement that involves project specification planning, submitting proposals, evaluating and accepting bids, contract payment, and awarding. Procurement in public institutions, on the other hand, is not treated as a one-time event. There is evidence by professionals alike as they identified three (3) stages of the procurement process. This include procurement budgeting and



preparation, contract awarding, procurement efficiency, and procurement solicitation. Rotich & Okello, (2015a) further indicated that procurement process could be in five stages. This include the following: requirements assessment and procurement planning, tendering process, paperwork and product creation, contract management and awarding, and auditing and accounting. Many scholars today regard advertising, design and identification, pre-qualification, bid preparation, bid submission, bid evaluation, contract award and post-qualification, contract results, monitoring, and administration as procurement phases (Cholette et al. 2019). However, the Public Procurement Act of 2003 (Act663) outlines the steps that public authorities must take when procuring works, products, or facilities. These include: the procurement planning, request for proposal, awarding of contract, and management of contracts.

There has been a number of agreement that, the purpose of public procurement is to ensure efficient machinery of governments to work, and for this to be feasible, procurement entities in the public sector are carried out in phases and free of involvement and circumvention (Cholette et al. 2019). For this reason, the explanation offered appeared to be quietly appropriate for the purpose of the study (Ghana Integrity Initiative, 2007).

2.11 Procurement Requirements of Public Sector

Public procurement plays an important function in government activity (Brandon-Jones and Kauppi 2018). This is to meet the needs for structures, services, goods and works in a timely manner. Furthermore, it must adhere to the basic values of openness, fairness,



accountability, and good governance (Khuan and Swee 2018).

2.11.1 Transparency

The main purpose of the Public Procurement Act is to make sure that the public procurement process in Ghana is harmonized to bring about transparency and equity. The procurement shall ensure that public funds are spent on works and services of the highest possible value. According to (Khuan and Swee 2018), the concept of transparency can be referred to as a mechanism for the development of a welcoming environment where data is made available, understandable and usable by all involved persons on current acts, conditions and decisions. Transparent procurement processes will help the government allocate resources more efficiently by increasing competitiveness, saving money, and ensuring good procurement efficiency, as in the case of taxpayers (PPB Training 3rd Module, 2007). Essentially, public procurement bulletin must be released to reduce corruption in public procurement systems; contract awards must be reported in media; good tenderers and final award prices must be listed, and transparency requirements must be assured to be more accountable and transparent. Many of these are basic obligations of public procurement in the light of (Musanzikwa 2013; Rotchanakitumnuai 2013a), which directly affect corrupt practices.

2.11.2 Accountability

Accountability, by definition, is the mechanism whereby an agency or entity is completely accountable for any aspect of the procurement procedure that they exercise authority. The key justification for accountability in procurement practices is to promote



and improve fairness and openness perception. This leads to a decrease in the incidence of corruption and further complies with the regulatory system and Procurement Law, Act 663 (PPB 3rd Module Training, 2007). Procurement practitioners holding contractors for public works, as well as ordinary people, have the ability at all levels of the procurement process to observe and test all procurement operations. People have access to updated policies, tender programme records, tender status assessment, and results from a notification. An e-procurement system is a tool for file standardization and strengthens suppliers and allows the supervision of procurement procedures. Accountability is improved for relatively expensive purchases by public transparency at all stages of the procurement process.

2.11.3 Efficiency

A public procurement programme that is efficient is said to function with minimal bureaucracy and timely sensitivity towards the end-users of the service or products that have been acquired. On that basis, efficiency can be defined strictly in terms of value for money (which means guaranteeing the lowest costs for the best price available). In this context, the concept of productivity can only be accomplished by free competition, as the procurement reform tends to be the catalyst for greater liberalization of the system. To make the procurement in Ghana competitive and successful, it is necessary to take over the procurement activities in an atmosphere of openness and professionalism with a clear interpretation of the regulations aimed at fostering and enhancing competition. Kusi, Antwi, et al., (2016)) states that procurement is, in general, an audible, open, and



competent process for efficient management of value-for-money services, works, and products. As a result of electronic procurement, automated workflows significantly helped to minimize the administrative or processing costs associated with transacting and thereby acted as a significant source of savings in public contracts. Khuan & Swee, (2018) have indicated that government companies have dramatically increased their efficiency due to the system of e-procurement with lower transaction costs as well as reduce the transaction duration. In the meantime, the automation of cycle demand payment has resulted in a decrease in manual processing, characterized by task-prone oversight that enable procurement experts to stress a more efficient activity (ADB, 2013).

1.11.4 Value for money (VFM)

This principle is important to measure the effectiveness of the purchase process (entries and results). It is the ideal way to evaluate the cost and the complete quality of life of a goods and services that meets the expectations or needs of the user. All those who bear responsibility for procuring products and services and making payments related with the public procurement process or public funds should actively seek to avoid fraud, waste as well as of public resources misuse. To achieve this principle, personnel involved in procuring goods, works and services must deal with specifications of the required goods and avoid the payment of excessively high prices for goods that are not of quality, unhealthy relationship with bidders or other anomalies.

2.11.5 Effectiveness

Data is automatically processed, and reports are in the procurement phase via e-



procurement. Better data management quality will provide better opportunities to track suppliers' results, including their acceptance and benefits management (ADB 2013). The central procurement bodies (CPBs) can also now negotiate fair prices for this publishing power. CPBs can easily access information through e-procurement, resulting in efficient negotiations with consented parties.

2.11.6 Legal and Regulatory Framework

The Public Procurement, Act 2003 (Act663), establishes a legislative, procedural, and administrative structure in Ghana's procurement system to ensure public integrity and fiscal transparency. Primarily, the Procurement Act has five identified standards or pillars around which public sector procurement revolves (World Bank, 2003). Tender documents; uniform procurement processes; the administrative and legal framework; anti-corruption measures; professional procurement workers; and an impartial mechanism of management are among the pillars. The objectives of the Procurement Acts are to harmonize procurement procedures in the public sector in order to ensure an economic, effective, and judicious utilisation of public resources, by ensuring that public bodies perform open, non-discriminatory, and equitable procurement functions. In addition to international funds and international assistance, this Act applies to procurement finance derived in part or entirely from public resources for the procurement of infrastructure, facilities, and products, including loans contracted to support procurement by Ghanaian governments. Moreover, the Procurement Act, yet again, established the Public Procurement Authority (PPA), which was formerly known as the Public Procurement



Board (PPB), Tender Approval Boards (TRB), and Entity Tender Committees (ETC). The Act establishes the rules and regulations for procurement thresholds and processes, complaint, settlement and appeals procedures and disposal of stock. However, the Act 663 has made some exceptions and it does not apply to some situations such as:

- ❖ When the Minister determines that alternative processes are in the best interests of the country.
- ❖ When alternative methods are specified in a loan or funding agreement that excludes stores management and/or distribution. (Kusi, Antwi, et al. 2016).

2.12 Public Procurement in Ghana

The need for a well-functioning public procurement system in anticipation of accelerated national development cannot be overstated. This is especially true for developing countries, where procurement usually accounts for a large share of total cost. For example, in Ghana, public procurement accounts for about 50% - 70% of the national budget (after personal emoluments), representing about 24% of total imports and makes up about 14% of the country's Gross Domestic Product (GDP) (World Bank, 2003) while most industrialized countries spend about 10% of their GDP on public procurement.

In Ghana, the regulatory system for public procurement has traditionally been limited (Abagna Azanlerigu and Akay 2015; Khuan and Swee 2018). The Ghana Supply Company Limited, in cooperation with the Ghana Supply Commission, has been the parastatal procurement agent for all public supplies since January 2000. Long delivery



times were caused by a shortage of trained staff, inadequate preparation for the necessary goods, a lack of a proper database, and issues with timely fund procurement. The Ministry of Finance has been working on the implementation of a National Procurement Code, using the Ministry of Health's recent procurement accomplishments as an example (Abagna Azanlerigu and Akay 2015).

2.12.1 Brief History of Ghana's Public Procurement Law

Ghana's government has been pursuing sanity in the public spending process by initiating the Public Financial Management Reform Programme (PUFMARP) in 1996 to promote fiscal sanity and value for money in the public procurement landscape. The program's aim was to strengthen Ghana's financial management. The procurement system's flaws were one of the main results of PUFMARP. The following are some of the big flaws identified:

- ❖ No comprehensive public procurement policy;
- ❖ Lack of central body with technical expertise;
- ❖ Unclear Procurement entities' roles and responsibilities;
- ❖ Lack of comprehensive legal framework to protect public procurement;
- ❖ Inadequate rules and regulations for guiding, directing, training, and monitoring public procurement

(Ameyaw, Mensah, and Osei-Tutu 2012).

In 1999, the Public Procurement Oversight Group was established to guide the development of a comprehensive public procurement reform program, which ended in the drafting



of a public procurement bill in September 2002, which was signed into law on December 31, 2003.

The Ghanaian government passed the Public Procurement Act in 2003. This act was enacted to replace the numerous laws that previously governed procurement practices.

The Act (Act 663) creates the public procurement board, tender boards, and Tender Review

Board; it outlines the procurement processes, procedures, tenderer appeals, and store disposal;

and it determines offenses and relevant punishments, as well as thresholds in schedules.

The Parliament of the Republic of Ghana has enacted the Public Procurement Act 2003 (Act 663) which seeks to provide opportunities for public procurement, establish public procurement boards, manage administrative and institutional arrangements for procurement, and determine tender procedures. It is therefore important for organizations to make a purchase policy and ensure that the system is working properly. The main purpose of public procurement in the public sector is to ensure the prudent, economic and effective use of state resources and ensure that public procurement is conducted in a fair, transparent and non-discriminatory manner (Kusi, Antwi, et al. 2016).

2.12.2 Public Procurement in the Public Health Sector

The Ministry of Health has been one of the earliest ministries to amend its procurement



policies as part of broader health reforms since 1997. These moved the procurement burden from the national to the regional, district, and sub-district levels. Simple procurement processes, like the formation of Procurement Committees, were established by the Ministry. These committees formed part of the budgetary package for the Budget Management Centers, which are; health facility units (which were renamed Hospitals) in Ghana's integrated public health system (Quayson and Akomah 2016).

In 2003, Ghana passed the Public Procurement Act (Act 633). The aim was to provide legal support for the newly implemented procurement structure. The framework was designed to improve the fairness and openness of the process. The implementation of these laws has so far been fraught with difficulties from all sides. Desmond et al., (2019) and Quayson and Akomah, (2016) wanted to know how well public procurement officers followed the legislation while doing their duties. They discovered that the Ashanti and Brong Ahafo regions had 19.8% and 17.8% compliance rate, respectively, using a standardized questionnaire. They concluded that the standard of conformity in the country was generally poor using this as a basis for generalisation. They said that procurement officials' strong desire to profit from their work weakened the mechanisms and responses to weak enforcement.

2.13 The Relationship Between E-procurement and Supply Chain Management

Since sourcing is also an imperative part of the supply chain. This research uses these factors as constructs to investigate the interaction between e-procurement and regulatory environment on supply chain efficiency in order to well understand the phenomenon.



According to Jain et al., (2018) and Smith & Flanegin, (2014), e-procurement does not just involve searching for and buying goods on line only, it links firms and their business process with suppliers directly while dealing with all collaborations between them.

Khuan & Swee, (2018) stipulate that supply chain can be made more agile, when it reacts to short term variations in request or supply quickly handled to meet external requirement efficiently, then e-procurement is practiced properly which cuts down cost, creates high responsiveness and enables fast responses through the supply chain.

A successful implementation of an organization's e-procurement system will make its supply chain more effective via paperless processing of order, receipt and invoices. Customer demands and the high cost incurred in competition in today's market environment has forced firms to examine their supply chain procedures and hook on to the huge savings potential from indirect expenditure (Nurmandi and Kim 2015). According to Kiprono, (2013); supply chain management is usually sustained by information technology with the use of enterprise resource planning (ERP), manufacturing resource planning (MRP) or electronic data interchange networks with suppliers.

These systems are far less costly and more versatile and improved tactical standardization. Almost all reports on e-procurement show significant efficiencies in supply chain management.

The core concept behind e-procurement is to make sure that, the end-user in the procurement process is included, with an automated multi-vendor catalogue and to close



process holes in the supply chain for indirect products (Neef, 2001).

E-procurement, according to Sahu, (2016), is the control of supply chains in the procurement of indirect products using internet information systems and e-markets.

E-procurement allowed five major changes in the supply chain, according to Ateto et al., (2013): protecting managers' budgetary oversight, providing robust process efficiency with less delays, offering much greater clarity and usability through the whole process, enhancing management knowledge which go a long way to strengthened user compliance and improving system stability.

2.14. How E-Procurement Reduces Cost and Creates Value in the Supply Chain

E-procurement improves flexibility in the supply chain cycle by controlling the time, which ensures the order is delivered not too soon or late. This can help to avoid storage of inventories and associated costs and also avert it from influencing the production process in the event of delay delivery. Because electronic order processes are carried out in conjunction with transaction agreements, the overall procurement and inventory management in the supply chain will definitely be reduced (Lee, Allen, and Wilkins 2020).

Furthermore, e-procurement helps to increase control of the supply chain, manage key procurement information proactively and make better quality buying decisions in a company, which boost efficiencies and generate value for the suppliers and for the entire supply chain network, not just for an enterprise (Lee et al., 2020).



However, both private and public businesses have dramatically modified their buying practices, enabling them to adjust their business strategies to minimize costs, speed up delivery times, keep real time track of orders, minimum inventory level on time (JIT), improve accountability, predict and foresee future demands in a better way, and update systems online (Lee et al., 2020). Previous academic works have presented that the correct implementation of e-procurement can bring significant direct and indirect benefits. E-procurement according to Lee et al., (2020) has saved millions of dollars for firms which use it properly. Unlike all other systems come with remedies, e-procurement comes with its streamlined deficiencies and potential challenges.

2.15 Regulatory Bodies

The Public Procurement Act 2003, Act (663), as amended by the Public Procurement (Amendment) Act 2016 (Act 914), is the chief legislation in Ghana that regulates and monitors public procurement. As part of Ghana's Public Financial Management Reforms and Good Governance programme, the Act was enacted to improve the integrity and openness of government financial management and spending. The Act directs the procurement of goods, works, and services financed wholly or partly with public funds, and the disposal of government property. The Act requires all government departments, organisations, and institutions of which the government has a controlling stake to comply with it. Teaching hospitals, for example, are autonomous entities with their own structure in the procurement of goods and services. The Chief Director of the Ministry of Health is responsible for ensuring proper financial and executive support for procurement within



the Ministry and its departments, according to the procurement manual (2004). He or she will be in charge of ensuring that, compliances with PPM is followed and the right sanctions given to defaulters.

The Medical and Dental Council, the Nurses and Midwives Council, and the Pharmacy Council are also regulatory bodies under the Ministry of Health. These are semi-autonomous bodies under the Ministry of Health tasked with upholding professional practices in their respective fields. The procurement process defined in this manual applies to these institutions since they are under the Ministry of Health. Procurement activities are the responsibility of the head of a regulatory body. An officer in charge of procurement shall be responsible for the execution and all procurement processes must follow the guidelines outlined in this document. The Head of the procuring entity has the ultimate procurement responsibility under the Public Procurement Act (Act 663). He / She is to ensure that provisions of the act are complied with. This means that various entities in an organisation or a procurement body can be in charge of different procurement operations. As a result, it is the duty of the entity's head to ensure that all of these operations, even if they are carried out by separate people, the activity should be successfully organised and controlled.

The MOH has a centralized procurement strategy for some goods and services, this is to take advantage of economies of scale, and also ensuring that expertise is not duplicated through procurement units. However, the advantages of decentralised procurement led to the establishment of Budget and Management Centres (BMC). In the Public Procurement Act663, BMC are similar to procurement units.



In the Public Health Sector, the Minister of Health is in charge of all activities, including providing leadership, direction, and supervision of procurement management.

2.16 Conceptual model.

A conceptual model offers a visual overview of the relationship between the theory and measurement variables (Ilhan and Rahim 2017). The importance of defining the variables and their relationships results in the formulation of empirical research of those relationships (Losch 2017). This conceptual model looked at the effect of e – procurement on supply chain management and also assessed whether or not the regulatory environment has some influence in ensuring that e-procurement adoption is implemented effectively.

Conceptual model and Hypothesis

H1: There is a significant influence of e-procurement (EP) on supply chain management (SCM).

H2: There is a significant influence of e-procurement (EP) on regulatory environment (RE)

H3: There is a significant influence of regulatory environment (RE) on supply chain management (SCM).



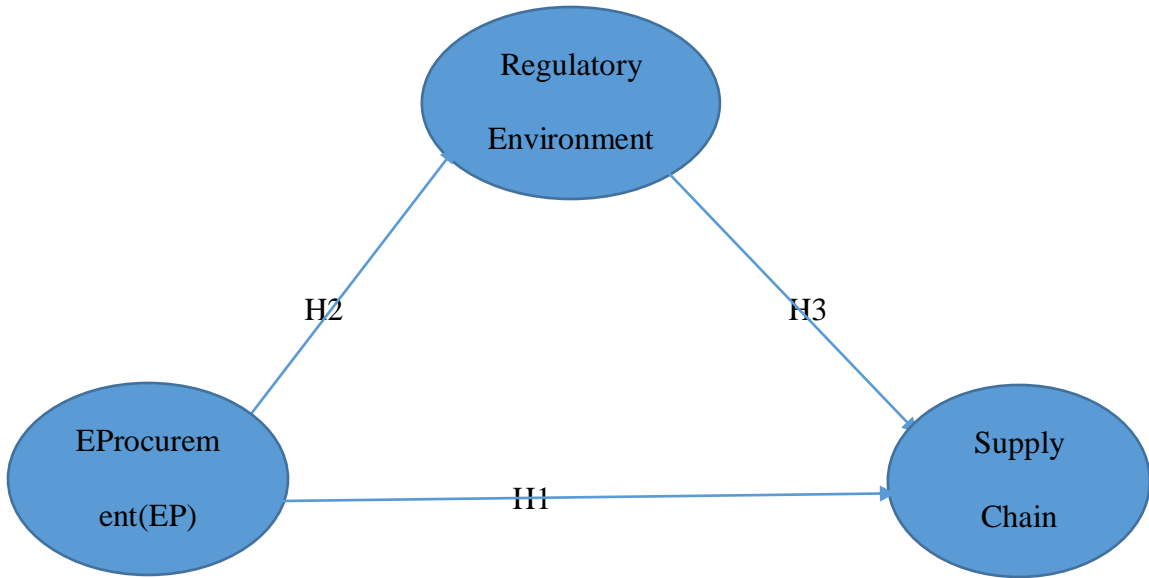


Figure2.1: Conceptual model

In the figure (2.1) above, e-procurement would be the independent variable and will be measured by e-tendering, e-sourcing, e-informing, e-ordering, e-auctioning and Web-Based Enterprise Resource Planning (ERP). The independent variable which is e-procurement has a direct bearing on the dependent variable which is supply chain management. The dependent variable is influenced by the independent variable. The following factors will be used to measure dependent variable: inventory management and forecasting, warehousing, transport, customer services, procurement and supply chain management. The overriding variable will be the regulatory environment which serves as a midway factor that may influence both the independent and dependent variables.



CHAPTER THREE

METHODOLOGY

3.1 Introduction

Research methodology refers to the study of methods and principles and their application in a certain field of academic survey (Zangirolami-Raimundo, De Oliveira Echeimberg, and Leone 2018). The selection of research method is influenced by the research questions, nature of study and research purposes (Winit-Watjana 2016). According to Guest et al., (2012) methodology is the general principles behind research. The authors further elaborate that methodology underpins the values and assumptions that form the rationale for research.

The study area profile, research design, research strategy, research philosophy, study population, sampling technique and scale, types and sources of data, data collection methods and instruments, data validity and reliability, data interpretation, and study ethical issues are all discussed in detail in this chapter.

3.2 Research Design

Research design according to Bougie & Sekaran, (2016), is described as a structure or glue that grasps/holds all of the elements in a study. Saunders & Tosey, (2013) further characterized research design as a number of methods and procedures for data collection, measurement, and analysis; it includes a detailed description of the processes used to gather information needed to solve a research problem. Study questions according



Mitchell, (2018) are crucial in gaining insight and investigating phenomena. As a result, selecting an appropriate design aids in connecting the data gathered to the main research question and the study's conclusion (Mattick, Johnston, and de la Croix 2018). The research question usually informs the design (Yin and Quazi 2018). A research design is an idea, plan and a technique for a study that enables the choice from a wide assumption to a comprehensive method of gathering data and analysis (Ridder 2017).

3.3 Research Approach

Deductive and inductive methods are represented in the layer on study onion (Saunders et al., 2016). The deductive method relates to a subject or value theory and reduces it to a more valid hypothesis that has been tested (Bryman 2012). The inductive method, in comparison, conducts definite observations and steps, shapes patterns, formulates inference and eventually draws conclusions (Amaratunga et al. 2002). This study employs the deductive approach.

3.3.1. Deductive

In a deductive study, hypothesis is developed based on an already existing theory and subsequently developing a research strategy to examine the hypothesis (Saunders & Lewis, 2012). Deductive method refers to reasoning from specific to general. (Pandey 2018) indicated that a deductive design test relationship. According to Saunders & Lewis, (2012), in an inductive interpretation, the truth of the conclusion is contingent on the truth of the premises. The testing of hypothesis in respect of an existing theory is based on data collection and analysis (Miller 2017). This approach is regarded as most appropriate for



positivism, which enables the researcher to formulate hypotheses and the statistical evaluation of expected findings to an acceptable degree of probability (Graneheim et al., 2017; Saunders & Lewis, 2012).

3.3.2 Justification for using deductive

The researcher uses deductive method because hypotheses have been formulated from the start of this study. The research then intended using relevant methods to test those hypotheses to prove the effects of e-procurement adoption on supply chain management.

3.4 Research strategy

Quantitative, qualitative and mixed approaches are three types of analysis open to researchers to achieve validation of the results (McKim 2017). This study is based on a quantitative method consisting of quantitative data collection and analysis (Green et al. 2015; Palinkas et al. 2015). To check a theory or hypothesis, quantitative study includes using instruments to collect data for statistical analysis (Yilmaz 2013). In this study, the quantitative research approach was appropriate because it involves the review of several variables of this survey. The quantitative approach was suitable for this thesis process since, through testing the hypotheses, the researcher was trying to ascertain whether there was a positive and significant association between e-procurement and supply chain management. In a quantitative analysis, a researcher uses predetermined variables to test a hypothesis or hypotheses but cannot analyze participant interactions (Yin and Quazi 2018). Scholars have use mixed approaches to incorporate qualitative and quantitative methods to obtain a deeper understanding of a phenomenon (Noel et al. 2016).



The qualitative methodology includes in-depth and full detail evaluation of problems and subjects (Saunders & Tosey, 2013). Researchers use qualitative approaches to explain patterns and attitudes relating to participants' intellectual viewpoint and interpretation (Brown, Nuberg, and Llewellyn 2017; Pham 2018). For this study, a qualitative research strategy was not suitable, as qualitative research includes participant experiences through interviews, personal observations, focus groups and case studies (Klatzow et al. 2019). Qualitative tests often test self-regulated learning as an occurrence of the data obtained during the learning process (Yin and Quazi 2018). The researcher gathers data using a quantitative approach without considering the thoughts or feelings of the subject or researcher (Brown et al., 2017). For testing hypotheses, researchers use quantitative analysis techniques to analyze the relationships between two or more variables (Canter and Canter 2018). Brown et al. (2017) noted that quantitative is the most prevalent method of study in journals, and a reliable way of representing a population.

3.4.1 Justification for using quantitative

The reason for using quantitative is based on research goal and research precedence. The study used quantitative method because it was appropriate for testing the association amongst independent and dependent variables. It also provided avenue for testing hypotheses.

The researcher's focus was to test a theory via a scientific process, which makes quantitative method meet the goal of this study.

The chosen research strategy was quantitative, since quantitative research concentrates on



predicting, utilizing test and controlling structures with huge random samples to generate details in order to reject or accept hypotheses (McCusker and Gunaydin 2015). To prove or disprove hypothesis, the quantitative researcher uses numeric data (Yin and Quazi 2018). Also, a quantitative study was used to look into the details that explain the various characteristics of the e-procurement predictors (Aboelmaged 2010). Quantitative study was used other than other researches because data collected was numerical and could be used to test opinions statistically (Andhini 2017).

3.5. Research philosophy

Saunders, (2019) referred to research philosophy as the development of knowledge that explains a research paradigm. Such knowledge development is based on certain assumptions on how individuals see the world (Saunders, 2019). A research philosophy makes clear the nature, foundation and development of knowledge in a research that supports the belief about how the data on social reality should be gathered, evaluated and interpreted to create meaningful findings (Mitchell 2018). Research philosophy is classified into epistemology, positivism, realism and interpretivism (Goldkuhl 2012; Klatzow et al. 2019).

3.5.1. Epistemology

In business research, epistemology focuses on sources of knowledge (Boon and Van Baalen 2019) and knowledge is connected to contextualism (Yilmaz 2013). Tashakkori et al., (2015) refer to it as a study of the principles, where the investigator categorizes what does and does not constitute the knowledge. It simply means, what is known to be the



truth. Accordingly, (Saunders & Faller, 2016) proffered that, epistemology deals with nature, limitations, possibilities and sources in an area of study. Epistemology is opposite of ontological thinking (Ryan and Deci 2017). The epistemological method reveals a researcher's belief and drives the research (Moon & Blackman, 2014; Staller, 2013).

3.5.1.1 Positivism

Positivism entails working with noticeable social reality and theoretical stance of the natural scientist to create law-oriented generalization (Saunders et al., 2019). Positivism promises clear and accurate knowledge. Positivism hinges on quantifiable observation that result in statistical analysis (Emeriau, Roboüam, and Dupré 2020). Its contributions are explanation and predictions. Positivism is in agreement with pragmatist understanding that, knowledge comes from the experience of people (Tashakkori et al. 2015). Positivism researchers are independent from the research and has no room for human interest within the research (Saunders et al., 2016). The general rule in positivist research is that, it normally implements deductive approach (Saunders & Lewis, 2012).

3.5.1.2 Realism

Realism relies on the concept of independence of reality from people (Novikov and Novikov 2013) Realism is founded on the assumptions of specific approach to the knowledge development (Mitchell 2018). According to philosophers, realism can either be critical or direct realism (Ryan and Deci 2017). Direct realism refers to a correct illustration that can be gotten from the practices and experiences provided by the senses (Losch 2017). It is held that in critical realism, anything experienced via the senses are



later processed by the mind intuitively (Losch, 2017). Critical realism accepts that, people's views and experiences of this universe are restricted to their own intuitive understanding (Guest et al., 2012). Resultantly, Saunders et al. (2016) clarifies that, under realism stance, data collection technique and data analysis will differ depending on whether the investigator is using quantitative or qualitative method.

3.5.1.3 Interpretivism

Interpretivism stresses that individuals are different from physical phenomena since they create meaning (Goldkuhl 2012; Pham 2018; Winit-Watjana 2016). This approach says that people and their social environment is difficult to be studied in the same manner as physical phenomena, hence, social science research is seen to be different from natural science research. The goal of interpretivism is to develop new, more affluent understanding and clarification of social setting and world (Saunders & Tosey, 2013). Therefore, investigators consider firms from the perspective of different groups of individuals. Interpretivism is explicitly subjective since it focuses on making complex meaning and rich multi-interpretation (Reed 2016). Interpretivism from axiological implication, recognizes their analysis of research methods and data by their own values and beliefs, play a significant function during the research (Saunders & Tosey, 2013).

3.5.2 Justification for adopting Positivism

The study is anchored on positivism because, the researcher has used existing theory (uses and gratification theory) to develop hypothesis (Saunders et al., 2016). The objective of this report, which aims to analyze how e-procurement (EP) adoption affects



supply chain management (SCM) at the Tamale Teaching Hospital of Ghana, justifies the researcher's choice of this form of paradigm. Under positivism, the researcher stays impartial and detached from the data and the research at large to avoid influencing the results (Hair, Ringle, and Sarstedt 2011; Pham 2018; Siebert et al. 2016). In that case the researcher conducts as far as possible, in a value free-way (Saunders et al., 2016). The researcher as well intends to analyze data collected using Partial Least Squares-Structural Equation Modeling (PLS-SEM) and some hypotheses drawn to test e-procurement (EP) adoption affects supply chain management (SCM). Positivism allows the researcher to use logical reasoning to empirically analyze actual events and describe them (Saunders et al., 2016). From all the explained theories it points out that the result of the study can be trusted to help investigators to make logical assumptions.

3.6 Research Time horizon

Studies are based on time dimensions such as cross-sectional and longitudinal (Saunders et al., 2016; Yin & Quazi, 2018).

This research relied on collecting data that is available at a single point in time in a population, thereby making it a cross-sectional study. The notion of performing a cross-sectional analysis is attributed to the fact that this work has been carried out for academic purposes and within a specific time frame (Kothari 2014).

3.7 Study Population

Study population according to Guest et al., (2012), embodies all cases of individuals or organisations who share some specific features; it forms the larger set from which a



sample is drawn.

In this context, the research population refers to the totality or sum of all participants in the sample. The target population includes the management and senior employees of the Tamale Teaching Hospital (TTH), which include: Chief Executive officer, Procurement Officers, Administrative managers, Finance Officers, Planning Officers, Store Officers, Project Managers and Heads of Departments in the hospital. The above mentioned target officers were chosen to help discover and assess the potential effects of e-procurement adoption on supply chain management in the hospital. Also, the selected group of staff were assumed to be involved directly or indirectly in various stages of the procurement processes and thus possess a wealth of knowledge that would allow them see the potential effects of e-procurement adoption on supply chain management in TTH.

Demographics and bio data were not included in the questionnaire produced for the survey because no private data on the respondents was obtained. It concentrated on the work carried out by workers to achieve higher efficiency. This section included three (3) constructs that were collected. That is, e-procurement (EP), Regulatory Environment (RE) and Supply Chain Management (SCM). All constructs and metrics used to test the constructs were discovered by the examined literature. Individual constructs were also evaluated using a five-point Likert-type scale with ranges from 1 to 5, with 1 indicating strong agreement and 5 indicating strong disagreement. For multivariate analysis, the five-point Likert-type scale was considered to provide precise and reliable results (Jr, Babin, and Anderson 2010). A description of the constructs adopted for this study is given in table 3.1



Table 3.1 Constructs and the number of items used in this study.

Constructs	Number of Items	Adapted from
E-procurement (EP)	7	Ryu (2018)
Supply Chain Management(SCM)	5	Ryu (2018)
Regulatory Environment(RE)	6	Ryu (2018)

Table 3.2: Distribution of Population

Officers	Total
Chief Executive Officer	1
Procurement managers	5
Accountants	35
Administrators	15
Supply officers	19
Planning managers	5
Estate managers	5
Heads of Units/Depts.	15
Total	100

Source: (Fieldwork), 2020

3.8 Sample design and Sampling Techniques

A sampling structure defines the list of all populations from which a sample is drawn



(Cooper and Schindler 2011). The estimated population for this study was 100 people, which made it difficult for the researcher to examine every individual member due to the different work schedules they each have and also due to the impact of the COVID-19 pandemic.

This study population was grouped into two (2) i.e. management group and senior staff group especially those who are directly involved in the procurement practices. The aim of the research sampling procedure was to choose participants who best matched the main concept of the study. To attain sample adequacy, the researcher used a quantitative method of obtaining the sample size using PLS-SEM "10 times law" method (Jr et al. 2010; Peng and Lai 2012). The "10-times rule" says that the least possible sample size for a study should be more than "10 times the highest number of ties to the inner or outer model leading to either of the model's constructs (Saunders & Lewis, 2012). From the research model, the construct with the highest indicators is e-procurement (7 indicators). As a result, the least possible sample size required for this study is $7 \times 10 = 70$, based on the "10-times rule." For this study, a minimum of 70 respondents is required. This study provided 70 respondents with questionnaires that met the "10-times rule" minimum sample size requirement. Once the minimum sample size needed to perform this analysis had been met, it was appropriate to implement a sampling technique to assist in the collection of data. Therefore, this research adopted a non-probability sampling technique using a purposive sampling method to select relevant participants for the study. The idea of choosing this technique is because it has the strength of getting rich and in-depth information on the central issues under study. Purposive sampling technique is suitable in



choosing respondents subjectively and because of their unique characteristics, experiences, attitudes, or perceptions hence, the need to choose staff who are directly connected with the procurement practices in the hospital. (Rotich and Okello 2015) indicated that investigators employ purposive sampling to choose participants that offer rich/adequate information and display knowledge of the research topic and question.

Purposive sampling techniques according to Saunders, (2019) depends on the decision of the researcher when selecting the units, such as participants, data, cases, or groups that are relevant to the research and offers an opportunity for the investigator to choose participants by the objective of the study.

The justification for choosing purposive sampling is because, it is suitable for answering a variety of research questions and eliminates individuals who are unsuitable for the sampling study, so only the most suitable participants are retained. Participants provide sufficient information for the study through a purposeful sampling (Yin and Quazi 2018). A purposive sampling technique enables an investigator to use his or her own judgments to choose participants who appropriately answer the research questions to meet the research objectives.

On the other hand, convenience sampling also called haphazard or accidental sampling, was also used in selecting officers especially the senior staff based on criteria of availability of respondent at an appointed time, easy accessibility and willingness to part-take in the study. It means in convenient sampling, researchers select participants who are easy to reach (Barngetuny and Kimutai 2015).

The researcher found convenient sampling technique useful in this study in order to



increase the possibility of the number of respondents. Convenient sampling was also used because of its simplicity and practicality of conducting research.

3.8.1 Sample Frame for the Study

The estimated population for this study was 100 staff of TTH, which was further grouped into two (2) i.e. management group and senior staff group especially those who are directly involved in the procurement practices. Out of the 100 staff, a sample size of 70 was obtained by employing PLS-SEM "10 times law" method (Jr et al. 2010; Peng and Lai 2012) and a non-probability sampling technique was adopted using a purposive and convenience sampling method. This is shown in the table 3.3 below.

Table 3.3 Sampling Frame for the Study

Officers	Population	Sample
Chief Executive officer	1	1
Procurement managers	5	5
Accountants	35	20
Administrators	15	14
Supply officers	19	10
Planning managers	5	5
Estate managers	5	5
Heads of Units/Depts.	15	10
Total	100	70



Source: Field survey. 2020

3.9 Data Collection Process

Having determined the research design, it is essential to indicate how data will be collected. To assess the current situation of e-procurement adoption and explore the potential effects of e-procurement on supply chain management in TTH, data was collected from primary sources only. Primary data is more accurate since it comes from the reliable source and is gathered specifically for the motive of the study. Data was collected through questionnaires designed in accordance with the hypothesis produced for the analysis on a 5 point Likert Scale. The research questionnaires were well - structured and the questions were close- end questions which was coded and different respondents who were sampled from TTH were asked to choose a given option. This was to ensure that the purpose of the research was accomplished in the end. Only once were respondents required to complete the survey, and data was collected from May to June 2020.

3.9.1 Tools for the Research

The researcher obtained data using an instrument with closed objects calculated on a five-point Likert scale, using the quantitative approach. The instrument is made of two parts (section A and B). Section A was designed to collect data that links to participant profiles. Section B gathered quantitative data on the objectives including, the influence of e-procurement on supply chain management in TTH and the influence of e-procurement on supply chain management through government policies.



The survey questionnaire offers many benefits in research and has been used as the key instrument for collecting data, therefore, the researcher adopted questionnaires from available literature. The questions were prearranged for the purpose of this study. In comparison to telephone or group interviews, a questionnaire is the most effective and equitable way to collect data since respondents can answer questions without disclosing their identities (Nidadhavolu 2018).

More so, the respondents were at ease in answering the questionnaire. This will actively encourage knowledge transparency, removing errors that arise because of the respondents' bias (Nidadhavolu, 2018).

3.9.2 Data Collection Procedure

Questionnaire was the primary tool for data collection. Despite the fact that seventy (70) questionnaires were distributed in general, some of them returned with missing values. This was however taken care of by employing the approaches for dealing with missing data as outlined in the following section.

The administration and retrieval of the questionnaires from the respondents took about a month.

The use of questionnaire was a cheaper way to collect data and a simple way to interpret it without knowing anything about statistics. Respondents were able to respond accurately and openly to the questions due to the anonymity of their answers without fear of intimidation or victimization.

The benefits of using a questionnaire to gather data from participants at the Tamale



Teaching Hospital include uniformity, less pressure on participants to answer the questions, and the speed with which it produces results. Many times, the use of questionnaires in data collection has its drawbacks, the analysis sees that the benefits outweigh the drawbacks.

3.9.3 Methods of Data Collection

A questionnaire is one of the key instruments used to gather data, according to Saunders et al., (2016), and it is a tool used for collecting responses to a predesigned subject matter using a form that the respondent completes.

With an introductory letter, establishing contact was easier specifically with the hospital's administration and the procurement unit of the hospital. The environment became conducive for the researcher after the initial introduction. Individual respondents were given questionnaires, and a follow-up was done afterwards. Officials who work in the procurement process made up the study sample frame. Questionnaires made data collection easier, ensuring that concepts and reality were as close as possible. It provided consistent responses from a group of respondents, which helped to lessen the untimeliness caused by unfavourable interview times and busy schedules.

3.10 Pilot Testing of Data Collection Instruments

The questionnaires were pre-tested on some Tamale Teaching Hospital employees to ensure that the questions were appropriate and clear. The primary concern was on the English language's architecture, as well as the questions' legitimacy and consistency. The pilot study was extremely beneficial to the researcher because it demonstrated whether



the questions were producing the appropriate answer for the research. Additionally, it suggested to the researcher whether there will be follow-up questions from participants that may require certain clarification. This allowed the researcher to anticipate and plan for potential questions, resulting in a very good survey.

3.11 Validity and Reliability

According to Canter and Canter, (2018), any researcher who wants to conduct quantitative research should concentrate on designing a study with these two features, evaluating the findings and assessing the study's quality (validity and reliability). Buchan and Croson, (2004) reveal the significance of validity and reliability of research tools, stating that quantitative research requires a significant concentration in reliability and validity. The analysis is useless in scientific eyes if the data is not trustworthy and true, when the evaluation methods are not dependable and valid, and if the developed features do not establish reasonable internal and external validity. As a result, these two main factors were taken into account during the research process, from start to finish. The hand-delivery technique was used during the administration of questionnaires to make sure that data was gathered from the intended respondents. During the analysis stage, data gathered was interpreted and evaluated, in the same way as it was in the questionnaires. A situation where editing was done, great care was taken to prevent any researcher bias.

3.12 Data Analysis

The participants' responses were obtained. After that, the researcher double-checked the questionnaires for errors. There were no missing surveys, and the information was thus



able to be examined. Before the data was being analyzed with the SmartPLS tool, data was coded and organized into combined constructs in Excel format.

3.12.1 Partial Least Square in Structural Equation Modeling

Structural Equation Modeling (SEM) is a technique used by IS to validate constructs and control links between constructs in multivariate data analysis (Gefen, Straub, and Boudreau 2000). According to Pigliucci and Kaplan, (2000), in a situation of a smaller number of structural" factors specified by hypothesized underlying model, SEM is a class of approaches intended to reflect hypotheses about the means, variances, and covariance of observed data." Two major approaches to SEM exist. In other words, SEM based on covariance (CB-SEM) uses software packages such as Mplus, AMOS, LISREL, etc. and Partial Least Squares SEM, which focuses on variance analysis and can be carried out using software packages such as SmartPLS and ADANCO (Hair et al. 2019; Henseler and Sarstedt 2013). The PLS-SEM method was followed by this report. This was largely because PLS-SEM, unlike CB-SEM, is an approach to SEM with no data distribution assumptions (Astrachan, Patel, and Wanzenried 2014; Vinzi et al. 2010). That is, in research work where there are few people answering the questionnaires and the sharing of data is distorted, PLS-SEM is useful (Bulletin and 2016 2016; Kwong and Wong 2013). Additionally, the researcher has used PLS-SEM since the aim of the research was to explore the association that exist between dependent building and independent building structures, using the impact dimension and predictive importance of CB-SEM (Astrachan et al. 2014). First and foremost, measuring or evaluating outcomes in PLS-





SEM wants that the measurement models be tested. In essence, the examination or assessment of the measurement model enables the researcher to equal the sample hypothesis to the evidence collected for the analysis. For formative and reflective structures, the relevant parameters for evaluating measurement models differ (Jr et al., 2010). This study included reflective constructs, a reliability test and the quality of the measurement model before an evaluation of the structural model was needed. By ensuring the implementation of the normative decision rules, this study evaluated the reliability of the indicator, internal consistency for reliability, convergent validity and discriminant validity (Diamantopoulos et al. 2012; Hair et al. 2011).

The next move was to test the structural model after the measurement model had been validated successfully (Hair et al., 2010). To further assess the structural model, five basic procedures were used as suggested by (Diamantopoulos et al. 2012). This includes an evaluation of the structural model for collinearity issues, an evaluation of the significance and validity of relationships with the structural model, an evaluation of the Goodness of Fit (GOF), an evaluation of the impact size (f-square), and an evaluation of the predictive relevance (q-square). After completing the examination of the calculation and structural model, a multi-group analysis was conducted to evaluate the influence of moderating variables (regulatory environment) and the interaction among the autonomous and dependent constructs.

3.13 Ethical Issues

Ethical work is expected from the researchers (Murphy et al. 2014). Ethical research

requirements include giving respondents no harm, providing voluntary consent and maintaining privacy and confidentiality of the participants (Murphy et al., 2014). Ethical analysis also requires not worrying the site of selection and communicating the study's aim and intention (Ørngreen and Levinsen 2017). The researcher performed ethical research, did not harm the participants, offered informed consent, guaranteed privacy and confidentiality of the participants, did not interrupt the collection site and conveyed the intention and purpose of this study to participants. The researcher improves understanding by spending enough time describing informed consent and responding to questions that might come up.



CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

The findings from the data analysis are discussed in this chapter. The data was gathered through the use of questionnaires. This chapter further explains how PLS-SEM is used to test and validate the study model proposed. The data analysis section comprises of two parts. The first section concerns the evaluation of the measurement model for indicator reliability, internal reliability precision, convergent validity and discriminating validity by making sure that the basic rules for judgement are used. The second section centred on the assessment of the structural model for multi-linearity problems, the value of path coefficients, efficiency and predictive relevance and relevance to the performance analysis matrix.

The results of the data analysis phase of the collected responses to the study questionnaire presented in this chapter were completed by 70 staff of Tamale Teaching Hospital. An extensive descriptive study of the sample characteristics was provided and in the chapter. Moreover, this chapter demonstrated the research method of hypotheses that was implemented by this study using the statistical analysis method of Smart-PLS. The results of the study and the logic behind using the statistical techniques were presented in the chapter. Finally, in the light of the research issues, the conclusions and relevant outcomes of the data analysis were addressed in depth.



4.2 Assessment of Measurement Model

A study of measuring models is ideal for the first step of the evaluation of PLS-SEM effects. According to, Hair et al., (2010), the model estimates provide empirical measures of the interaction of the metrics (measurement models) with the structures (structural model). Basically, the measurement model evaluation or estimate allows the scholar to equate the theory used for the research and the actual data gathered for the research as well. The parameters for evaluating the measurement model vary in formative and reflective frameworks (Schwarz, Schwarz, and Black 2014). In this respect, all the frameworks of this study are formative, and thus the reliability and validity of the measuring model must be evaluated prior to an examination of the structural model. This measurement model has a long background in the social sciences, particularly when looking at the use of classical test theory, and is known to as Mode A in PLS-SEM. On this hypothesis, measurements are thought to show whether a particular construct's results (or aspects) are being discovered or found. As a result, causality is described as the relationship between a construct and the steps that make up that construct. Formative indicators may be used to represent a sample of all potential objects within the building's conceptual domain. There is therefore a close connection between the indicators relevant to a particular construct because a formative measure allows all the indicator artefacts to be activated by a similar build (i.e. from the same domain). Moreover, individual objects should be compatible, and without altering the purpose of the construct, a single object may typically be left out as long as the construct is reliable. The relationship between the construct and its measurements implies that all metrics change simultaneously if the



latent characteristic measurement changes. A series of formative scales is generally referred to as a scale. This research therefore assessed the reliability, internal reliability quality, converging validity and discriminatory validity of the predictor by making sure the implementation of the standard judgement rules (Joseph F. Hair et al., 2019; Schwarz et al., 2014).

4.3 Indicator Reliability

The indicator's reliability is described as "the degree to which a variable or set of variables conforms to what it is intended to measure. "Formative indicator loads are tested to check for the reliability of the indicator. To measure the e-procurement impact on supply chain management, the researcher looks at the key indicators of e-procurement, regulatory environment and supply chain management. As a result, mean increased loading greater than 0.708 suggests that the underlying indicator attribute accounts for more than 50% of the indicator value. This is recommended because it indicates that the item has predictive power, meaning it has better predictive ability, meaning it possesses greater than half of the capacity to reveal information, meaning that the loading of 0.708 or higher indicates that the item is reliable (Hair et al.,2019). While all of the various measures worked with their observed variables, however, those measures did not increase the corresponding latent variables. This is the reason they were all discarded from the model (Green et al. 2015). This analysis was run under certain conditions where some of the metrics were insufficiently high to warrant such a full expansion. The following indicators, EP5 and SCM1 were deleted after running the model because they did not



load significantly at the minimum threshold requirement of 0.708 to their corresponding latent variables. All other observed characteristics were highly correlated with their associated latent variables.

This shows that the latent variables which are EP, RE and SCM were perfectly measured as seen in figure 4.1. After extracting the outcomes of the results, an assessment and review of the calculation and structural model were conducted. The indicator loadings using the PLS algorithm are seen in Figures 4.2 and 4.3 before and after deletion of indicators with a coefficient of less than 0.708.

The study sought to assess the potential effects of e-procurement (EP) adoption on supply chain management (SCM) within public hospitals in Ghana.

It can be inferred from the findings that e-procurement have a significant relationship on supply chain management as all indicators of EP (EP1, EP2, EP3, EP4, EP6 and EP7) loaded above the 0.708 minimum requirement threshold and that of supply chain management (SCM) indicators (SCM2, SCM3, SCM4 and SCM5) also loading with a higher coefficient of 0.708 as shown in figure 4.3 after deletion were all reliable.

This means that e-procurement can offer numerous benefits to TTH if it is properly implemented and managed appropriately. As a result, this study is consistent with the study of Nawi et al., (2017) which assert that, e-procurement has a lot of benefits, and it has been seen as a way through which governments can reduce management cost and stay more competitive in the procurement of goods online. Oxford College of procurement and supply chain in their book, also opined that e-procurement has a lot of benefits,



including transactional benefits, management information benefits, price benefits, compliance benefits, payment benefits among others, nevertheless, organizations or firms can only enjoy this benefits through the appropriate use of e-procurement.

Research participants were equally asked to rate their level of understanding with statement regarding the potential factors that may affect the e-procurement system in their organisation.

The deleted indicator from figure 4.3 which fall below the 0.708 limit explains that, the implementation of e-procurement may come with some challenges that Tamale Teaching Hospital would have to look out for when implementing e-procurement fully. The study conform to a study carried out by Nasrun Mohd Nawi et al. (2017) which identified several factors leading to difficulties in the implementation of e-procurement such as lack of trust of system by buyers, erratic energy supply, Government interference, internet services not been reliable and, unreliable information available on website were some of the potential factors affecting E-procurement system whiles issues of professionalism in the use of e- procurement systems, constraining legal and regulatory control and issues of procurement transparency and accountability were contrary to the statements.



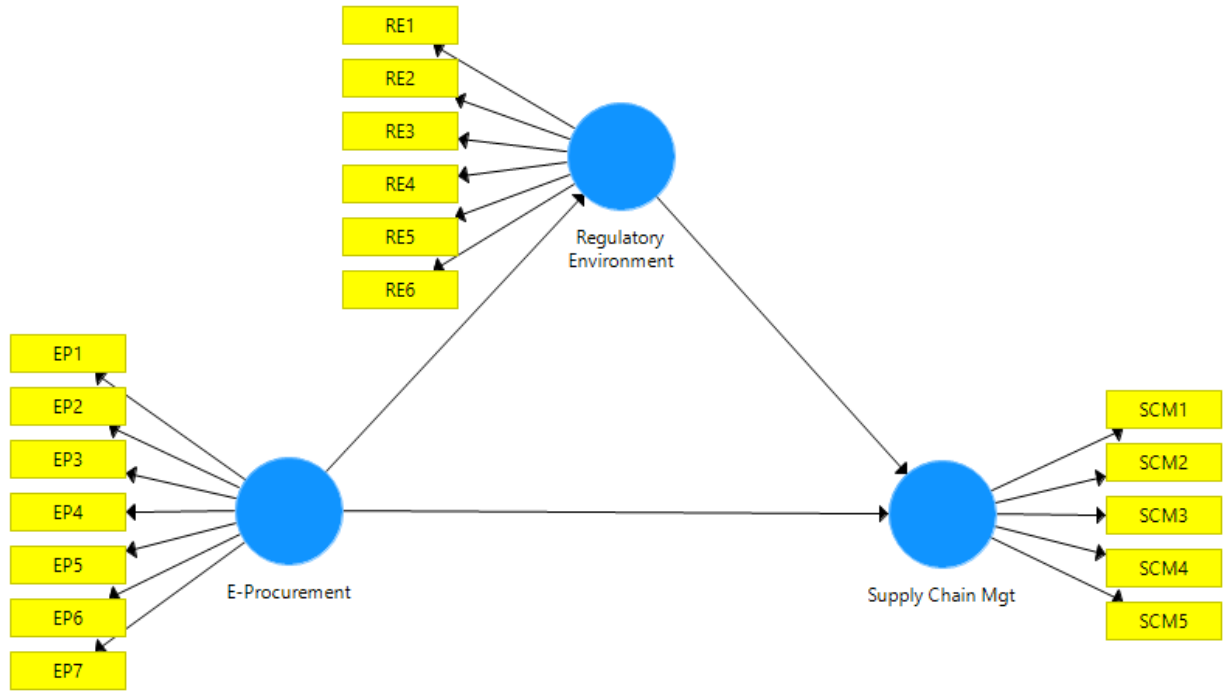


Figure 4.1 Model 2, Conceptual Model



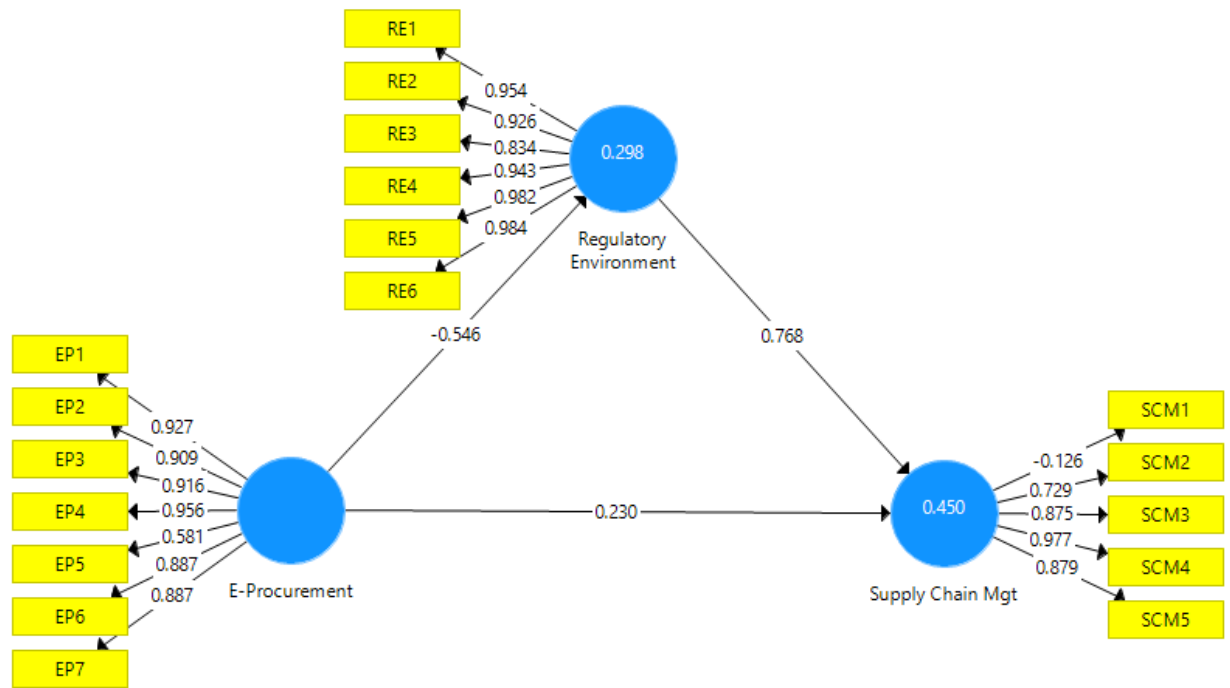
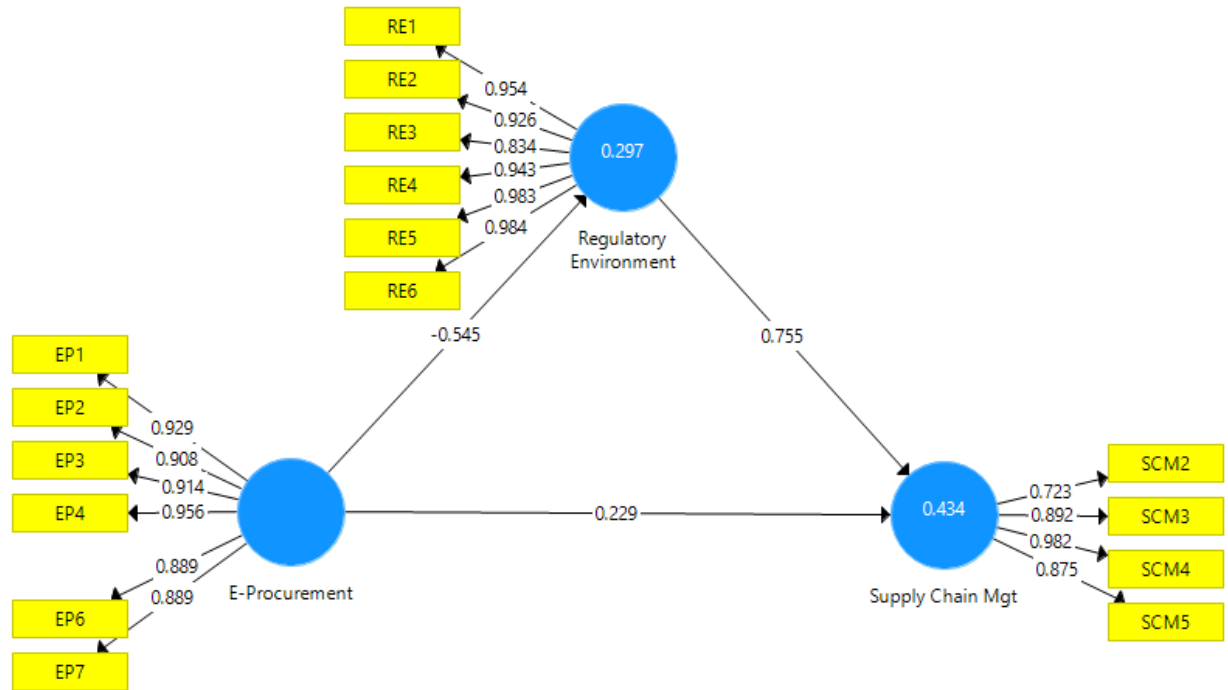


Figure 4.2 Model 3: PLS Results before Deletion of indicators less than 0.708





Indicators removed; EP5 and SCM1 were deleted after running the model because they did not load significantly at the minimum threshold requirement of 0.708 to their corresponding latent variables.

Figure 4.3 Model 4: PLS Results after Deletion of indicators less than 0.708

4.4 Internal Consistency Reliability

The second stage is the use of Cronbach alpha to measure the internal consistency quality after checking the correctness of the indicator. Historically, Cronbach's alpha metric for internal consistency; measures a reliability coefficient based on the observed inter-correlation of measurement predictor variables. Cronbach's alpha believes that both metrics are equally accurate (i.e., all the indicators have equal outer loadings on the construct). Nevertheless, PLS-SEM stresses its individual reliability in terms of





indicators. The scale factor's Cronbach's alpha is susceptible to the amount of objects that it contains, and its reliability underestimates internal consistency in general. As such, this can be used to provide conservative internal consistency efficiency measurements. Cronbach's high alpha value suggests that the values of all latent variable measures have the same range and significance (Cronbach 1951). The lowest threshold for Cronbach's alpha is 0.70 (Nunnally 1978). Table 4.1 shows that all latent variables or constructs had a Cronbach's Alpha value of over 0.70 and explains how significant e-procurement measures to supply chain management. Since the goods are unweighted, the Cronbach alpha has been questioned by researchers as having lower values and less accurate reliability (Hair et al., 2019; Schwarz et al., 2014). Because of population limitations, the inherent quality of Cronbach's alpha allows for the specification of varying degrees of internal accuracy, also known as composite reliability, under which a certain composite reliability may be tested (Loken 2009).

To fix the holes in Cronbach's alpha, Loken (2009) introduced composite reliability (Schwarz et al., 2014). In contrast to Cronbach's alpha, composite reliability implies that all indicators have unique loadings (Henseler, Ringle, and Sinkovics 2009), and thus serves as a more reliable indicator reliability metric (Chinn 1998). Higher values mean higher degrees of reliability; for instance, reliability values of 0.60 to 0.70 are deemed "appropriate for exploratory study." Furthermore, values between 0.70 and 0.90 mean "satisfactory" efficiency (Nunnally, 1978). Values greater than 0.90 (and certainly greater than 0.95) are unfavourable since they imply that both of the predictor variables are calculating equal occurrence and therefore are likely not to be a true assessment of the

model. Particularly such composite reliability values occur when the same query is slightly rephrased using semantically redundant objects. Researchers should avoid using duplicate products because they have negative implications for the material validity of the measurements (e.g., Rossiter,2002) and can increase error term associations (Drolet & Morrison,2001; Mladen et al., 2008). Finally, the values of composite reliability below 0.60 suggest the absence of internal accuracy reliability, while values of 0.95 and greater are considered problematic because they show that the products are greater than what is expected, resulting in a decrease in build reliability (Klatzow et al. 2019). Six composite reliability values from the findings starts from 0.723 to 0.889, indicating “satisfactory” to “good,” and three composite reliability values from the results are above 0.95, indicating a concern and thus not acceptable, as seen in Table 4.1 Rho_ A is an alternative to composite reliability for determining accuracy reliability (Salazar-Ordóñez et al. 2018). It is suggested that Rho_ A values of 0.70 be used. As seen in Table4.1, all latent variables have Rho_ A values greater than 0.70.



Table 4.1 Measurement Model Construct Reliability

	Items	Loadings	AVE	CR	Rho_A
E-					
Procurement	EP1	0.929	0.836	0.968	0.992
	EP2	0.908			
	EP3	0.914			
	EP4	0.956			
	EP6	0.889			
	EP7	0.889			
	<hr/>				
Regulatory	RE1	0.954	0.881	0.978	0.989
Environment	RE2	0.926			
	RE3	0.834			
	RE4	0.943			
	RE5	0.983			
	RE6	0.984			
<hr/>					
Supply Chain					
Mgt	SCM2	0.723	0.762	0.927	0.935
	SCM3	0.892			
	SCM4	0.982			
	SCM5	0.875			

All item loadings > 0.5 indicates Reliability (Hullard, 1999, p.198)
 All Average Variance Extracted (AVE) > 0.5 as indicates Convergent Reliability Bagoni and Yi (1988), Fornell and Larcker; (1981).
 All Composite Reliability (CR) > 0.7 indicates Internal Consistency (Gefen et al, 2000)
 All Cronbach's Alpha > 0.7 indicates Indicator Reliability (Nunnally, 1978)

The aim of this study is to assess the potential effects of e-procurement (EP) adoption on supply chain management (SCM) and to particularly analyze the value and cost benefits of e-procurement in the Tamale Teaching Hospital.

As seen in the table 4.1 above all Rho_A values are greater than 0.70 and all reliability



loadings are within the maximum threshold meaning the three latent variables are reliable and can be measured. In the case of this study, it implies that all the objectives are measurable. It is however, deduced from the study that e-procurement have some challenges nonetheless it creates value for money and increases fairness, transparency and accountability among others. This clearly agrees with Lee et al., (2020) studies which indicated that e-procurement helps to increase control of the supply chain, manage key procurement information proactively and make better quality buying decisions in a company, which boost efficiencies and generate value for the suppliers and for the entire supply chain network, not just for an enterprise. The study however inconsistent with the study of Cholette et al, (2019), which indicate that, electronic procurement initiatives is considered an absolute necessity for procurement departments who mostly aim to reduce costs, improve timeliness, guarantee quality, preserve integrity, maximize competition, and minimise financial and technical risks, some administrators believe that implementing these initiatives could result in significant failure and does not create value for money.

4.5 Convergent Validity

Convergent Validity is the degree to which a test exhibits convergence or relationship with other samples of the equal construct. Formative construct experiments are viewed as distinct methods for evaluating the same construct using the domain sample model. The items that serve as indices (measures) of a particular construct should either converge or have a large proportion of variation in common. Researchers regard all outer loads and





the average variance obtained from the metrics when determining convergent validity. Furthermore, convergent validity explains the extent at which individual items describing a construct converge as compared to items measuring multiple buildings (Schwarz et al., 2014). High outer loads of a construct mean that there is something in common with the associated indicators which the construct captures. This feature is often referred to as indicator reliability. A general principle that is formulated is the fact that, typically at least 50 percent, a latent variable can explain a large piece of the variance of each indicator. This also means that the construct and its predictor are both more than the variance between the measuring error and its variability. This means that the outer loading of an indicator should be greater than 0.708, so the number squared (0.708²) equals 0.50. In certain cases, 0.70 is thought to be near enough to 0.708 to be sufficient. In social science studies, investigators often observe lower outer loads, particularly when newly designed scales are used (Hulland 1999). Instead of removing indicators when their outer loading is less than 0.70, instantaneous researchers should wisely consider the impact of object elimination on composite reliability and establish content validity. Approximately, predictors with outer loadings in between 0.40 and 0.70 can only be taken into account if the deletion of the indicator raises the composite reliability (or average variance extracted) directly above the proposed maximum limit value. The validity of an indicator's material is also taken into consideration before deciding whether or not to delete it. Weaker outer load indicators are often maintained because of their importance to content validity. Since outliers (e.g. indications with a loading of 0.40 or lower) must always be removed from the design outlier and reports of absolute

discrimination, regardless of format, always omit them (Joseph F Hair et al., 2010).

The average variance extracted (AVE) is an ordinary measure to define convergent validity at the construct level. The key mean load value of the predictor is calculated by squaring the total aggregate set of loadings for all measures. The AVE is therefore analogous to the group of a construct. The AVE value of 0.50 or greater, using the same rationale as the one used for individual indicators, shows that on average, the construct elucidates indicators which are higher than half of the variance of its indicators. In comparison, an AVE of less than 0.50 suggests that more errors exist in the items on average than the variance of the construct (Fornell and Larcker 1981). The maximum limit for AVE is 0.50 (Hair et al., 2019). This implies that the latent element or construct gives details of at least 50 percent of the inconsistency of its objects, indicating adequate convergent validity (Joseph F. Hair et al., 2019; Schwarz et al., 2014). Table 4.1 shows AVE values more than the 0.50 minimum limit, indicating sufficient convergent validity.

As indicated in table 4.2 above, the AVE values of all the construct are higher than 0.50. It implies that there exists a strong relationship between EP, SCM and RE. The above conclusions are consistent with the study of Nurmandi and Kim, (2015) which assert that a successful implementation of an organization's e-procurement system will make its supply chain more effective via paperless processing of order, receipt and invoices. Customer demands and the high cost incur in competition in today's market environment has forced firms to examine their supply chain procedures and hooked on to the huge savings potential from indirect expenditure.



4.6 Discriminant Validity

Discriminant validity is explained by Hair et al. (2019, p.9) as the “degree to which a construct is empirically distinct from other constructs in the structural model”. As a result, defining discriminant validity means that a construct is exceptional and captures occurrences not captured by other builds in the model. To define or determine discriminatory validity in PLS-SEM, two acts of discriminatory validity have been proposed. One way to test discriminant validity is to analyse the cross loads of the indicators, particularly the outer load indicator on the linked construct should exceed all its charges on other constructs. A discriminant validity issue occurs when cross loads are more than the outer loads of the indicators. In terms of determining discriminant legitimacy, this condition is widely regarded as very lenient (Joe F. Hair et al., 2011). This means that more than one constructs are expected to reveal validity. The combination or contrast of every latent variable score with all other items calculates the cross-loading (Chinn 1998). When each loading indicator for its construction is higher than some other construct then each of the structures or latent variables load maximum with its indicators or allocated objects, it is generalizable that the latent variable or construct indicators differentiate between themselves. In other words, they are not interchangeable. As the latent variables load the maximum on their allocated constructs than any other construct, it can be inferred that they are discriminant to each other (s).



Table 4.2 Indicator Item Cross Loading

	Regulatory		
	E-Procurement	Environment	Supply Chain Mgt
EP1	0.929	-0.396	-0.034
EP2	0.908	-0.529	-0.326
EP3	0.914	-0.598	-0.231
EP4	0.956	-0.587	-0.191
EP6	0.889	-0.383	-0.046
EP7	0.889	-0.36	-0.015
RE1	-0.653	0.954	0.71
RE2	-0.497	0.926	0.551
RE3	-0.553	0.834	0.345
RE4	-0.297	0.943	0.553
RE5	-0.531	0.983	0.657
RE6	-0.478	0.984	0.649
SCM2	0.005	0.293	0.723
SCM3	-0.349	0.612	0.892
SCM4	-0.236	0.607	0.982
SCM5	-0.019	0.6	0.875

The Fornell-Larcker criteria represents another and more traditional approach to determining the validity of discrimination. Correlations between latent variables are calculated using the square root of the AVE values. Specifically, each construct square



root AVE must be larger than its maximum association to any other construct. (Note: This condition can also be mentioned as the AVE should be more than every other construct's squared correlation.) The rationale of this approach is built on the assumption that a construct shares more variances than any other construct with its related indicators. Fornell and Larcker, (1981) argue that a latent variable can share more variation with its variables than any different latent variable in order to achieve discrimination. The AVE of each latent variable, in short, should not be less than the latent variable's highest square association to other latent variables. Table 4.2 shows that the different latent variables share more variance than with the other latent variables with their assigned indicators. This is indicated by bolding the numbers in the Table 4.2. Also, it can be shown that in both rows and columns the bold numbers indicate the highest values. In this situation, it can be concluded that discriminant validity has been established. This research is consistent with some studies, which state that there is a positive association between e-procurement and supply chain management, for example in the studies of (Nasrun Mohd Nawi et al., 2017).



Table 4.3 Discriminant Validity (Fornell-Larcker Criterion)

	E-Procurement	Regulatory Environment	Supply Chain Management
E-Procurement	0.914		
Regulatory Environment	-0.545	0.939	
Supply Chain Mgt	-0.183	0.63	0.873

* The diagonal are the square root of the AVE of the latent variables and indicates the highest in any column or row

The Fornell and Larcker (1981) criteria has been criticized by researchers as a poor metric for measuring discriminant validity. For example, Thiele et al., (2015) claim that the Fornell and Larcker (1981) test fails when loadings of an indicator on a latent variable changes marginally (for instance, where indicator loads span from 0.65 to 0.85). As a result, Thiele et al. (2015) proposes using the Heterotrait-Monotrait Ratio (HTMT) of associations (Voorhees et al. 2016) as an appropriate test to determine discriminant validity. Thiele et al., (2015) proposed a Monte Carlo simulation analysis to demonstrate the superior efficiency of HTMT. The results showed that HTMT would reach its higher sensitivity and specificity rates (that is, 97 percent -99 percent) than cross-loadings and Fornell and Lacker (0.00 percent and 20.82 percent respectively). “The mean value of individual correlations across constructs relative to the (geometric) mean of average correlations for items measuring the same construct” is how HTMT is described (Hair et



al., 2019, p.9).

Table 4.4 Discriminant Validity- Heterotrait-Monotrait Ratio (HTMT)

	E-Procurement	Regulatory Environment	Supply Management	Chain
E-Procurement				
Regulatory Environment				
Environment	0.525			
Supply Chain Mgt	0.26	0.632		

When HTMT values are higher, discriminate validity issues arise. It is recommended that this be used for a 0.90 threshold (Gold, Malhotra, and Segars 2001). When the HTMT value exceeds the 0.90 threshold, discriminant validity is absent. As can be seen in Table 4.4, none of the HTMT values exceeded the 0.90 threshold, indicating that discriminant validity was achieved (Gold et al., 2001; Joseph F. Hair et al., 2019). Bootstrapping can also be used to see whether the HTMT value is slightly different from 1.00 (Thiele et al., 2015) or the maximum limit value (that is, 0.90). With a confidence interval of 0.95, “consistent PLS bootstrapping” was done. Table 4.5 illustrates the results.

On an average a large number of responses indicated that respondents had knowledge and were aware of the e-procurement systems that were used in the hospital and knew of the benefits of e-procurement, potential factors affecting e-procurement adoption and how e-procurement influence supply chain, the remaining smaller number either did not know





or failed to provide information on their knowledge level on e-procurement systems that has been used in the institution. The results of the study could be connected to some studies for instance PPA (2010), report which indicated that Ghana's public sector, especially the health sector, is now putting steps in place through the e-Ghana project to ensure the use of technology in government's transactions with the public. This initiative has allowed numerous bodies to advertise their tenders online, vendors to apply their bids online, and the contract award process to be conducted online (Koorn et al., 2001).

On the issue of potential factors affecting e-procurement adoption, all the factors revealed by the study were significant with the exception of issues of professionalism in the practice of e-procurement, constraining legal and regulatory control and issues of procurement transparency and accountability. The significant factors include, lack of trust of system by buyers, Volatile power supply, Government interference, Erratic internet services/internet jam and, Unreliable information available on website among others. The results of the study is not in conformity with that of Jain et al., (2018) and Mahdillou & Akbary, (2014) studies which states that procurement entities do not have experienced human resources to manage procurement activities. As a result, few workers who are available do not have the requisite skills to offer true enforcement of quality standards, track e-procurement procedures, determine criteria, define procurement requirement, and perform supervisory roles which eventually result in budget constraints.

Also the study is inconsistent with the studies of Nasrun Mohd Nawi et al. (2017) and Calipinar & Soysal, (2012) that identified technology, facilities, regulation, and the environment as the challenging factors leading to ineffective implementation of e-

procurement. However, result also shows that for e-procurement and supply chain to be successful, regulatory agencies play a vital role. This assertion confirms a study by Public Procurement Act 2003, Act (663), as amended by the Public Procurement (Amendment) Act 2016 (Act 914), is the chief legislation in Ghana that regulates and monitors public procurement.

Table 4.5 Discriminant Validity: Bootstrapping for Heterotrait-Monotrait Ratio (HTMT)

	Original	Sample		95%CI	95%CI
	Sample (O)	Mean (M)	Bias	LL	UL
EP1 <- E-Procurement	0.669	0.664	-0.005	0.315	0.844
EP2 <- E-Procurement	1.048	1.02	-0.028	0.876	1.163
EP3 <- E-Procurement	1.109	1.094	-0.015	1.012	1.226
EP4 <- E-Procurement	1.068	1.052	-0.016	0.975	1.176
EP6 <- E-Procurement	0.654	0.647	-0.007	0.319	0.825
EP7 <- E-Procurement	0.599	0.598	-0.002	0.285	0.77
RE1<-Regulatory Environment	1.152	1.138	-0.014	1.109	1.207
RE2<-Regulatory Environment	0.886	0.886	0	0.804	0.936
RE3<-Regulatory Environment	0.744	0.752	0.008	0.606	0.814
RE4<-Regulatory Environment	0.731	0.748	0.017	0.66	0.769
RE5<-Regulatory Environment	1.008	1.004	-0.004	0.985	1.03
RE6<-Regulatory Environment	0.959	0.96	0.001	0.938	0.977
SCM2 <- Supply Chain Mgt	0.496	0.489	-0.007	0.196	0.638



SCM3 <- Supply Chain Mgt	0.852	0.844	-0.008	0.741	0.982
SCM4 <- Supply Chain Mgt	0.901	0.895	-0.006	0.77	0.954
SCM5 <- Supply Chain Mgt	1	0.995	-0.005	0.908	1.136

4.7 Structural Model Assessment

The next step is to test the effects of the structural model. That is the effects of e-procurement on supply chain. This includes analysing the predictive capabilities of the model and its relationships. However, we have to analyse the structural model of collinearity before we define these studies (Step 1). This is because in the structural models the calculation of path coefficients is based on OLS regressions from each endogenous latent variable on its respective predecessors. Like in a normal multiple regression, the path coefficients can be skewed if the estimate contains substantial collinearity levels among the predictor components.

When analysing the structural model, the PLS-SEM adapts the model to sample data, to attain the best factor estimates by taking full advantage of the explained variance of the latent endogenous variable. The feature of PLS-SEM varies from CB-SEM, which calculates factors to eliminate discrepancies among the covariance of the sample and those foreseen by the conceptual and practical model. The basic standards for evaluating the structural model in PLS-SEM are the importance of the path coefficients (Step 2), the level of the R^2 values (Step 3), the effect size (f^2) (Step 4), the predictive relevance (Q^2), and the q^2 effect size (Step 5).



4.8 Assessing Structural Model for Multicollinearity Issues

There is a combination of the predictors in a multiple regression analysis when multicollinearity occurs (O'Brien 2007). The multicollinearity study was carried out for each independent construct by evaluating the variance inflation factor (VIF). A lowest limit of 5 or below is required to do away with collinearity problems (Hair et al. 2011). When this condition is satisfied, it implies that the construct under consideration is already in the equation almost a complete linear combination of independent variables (Brickman and et al 1982). All VIF values are below 5 in Table 4.6, suggesting that there are no collinearity problems in this analysis. If the tolerance and VIF recommendations say collinearity, you should try replacing building structures, combining predictors into a single building or constructing higher order buildings to deal with collinearity issues.

Table 4.6 Multicollinearity Statistics (Inner VIF)

	Regulatory	
E-Procurement	Environment	Supply Chain Mgt
E-Procurement	1	1.423
Regulatory Environment		1.423
Supply Chain Mgt		

4.9 Assessing Structural Model for the Significance of Path Coefficient

After the PLS-SEM algorithm has been run, estimates for the interactions of the structural



model (i.e. path coefficients) describing the relationships between the structure are obtained. Around -1 and +1, there are uniform values for directing coefficients. Estimated track coefficients close to +1 reflect strong positive relations, almost always statistically significant (and vice versa for negative values) (i.e., different from zero in the population). When the approximate coefficients are far closer to zero, the interactions have stronger effects. The significance of a coefficient is essentially determined by its normal error, which is determined using bootstrapping. The bootstrapping technique is used to determine if a formative indicator makes a meaningful contribution to its subsequent construct. The bootstrap standard error permits the analytical t value to be calculated. It is important to determine the significance of the path coefficient between the model's latent variables when examining collinearity (Schwarz et al., 2014). To accomplish this, we use a SmartPLS bootstrapping algorithm with a large number of 500 subsamples while using a two-tailed distribution of 0.1 (10%). Bootstrapping is a nonparametric resampling technique that determines predictive heterogeneity by analysing the variability of sample results rather than relying on parametric assumptions to prediction estimate accuracy" (Streukens & Leroi-Werelds, 2016). Due to the fact that PLS-SEM does not demonstrate that data are usually distributed, a non-parametric test using SmartPLS must be performed (Hair et al., 2016). The bootstrapping procedure generates t-statistics for the purpose of analysing direct and indirect results (Hair et al., 2016). Table 4.7 summarizes the results. Given the assumption of a 95% confidence interval, a minimum critical value of 1.65 is recommended for a 10% (two-tailed) significance stage (Hair et al., 2011). As seen in Table 4.7, the three theories have been



supported, with a crucial t-value of 1.65 or greater. Figure 4.4 also illustrates the same findings.

From the study's findings one can clearly say that, e-procurement and supply chain management have a strong positive relationship. As a result, e-procurement is described as "the management of supply chains in the procurement of indirect products using internet information systems and e-markets" (Awadallah & Saad,2018; Brandon-Jones, 2018).

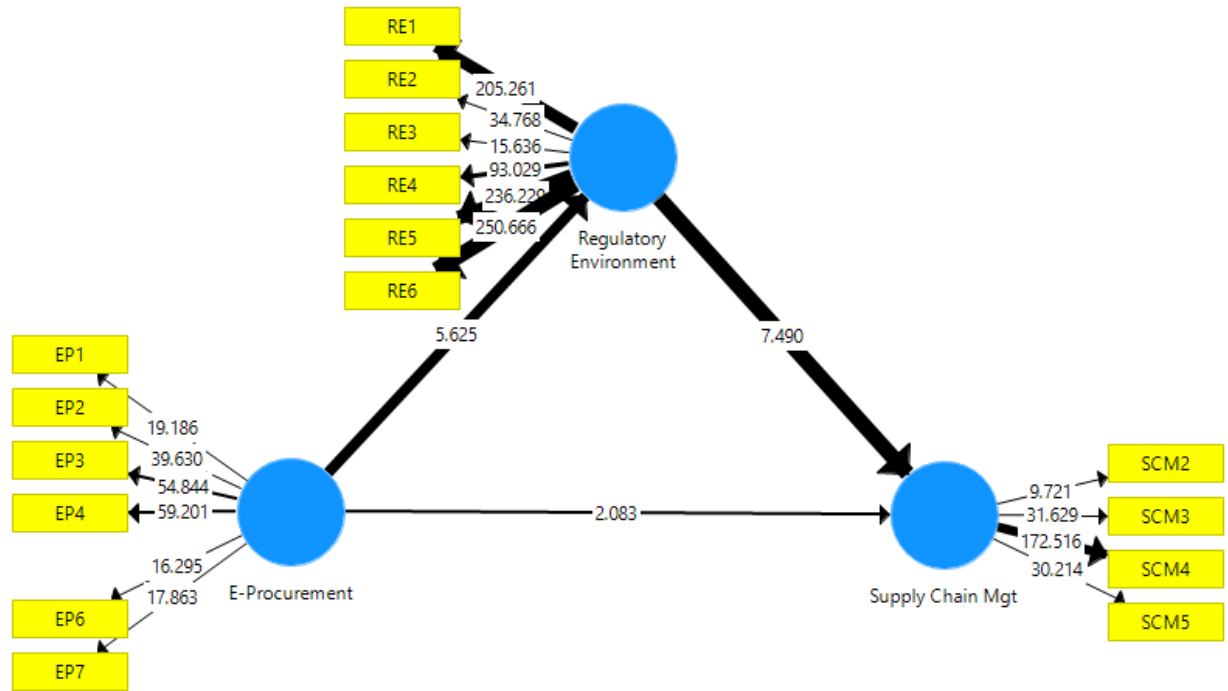


Figure 4.4 Model 4 Hypotheses Testing for Direct Effect

Table 4.7 Direct relationship for Hypothesis Testing

Hypothesis	Relationship	Std Beta	Std Error	t-value	Decision	95% CI LL	95% CI UL
H1	E-Procurement->Regulatory Environment	-0.549	0.097	5.625**	Supported	-0.699	-0.373
H2	E-Procurement->Supply Chain Mgt	0.222	0.11	2.083**	Supported	0.039	0.404
H3	Regulatory Environment -> Supply Chain Mgt	0.754	0.101	7.490**	Supported	0.603	0.917

With the assumption of a 95% confidence interval, a minimum critical value of 1.65 is recommended for a 10% (two-tailed) significance stage (Hair et al., 2011). As seen in Table 4.7, the theories have been supported, with a crucial t-values of 5.625, 2.083 and 7.490, which means, there is a direct relationship between the construct. This confirms the assertion of a study by Jain et al., (2018) and Smith & Flanegin, (2014), that e-procurement does not just involve searching for and buying goods on line only, it links firms and their business process with suppliers directly while dealing with all collaborations between them.



4.11 Coefficient of Determination (R^2 Value)

The best often used calculation to see how well the structural model suits the data as known is called the determination coefficient (R^2). This parameter is a representation of the model's ability to make accurate predictions and is calculated as the square correlation between the actual and expected values of the endogenous construction's growth rates. The constant coefficient measures the effect of the exogenous latent variables on the endogenous latent variable. To be more concrete, since the coefficient of variation (also known as the square correlation coefficient) is the total of the unexplained variance of both endogenous and exogenous items, it is also the sum of the variance in constructed terms. The R^2 value varies from 0 to 1 with the amount of variance that represents a higher predictive measurement. Rules of thumb for appropriate R^2 values are tough to document as this is dependent on the sophistication of the model and on the field of analysis. Although R^2 values of 0.20 are well-thought-out to be high in fields such as customer behavior, researchers predict even higher values of 0.75 and above in performance driver studies. R^2 values of 0.75, 0.50, or 0.25 for endogenous latent variables can be defined as significant, reasonable, or weak as a rough rule of thumb in scholarly research that emphasizes on marketing concerns (Hair et al. 2011; Henseler et al. 2009). When we compare models that are represented differently using the R^2 value, problems often occur (but with the same endogenous construct). For instance, if we introduce non-significant constructs that are marginally associated with the endogenous latent variables are included in a structural model, the R^2 will increase. When the sample size is similar to the amount of exogenous latent variables envisaging the endogenous



latent variable under consideration, this form of effect is most evident. As a result, if the R^2 is the only criterion for determining a model's predictive accuracy, there is a natural tendency against choosing models with a large number of exogenous constructs, even if they are only tangentially connected to the endogenous constructs.

It's not a good approach to pick a model based on the R^2 value. The addition of additional (non-significant) constructs to clarify an endogenous latent variable often raises its R^2 value in the structural model. The more paths point to a main construct, the higher the value of its R^2 . Researchers, nonetheless want models that are excellent at describing the statistics (thus with high R^2 values) but have less exogenous constructs as well. These are referred to as parsimonious versions.

As is the case for multiple regression, the modified R^2 value (R^2_{adj}) can be used to avoid a bias towards complex models. This criterion is adjusted based on the proportion of exogenous constructs to the sample size.

The R^2_{adj} value decreases the R^2 value by the number of explaining constructs and the sample size, thereby compensating for the systematic addition of non-significant exogenous constructs solely to upsurge the described variance R^2 . It is good to know that R^2_{adj} cannot be interpreted just like the normal R^2 . Rather than that, the R^2_{adj} is used to compare the explanatory power of models with varying numbers of exogenous latent variables and/or data sets with varying sample sizes (Henseler and Sarstedt 2013). It encapsulates the exogenous latent's cumulative impact.



Table 4.8 R²

	R Square	R Square Adjusted
Regulatory Environment	0.297	0.287
Supply Chain Mgt	0.434	0.417

4.12 Goodness-of-fit test for outer model

The goodness-of-fit test for the outer model includes three measures: convergent validity, discriminant validity, and reliability. The convergent validity of the outer model is checked by examining the Factor Loading Rate and AVE (Average Variance Extracted) Rate as showed in Tables 4.1. Table 4.1 indicates that factor loading for all indicators is greater than 0.7, indicating that all indicators are accurate in terms of convergent validity. All latent variables have AVE rates greater than 0.5, implying that all latent variables are valid in terms of convergent validity. The outer model can be said to have convergent validity based on factor loading and AVE parameters. The outer model's discriminant validity is determined by conducting a discriminant validity test on the cross-loading phase using factor loading rates for each predictor in the latent variable. As illustrated in Tables 4.1, cross-loading across factor loading rates of each predictor in latent variables resulted in higher cross-loading rates than cross-loading across factor loading rates of latent variables.



4.13 Reliability test for outer model.

The outer model's reliability is determined using an approximation of the cumulative reliability score of each latent variable. Table 4.1 summarizes the study's findings about outer model reliability. The cumulative reliability score for all latent variables is greater than 0.7 in Table 4.1, meaning that all latent variables are stable. The findings of the goodness-of-fit analysis for the outer model indicate that both validity and reliability criteria are fulfilled in terms of convergent validity, discriminant validity, and reliability. As a result, the outer model is deemed to be fit.

4.14 Goodness-of-fit test for inner model

The R^2 value is used to evaluate the goodness-of-fit of an inner model in the goodness-of-fit test. The test procedure is carried out using SmartPLS, and the outcomes are shown in Table 4.8. Regulatory environment (RE) has a variance (R^2) of 0.297 and SCM of 0.434, as shown in Table 4.8. Since the R^2 condition has been met, the inner model is considered to be fit and can be used for hypothesis testing.



CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This research lays emphasis on the potential effects of e-procurement adoption on supply chain management in the Tamale Teaching Hospital.

With regard to the research results, this chapter provides a review of the data findings including suggestions for potential solutions to the identified problems. The results are summarized using the study goals and questions from chapter one, as well as the literature discussed in chapter two. The chapter closes with recommendations, suggestions for future studies, limitations and conclusion considering the study's findings.

5.2 Discussion of Hypotheses Testing Results

The objective of the study is to assess the potential effects of e-procurement (EP) adoption on supply chain management (SCM) in Tamale Teaching Hospital. In addition, the research has the following specific objectives;

1. To discover and analyze the major prospects and challenges associated with the e-procurement system in the Tamale Teaching Hospital.
2. To identify and analyze the value and cost benefits of e-procurement in the Tamale Teaching Hospital.
3. To explore the factors that affect the e-procurement system in the Tamale Teaching



Hospital.

To achieve this, the study particularly tested the conceptual model by depending on data collected from 70 participants who are involve in Procurement activities in the Tamale Teaching Hospital i.e direct relationship for hypothesis testing, the researcher used PLS-SEM as a tool for calculation and adopted purposive and convenience sampling technique.

Respondents were made to rate themselves of their knowledge on the potential effects of e-procurement (EP) adoption on supply chain management (SCM), the influence of Regulatory Environment (RE) on supply chain management(SCM), and the influence of e-procurement (EP) on regulatory environment (RE).

5.2.1 Potential Benefits of E-procurement in TTH

Following the completion of this study, it was discovered that a significant number of respondents have a basic knowledge on the use of e-procurement and can see a number of potential benefits of e-procurement adoption if properly implemented. From literature and preliminary survey, the benefits of e-procurement were recognized and stated in survey questionnaires for participants to score on a five-point Likert scale. The data was analysed using SmartPLS, and all of the t-values were shown to be significant in the respondents' opinion. The study revealed five (5) most important benefits of e-procurement in order of importance: Harmonization, reduced price and product standardization, reduction in administrative cost and reliability of spending information, enhanced quality and improved buyer or supplier relationship. The results is consistent



with the study of Vaidyanathan and Devaraj, (2008) which identified five significant improvements in the supply chain that e-procurement allowed associate managers to monitor their budgets by maintaining robust process performance with less delays, significantly increased transparency and usability throughout the whole process, enhanced management awareness, improved user compliance and system stability and process compliance.

5.2.2 Potential Factors Affecting E-Procurement Adoption in Public Procurement Entities.

This objective was accomplished solely by the use of the survey questionnaires used in the analysis. The questionnaire identified eight barriers to e-procurement adoption in Ghanaian public hospitals. All the factors revealed by the study were significant with the exception of issues of professionalism in the practice of e- procurement, Constraining legal and regulatory control and issues of procurement transparency and accountability. The significant factors include, lack of trust of system by buyers, Volatile power supply, Government interference, Erratic internet services/internet jam and, Unreliable information available on website among others. This study is inconsistent with the studies of Nasrun Mohd Nawi et al. (2017) and Calipinar and Soysal, (2012) that identified technology, facilities, regulation, and the environment as the challenging factors leading to ineffective implementation of e-procurement.



5.2.3 Evaluating the potential benefits and Challenges of E-procurement in order to determine whether or not the implementation will be successful.

The issues associated with the introduction of e-procurement, including the benefits, were also examined in order to decide whether or not the implementation of e-procurement would be a success for Tamale Teaching Hospital (TTH). According to the study's results, there are major obstacles to the implementation of e-procurement, that notwithstanding, the Tamale Teaching Hospital can successfully introduce e-procurement to achieve efficiency in the procurement processes. However, regulatory agencies should offer TTH a facelift in e-procurement through government initiatives in order to deliver the overwhelming benefits found in the study.

5.2.4 Potential Value and Cost Benefits of E-procurement

Some benefits of e-procurement that respondents commonly agreed on are harmonization, reduced price and product standardization, reduction in administrative cost and reliability of spending information, enhanced quality and improved buyer or supplier relationship.

Nasrun Mohd Nawi et al. (2017), identified similar benefits of e-procurement in their study, including the reduction of administrative expenses, lead-time order costs, and the opportunity cost of capital, as well as providing quality bidding, efficient timeliness, cost-saving, minimising efforts in carrying out business activities, reducing financial and technological risks, and increasing competition, all of which lead to lower costs of purchasing goods or services.



According to Koorn et al. (2001), the introduction of EP would allow various bodies to advertise their tenders online, suppliers to submit bids online, and the processes involved in contract award to be conducted online. A successful achievement of this greater benefits is through regulatory agencies, policies and supply chain management. This study also proved that regulatory agencies have a significant influence in ensuring effective adoption of e-procurement.

This research, contrarily, agrees with Mathur et al., (2018), which states that the backbone of every healthcare industry is its SCM. Mathur et al. (2018) further explain that the availability of medical supplies at the right time, in the right quantity, and in the right quality is critical to the quality of healthcare delivery. To accomplish this, semi-autonomous Ministry of Health agencies including the Medical and Dental Council, the Nurses and Midwives Council, together with Pharmacy Council are tasked with upholding professional standards in their respective fields (Ministry of Health Manual, 2004).

5.2.5 Potential Factors Effecting E-procurement

Research participants were equally asked to rate their level of understanding with statement regarding the potential factors that may affect the e-procurement system in their organisation. Precisely, a significant number of the respondents who answered this question principally agreed with the assertions that, Lack of trust of system by buyers, Erratic energy supply, Government interference, Internet services not been reliable and, Unreliable information available on website were some of the potential factors affecting



e-procurement system whiles Issues of professionalism in the use of e- procurement systems, Constraining legal and regulatory control and issues of procurement transparency and accountability' were contrary to the statements.

The results of this study is not in conformity with that of Jain et al., (2018) and Mahdillou and Akbary, (2014) studies which states that procurement entities do not have experienced human resources to manage procurement activities. As a result, few workers who are available do not have the requisite skills to offer true enforcement of quality standards, track e-procurement procedures, determine criteria, define procurement requirement, and perform supervisory roles which eventually result in budget constraints.

5.3 The Association between E-procurement(EP) and Supply Chain Management(SCM)

Of the three hypotheses formulated, all were supported with t_ values of 2.083, 5.625 and 7.490. This is shown in figure 4.3 and table 4.7 in chapter 4 above. Which means there is a strong association between the three latent variables. To measure the level of knowledge staff have on use of e-procurement in the organization, the study saw a positive response on advertising tenders online, e-informing or e-notification, e-awarding, e-invoicing, reverse auctioning, e-tendering, call for proposals done through company website and e-sourcing.

Furthermore, the study discovered that electronic procurement (EP) has a major impact on Supply Chain Management (SCM). This study supports the findings of Leonard and Baum, (2005), who claim that e-procurement can make a company's supply chain more



effective by allowing orders, receipts, and invoices to be processed without paper. Increasing costs, rivalry, and consumer pressure would force businesses to rethink in their supply chain processes and take advantage of the tremendous savings potential of indirect spending.

The research revealed a positive association between e-procurement and supply chain management which could be alluded to in some studies, for example (Nasrun Mohd Nawi et al., 2017). This may be due to the status of TTH as a teaching hospital and the design in which these experiments were conducted. The key benefits of e-procurement, according to Smith & Flanegin (2004), include cost savings, process re-organisation, and increased contract fulfilment, among others.

The authors further elucidate that, e-procurement saves money for the government because it reduces the expense and effort of handling purchasing orders, which can be controlled electronically, as well as inventory costs and order fulfilment time. According to an Asian Development Bank report (2013), government and other public agencies that have implemented the e-procurement process have reaped a slew of benefits, including increased transparency, contract award alerts, online bid submission, and increased tenderer participation due to better information and access to opportunities. This study therefore, agrees with Asian Development Bank Report (2013), therefore, management of TTH are advised to embrace e-procurement fully to ensure transparency, fairness, accountability for effective and efficient e-procurement processes.

Supply chain management is greatly influenced by e-procurement. The study's findings show that, e-procurement and supply chain management have a strong positive



relationship. As a result, e-procurement is described as “the management of supply chains in the procurement of indirect products using internet information systems and e-markets” (Awadallah & Saad,2018; Brandon-Jones, 2018).

5.4 Relationship between E-procurement (EP) and Regulatory Environment(RE)

It is also clear that, to achieve full success in SCM, regulatory agencies play a vital role. To that extend a public institution like TTH should listen to the call by PPA and implement EP to ease procurement processes. The outcome of the supported hypothesis can be seen in Tables 4.7 and 4.8.

Despite the fact that e-procurement has a huge impact on Supply Chain Management. Electronic transactions in the procurement process are not taken into account by the new Public Procurement Amendment Act (Act 914).

According to the Public Procurement Authority (PPA), Ghana was the first country in the West African sub-region to introduce an electronic procurement system for the public sector in 2019, however, some public institutions like TTH have still not implemented it.

Even though, the e-procurement has its challenges, its benefits as shown in this research cannot be overemphasized, it is therefore paramount that regulatory agencies help to support the call of PPA.

5.6 Relationship between Regulatory Environment and Supply Chain Management (SCM)

Regulatory environment and supply chain management are positively related. A study by



Desmond et al., (2019) reveals that public procurement officials complied with laws in the execution of their duties. This is true because this research saw a positive relationship between regulatory environment and supply chain management. This was due to compliance with legal framework by public procurement officials.

5.7 Conclusion to the Study

E-procurement can be a successful concept for any organization's performance if it is well practiced. It paves way for better procurement processes, brings about effective monitoring, improved communication that increases the ability to coordinate remote processes, help save cost and time through effective and efficient procurement procedure.

According to the findings of the report, e-procurement should be introduced in Ghana's public hospitals. The study also shows that companies that use e-procurement benefit from it a countless times. This benefits include, among other things, harmonization, reduced price and product standardization, reduced administrative costs and reliability of spending information, increased efficiency, and strengthened buyer or supplier relationships. This is not to suggest that there are no obstacles to e-procurement adoption.

According to the study's findings, to effectively implement e-procurement, an organization is most likely to face some challenges like Government interference, Volatile power supply and Erratic internet services/internet jam among others. The level of responses provided by respondents indicates that staff of the Tamale Teaching Hospital are not well-informed about e-procurement processes.

To summarise, the researcher believes that e-procurement is a tool that can have a major



impact on organizational success; however, the regulatory environment is important in ensuring its successful adoption.

5.8 Recommendations

The researcher would like to make the following recommendations to concerned bodies after conducting an e-procurement research, and on the account of the study results:

A facelift should be given to e-procurement scheme as well as procurement experts and policymakers should be empowered to make sure that regulatory environment is enhanced to reap the benefits of e-procurement adoption in Ghana's public hospital.

Furthermore, the government should make a concerted attempt to make sure that service providers (suppliers) are well-equipped through the provision of secure connectivity hubs and education. In addition, e-procurement is heavily influenced by technology. As a result, organisations like TTH must build and maintain a strong IT infrastructure to meet the needs of their employees.

More so, e-procurement makes tracking of goods and services, as well as warehousing and inventory management easy; however, Tamale Teaching Hospital employees who deal directly with e-procurement are not trained in the technology. The hospital's management should think about the training needs of its employees, particularly those directly involved in the procurement process, in order to provide them with technical knowledge on e-procurement system.

Finally, since lack of confidence in the e-procurement system by suppliers has been



described as an obstacle, it is fair to suggest that the Tamale Teaching Hospital's management recognize its main suppliers and educate them.

5.9 Directions for Further Research

This study reveals a number of areas that need further investigation. For future studies, the following suggestions are made:

1. A study can be conducted on the role of regulatory environment on Supply Chain Management in the public entities.
2. Future research should look into the potential barriers of e-procurement in public entities.
3. Future research should also look into the effect of regulatory environment on the implementation of e-procurement in both and public private sector organizations.
4. Finally, future research may consider introducing other mediating variables such as political influence, organizational culture, etc. in the relationship between e-procurement adoption and supply chain management.



REFERENCES

- Abagna Azanlerigu, James and Emmanuel Akay. 2015. *Prospects and Challenges of E-Procurement in Some Selected Public Institutions in Ghana*. Vol. 7. Online.
- Aboelmaged, Mohamed Gamal. 2010. "Predicting E-Procurement Adoption in a Developing Country: An Empirical Integration of Technology Acceptance Model and Theory of Planned Behaviour." *Industrial Management and Data Systems* 110(3):392–414.
- Altayyar, Ahmed and John Beaumont-Kerridge. 2016. "External Factors Affecting the Adoption of E-Procurement in Saudi Arabian's SMEs." *Procedia - Social and Behavioral Sciences* 229:363–75.
- Amaratunga, Dilanthi, David Baldry, Marjan Sarshar, and Rita Newton. 2002. "Qualitative and Quantitative Research in the Built Environment: Application of 'Mixed' Research Approach: A Conceptual Framework to Measure FM Performance Project I'DGO: Inclusive Design for Getting Outdoors View Project Ageing in Place for Elderly People in Malaysia (for Landed Property) View Project." *Emerald.Com* 51(1):17–31.
- Ameyaw, Collins, Sarfo Mensah, and Ernest Osei-Tutu. 2012. "Public Procurement in Ghana: The Implementation Challenges to the Public Procurement Law 2003 (Act 663)." *International Journal of Construction Supply Chain Management* 2(2):55–65.
- Andhini, Nisa Fitri. 2017. *Creswell and Poth, 2018, Qualitative Inquiry 4th.Pdf*.



- Asare, Evelyn Nsiah and Prempeh, Kwadwo Boateng. 2017. “An Empirical Assessment of Factors That Influence the Implementation of E-Procurement in Technical Universities in Ghana.” *Munich Personal RePEc Archive* 6(9):52–60.
- Astrachan, CB, VK Patel, and G. Wanzanried. 2014. “Journal of Family Business Strategy.”
- Ateto, Denish, Steve Ondieki, and Walter Okibo. 2013. *The Effect of E-Procurement Practices on Effective Procurement in Public Hospitals: A Case of KISII Level 5 Hospital*. Vol. 3.
- Awadallah, Nancy and Sherif Gamal Saad. 2018. “E-Procurement as a New Trend in Hospitality Industry: A Descriptive Study in Egyptian Hotels.” *Astra Salvensis* 6:321–32.
- Bakker, Elmer, Jurong Zheng, Louise Knight, and Christine Harland. 2008. “Putting E-Commerce Adoption in a Supply Chain Context.” *International Journal of Operations and Production Management* 28(4):313–30.
- Barngetuny, David Chesire and Geoffrey Kimutai. 2015. “International Academic Journals EFFECTS OF E-PROCUREMENT ON SUPPLY CHAIN MANAGEMENT PERFORMANCE IN ELGEYO- MARAKWET COUNTY International Academic Journals.” *International Academic Journal of Procurement and Supply Chain Management International Academic Journal of Procurement and Supply Chain Management International Academic Journal of Procurement and Supply Chain Management* 1(5):99–120.



Bulletin, E. (2010). E-procurement: is ghana ready ? 1(4), 1–13.

De Boer, Luitzen, Jeroen Harink, and Govert Heijboer. 2002. “A Conceptual Model for Assessing the Impact of Electronic Procurement.” *European Journal of Purchasing and Supply Management* 8(1):25–33.

Boon, Mieke and Sophie Van Baalen. 2019. “Epistemology for Interdisciplinary Research – Shifting Philosophical Paradigms of Science.” *European Journal for Philosophy of Science* 9(1).

Bougie, R. and U. Sekaran. 2016. *Research Methods For Business: A Skill Building 7 Ed.*

Brandon-Jones, Alistair and Katri Kauppi. 2018. “Examining the Antecedents of the Technology Acceptance Model within E-Procurement.” *International Journal of Operations and Production Management* 38(1):22–42.

Brickman, Philip and et al. 1982. “Models of Helping and Coping.” *American Psychologist*.

Brown, Brendan, Ian Nuberg, and Rick S. Llewellyn. 2017. “Negative Evaluation of Conservation Agriculture: Perspectives from African Smallholder Farmers.” *Article in International Journal of Agricultural Sustainability* 15(4):467–81.

Bryman, Alan. 2012. *Social Research Methods*.

Buchan, Nancy and Rachel Croson. 2004. “The Boundaries of Trust: Own and Others’ Actions in the US and China.” *Journal of Economic Behavior and Organization*.

Bulletin, KKK Wong-Marketing and undefined 2016. “Analysis, Categorical Moderation



Analysis, and Higher-Order Constructs Modeling in Partial Least Squares Structural Equation Modeling (PLS-SEM): A B2B” *Researchgate.Net*.

Calipinar, Hatice and Mehmet Soysal. 2012. “E-Procurement: A Case Study about the Health Sector in Turkey.” *International Journal of Business and Social Science* 3(7):232–44.

Canter, Larry W. and Larry W. Canter. 2018. “Data Analysis and Presentation.” in *River Water Quality Monitoring*.

Chikwe, Goddey C. and Edwin M. Obi. 2016. “Rethinking Public Procurement System in Nigeria: The E- Procurement Option (A Study of Selected Local Government Areas in Southern Nigeria).” *International Journal of Business Marketing and Management* 1:37–48.

Chinn, W. W. 1998. “The Partial Least Squares Approach to Structural Equation Modelling.” *Modern Methods for Business Research*.

Cholette, Susan, Andrew G. Clark, and Özgür Özlük. 2019. “Increasing Procurement Efficiency through Optimal E-Commerce Enablement Scheduling.” *Journal of Public Procurement* 19(2):90–107.

Cooper, Donald R. and &. Pamela S. Schindler. 2011. *Business Research Methods*.

Cronbach, Lee J. 1951. “Coefficient Alpha and the Internal Structure of Tests.” *Psychometrika*.

Davila, Antonio, Mahendra Gupta, and Richard J. Palmer. 2003. “Moving Procurement



Systems to the Internet: The Adoption and Use of e-Procurement Technology Models.” *European Management Journal* 21(1):11–23.

Desmond, Addison, Ernest Osei Tutu, Ernest Kissi, Safowaa Osei Tutu, Ernest Kissi, Ernest Osei-Tutu, and Addison Desmond. 2019. “Evaluating Critical Factors for the Implementation of E-Procurement in Ghana.” *Article in International Journal of Procurement Management* 12(1):1–14.

Diamantopoulos, Adamantios, Marko Sarstedt, Christoph Fuchs, Petra Wilczynski, and Sebastian Kaiser. 2012. “Guidelines for Choosing between Multi-Item and Single-Item Scales for Construct Measurement: A Predictive Validity Perspective.” *Journal of the Academy of Marketing Science*.

Dixit, Anuj, Srikanta Routroy, and Sunil Kumar Dubey. 2019. “A Systematic Literature Review of Healthcare Supply Chain and Implications of Future Research.” *International Journal of Pharmaceutical and Healthcare Marketing* 13(4):405–35.

Eakin, David. 2003. “Measuring E-Procurement Benefits.” *Summit* 6(1):16-16: Page count = 3.

Emeriau, T., N. Roboüam, and R. Dupré. 2020. “Actualisation Des Stations de Grande Douve (Ranunculus Lingua) En Indre-et-Loire. Bilan Des Prospections et Programme d’actions.”

Fornell, C. and D. F. Larcker. 1981. “Evaluating Structural Model with Unobserved Variables and Measurement Errors.” *Journal of Marketing Research*.



- Gefen, David, Detmar Straub, and Marie-Claude Boudreau. 2000. "Structural Equation Modeling and Regression: Guidelines for Research Practice." *Communications of the Association for Information Systems*.
- Gold, Andrew H., Arvind Malhotra, and Albert H. Segars. 2001. "Knowledge Management: An Organizational Capabilities Perspective." *Journal of Management Information Systems*.
- Goldkuhl, Göran. 2012. "Pragmatism vs Interpretivism in Qualitative Information Systems Research Pragmatism vs. Interpretivism in Qualitative Information Systems Research." *European Journal of Information Systems* 2(21):135–46.
- Graneheim, Ulla H., Britt-Marie Lindgren, and Berit Lundman. 2017. "Methodological Challenges in Qualitative Content Analysis: A Discussion Paper." *Elsevier*.
- Green, Carla A., Naihua Duan, Robert D. Gibbons, Kimberly E. Hoagwood, Lawrence A. Palinkas, and Jennifer P. Wisdom. 2015. "Approaches to Mixed Methods Dissemination and Implementation Research: Methods, Strengths, Caveats, and Opportunities." *Administration and Policy in Mental Health and Mental Health Services Research* 42(5):508–23.
- Guest, James R., Andrew H. Baird, Jeffrey A. Maynard, Efin Muttaqin, Alasdair J. Edwards, Stuart J. Campbell, Katie Yewdall, Yang Amri Affendi, and Loke Ming Chou. 2012. "Contrasting Patterns of Coral Bleaching Susceptibility in 2010 Suggest an Adaptive Response to Thermal Stress." *PLoS ONE* 7(3).
- Gunasekaran, Angappa and Eric W. T. Ngai. 2008. "Adoption of E-Procurement in Hong



Kong: An Empirical Research.” *International Journal of Production Economics* 113(1):159–75.

Hair, Joe F., Christian M. Ringle, and Marko Sarstedt. 2011. “PLS-SEM: Indeed a Silver Bullet.” *Journal of Marketing Theory and Practice*.

Hair, Joseph F., Jeffrey J. Risher, Marko Sarstedt, and Christian M. Ringle. 2019. “When to Use and How to Report the Results of PLS-SEM.” *European Business Review*.

Hardy, Catherine A. and Susan P. Williams. 2008. “E-Government Policy and Practice: A Theoretical and Empirical Exploration of Public e-Procurement.” *Government Information Quarterly* 25(2):155–80.

Hawking, Paul, Andrew Stein, David C. Wyld, and Susan Foster. 2004. “E-Procurement: Is the Ugly Duckling Actually a Swan down Under?” *Asia Pacific Journal of Marketing and Logistics* 16(1):3–26.

Henseler, Jörg, Christian M. Ringle, and Rudolf R. Sinkovics. 2009. “The Use of Partial Least Squares Path Modeling in International Marketing.” *Advances in International Marketing*.

Henseler, Jörg and Marko Sarstedt. 2013. “Goodness-of-Fit Indices for Partial Least Squares Path Modeling.” *Comput Stat* 28(2):565–80.

Hulland, John. 1999. “Use of Partial Least Squares (PLS) in Strategic Management Research: A Review of Four Recent Studies.” *Strategic Management Journal*.

Ibem, Eziyi O., Egidario B. Aduwo, and Emmanuel A. Ayo-Vaughan. 2017. “E-



Procurement Adoption in the Nigerian Building Industry: Architects' Perspective.”
Pollack Periodica 12(3):167–80.

Ilhan, Nergiz and Md Mahbubur Rahim. 2017. “Benefits of E-Procurement Systems Implementation: Experience of an Australian Municipal Council.” Pp. 277–94 in
Digital Governance and E-Government Principles Applied to Public Procurement.

Jain, Mukul, Naseem Abidi, and Asit Bandyopadhyay. 2018. “E-Procurement Espousal and Assessment Framework: A Case-Based Study of Indian Automobile Companies.” *International Journal of Technology Management and Sustainable Development* 17(1):87–109.

Johnson, Michael. 2011. “Public Sector E-Procurement: A Study of Benefits from e-Markets in the Local Government Sector.” *International Journal of Services, Technology and Management* 16(1):1–27.

Jr, JF Hair, BJ Babin, and RE Anderson. 2010. “A GLOBAL P-ERSPECT-IVIE.”

Kademaunga, Clara Kabwela and Jackson Phiri. 2019. “Factors Affecting Successful Implementation of Electronic Procurement in Government Institutions Based on the Technology Acceptance Model.” *Open Journal of Business and Management* 07(04):1705–14.

Khuan, Loo Saw and Mr Francis Seow Hai Swee. 2018. “Technologies for Procurement: Current Trends and Emerging Trends.” *Emerging Technologies for Supply Chain Management* 45–61.



- Kiprono, Ruben. 2013. "Challenges of E-Procurement Adoption in the Kenyan Public Sector: A Survey of Parastatals in the Ministry of Finance." *School of Human Resource Development* 1(1):26–83.
- Klatzow, James, Jonas N. Becker, Patrick M. Ledingham, Christian Weinzetl, Krzysztof T. Kaczmarek, Dylan J. Saunders, Joshua Nunn, Ian A. Walmsley, Raam Uzdin, and Eilon Poem. 2019. "Experimental Demonstration of Quantum Effects in the Operation of Microscopic Heat Engines." *Physical Review Letters* 122(11).
- Koorn, R., D. Smith, and C. Müller. 2001. "E-Procurement and Online Marketplaces." *The Netherlands: Compact* 27–39.
- Kothari, CR. 2014. *Research Methodology: Methods and Techniques*.
- Kusi, Basil, Henry Asante Antwi, Gabriel Nani, Samuel Owusu Mensah, Michael Owusu Akomeah, and Xuefu Road. 2016. "Modeling an Effective E- Procurement System for Ghana ' s Healthcare Sector : A Critical Review and Proposal." *Academia.Edu* 2(6):641–52.
- Kusi, Basil, Henry Asante Antwi, Gabriel Nani, Samuel Owusu Mensah, and Michael Owusu Akomeah. 2016. "Adoptive Deficiencies and E-Procurement Lag among Hospitals in Ghana : A Logistic Regression Analysis." *Academia.Edu*.
- Kwong, Ken and Kay Wong. 2013. *Partial Least Squares Structural Equation Modeling (PLS-SEM) Techniques Using SmartPLS*. Vol. 24.
- Lee, Salvador Aldret, Diane Allen, and Christopher Wilkins. 2020. "Patent Application



Publication.” *United States Patent Application* 1–24.

Loken, Eric. 2009. “Structural Equation Modeling: A Multidisciplinary Journal.”

Structural Equation Modeling.

Losch, Andreas. 2017. “On the Relationship of Ian Barbour’s and Roy Bhaskar’s Critical

Realism.” *Journal of Critical Realism* 16(1):70–83.

Mahdillou, Hossein and Jawid Akbary. 2014. “E-Procurement Adoption , Its Benefits and

Costs.” *University of Boras* 1–60.

Mathur, Bhavana, Sumit Gupta, Makhan Lal Meena, and G. S. Dangayach. 2018.

“Healthcare Supply Chain Management: Literature Review and Some Issues.”

Journal of Advances in Management Research.

Mattick, Karen, Jenny Johnston, and Anne de la Croix. 2018. “How To...write a Good

Research Question.” *Clinical Teacher*.

Mawenya, AS. 2008. *Preventing CorruPtion in AfriCAN ProCurement Professor Awadi*

Sadiki Mawenya Analysing Key Policy and Governance Issues in Africa and beyond

SAIIA OccASIONAl PAPER.

McCusker, K. and S. Gunaydin. 2015. “Research Using Qualitative, Quantitative or

Mixed Methods and Choice Based on the Research.” *Perfusion (United Kingdom)*

30(7):537–42.

McKim, Courtney A. 2017. “The Value of Mixed Methods Research: A Mixed Methods

Study.” *Journal of Mixed Methods Research* 11(2):202–22.



- Miller, Jeff. 2017. "Hypothesis Testing in the Real World." *Educational and Psychological Measurement*.
- Mitchell, Anthony. 2018. "A Review of Mixed Methods, Pragmatism and Abduction Techniques." *The Electronic Journal of Business Research Methods* 16(3):103–16.
- Moon, Katie, Deborah A. Blackman, Vanessa M. Adams, Rebecca M. Colvin, Federico Davila, Megan C. Evans, Stephanie R. Januchowski-Hartley, Nathan J. Bennett, Helen Dickinson, Chris Sandbrook, Kate Sherren, Freya A. V. St. John, Lorrae van Kerkhoff, and Carina Wyborn. 2019. "Expanding the Role of Social Science in Conservation through an Engagement with Philosophy, Methodology, and Methods." *Methods in Ecology and Evolution* 10(3):294–302.
- Murphy, Robert, Lawrence Gallagher, Andrew Krumm, Jessica Mislevy, and Amy Hafter. 2014. "Research on the Use of Khan Academy in Schools." *SRI Education*.
- Musanzikwa, Michael. 2013. "Public Procurement System Challenges in Developing Countries: The Case of Zimbabwe, International Journal of Economics." *International Journal of Economics, Finance and Management Sciences* 1(2):119.
- Naude, Micheline J. and Johanna A. Badenhorst-Weiss. 2011. "The Effect of Problems on Supply Chain Wide Efficiency." *Journal of Transport and Supply Chain Management* 5(1):25–36.
- Nawi, Mohd Nasrun Mohd, Rafikullah Deraman, Jibril Adewale Bamgbade, Faisal Zulhumadi, Salman Riazi Mehdi Riazi, Mohd Nasrun Mohd Nawi, Rafikullah Deraman, Jibril Adewale Bamgbade, Faisal Zulhumadi, Salman Riazi Mehdi Riazi,



Mohd Nasrun Mohd Nawi, Rafikullah Deraman, Jibril Adewale Bamgbade, Faisal Zulhumadi, and Salman Riazi Mehdi Riazi. 2017. *E-Procurement in Malaysian Construction Industry: Benefits and Challenges in Implementation*. Vol. 6.

Neef, D. 2001. *E-Procurement: From Strategy to Implementation*.

Ngatia, Maku and Jomo Kenyatta. 2016. "Role of Public Procurement Oversight Authority on Procurement Regulations in Kenyan State Corporations. A Case of Kenya Electricity Generating Company (KenGen)." *Article in International Journal of Academic Research in Accounting Finance and Management Sciences*.

Nidadhavolu, Akhila. 2018. *Impact of Leadership Styles on Employee Job Satisfaction and Organizational Commitment – A Study in the Construction Sector in India*.

Noel, Adam, Yansha Deng, Dimitrios Makrakis, and Abdelhakim Hafid. 2016. "Active versus Passive: Receiver Model Transforms for Diffusive Molecular Communication." in *2016 IEEE Global Communications Conference, GLOBECOM 2016 - Proceedings*.

Novikov, Alexander M. and Dmitry A. Novikov. 2013. *Research Methodology*. CRC Press.

Nunnally, Jum C. 1978. "An Overview of Psychological Measurement." in *Clinical Diagnosis of Mental Disorders*.

Nurmandi, Achmad and Sunhyuk Kim. 2015. "Making E-Procurement Work in a Decentralized Procurement System: A Comparison of Three Indonesian Cities."



International Journal of Public Sector Management 28(3):198–220.

O'Brien, Robert M. 2007. "A Caution Regarding Rules of Thumb for Variance Inflation Factors." *Quality and Quantity*.

Offei, Isaac, Ernest Kissi, and Edward Badu. 2016. "Public Procurement Policies and Strategies for Capacity Building of SME Construction Firms in Ghana." *International Journal of Procurement Management* 9(4):455–72.

Ofori, Daniel and Osman Issah Fuseini. 2020. "Electronic Government Procurement Adoption in Ghana: Critical Success Factors." *Advances in Research* 21(3):18–34.

Ørngreen, R. and K. Levinsen. 2017. "Workshops as a Research Methodology." *The Electronic Journal of E-Learning* 15:70.

Palinkas, Lawrence A., Sarah M. Horwitz, Carla A. Green, Jennifer P. Wisdom, Naihua Duan, and Kimberly Hoagwood. 2015. "Purposeful Sampling for Qualitative Data Collection and Analysis in Mixed Method Implementation Research." *Administration and Policy in Mental Health and Mental Health Services Research* 42(5):533–44.

Pandey, Jatin. 2018. "Deductive Approach to Content Analysis." Pp. 145–69 in *igi-global.com*.

Peng, Rong and Han Lai. 2012. "DRE-Specific Wikis for Distributed Requirements Engineering: A Review." in *Proceedings - Asia-Pacific Software Engineering Conference, APSEC*.



- Pham, Lan. 2018. "A Review of Key Paradigms: Positivism, Interpretivism and Critical Inquiry. Improve Capability of Autistic Young Learners in Learning Maths in Australia View Project." *School of Education* (April):0–7.
- Pigliucci, Massimo and Jonathan Kaplan. 2000. "The Fall and Rise of Dr Pangloss: Adaptationism and the Spandrels Paper 20 Years Later." *Trends in Ecology and Evolution*.
- Puschmann, Thomas and Rainer Alt. 2005. "Successful Use of E-Procurement in Supply Chains." *Supply Chain Management* 10(2):122–33.
- Quayson, J. H. and Akomah. 2016. "MAINTENANCE OF RESIDENTIAL BUILDINGS OF SELECTED PUBLIC INSTITUTIONS IN GHANA." *AFRICAN JOURNAL OF APPLIED RESEARCH (AJAR)* *Www.Ajaronline.Com* 3(3):48–56.
- Reed, SJ. 2016. "Identifying Learning Acquired during Debriefing."
- Ridder, Hans Gerd. 2017. "The Theory Contribution of Case Study Research Designs." *Business Research* 10(2):281–305.
- Rotchanakitumnuai, Siriluck. 2013a. "Impact of E-Procurement on Procurement Practices and Performance." *Benchmarking: An International Journal* 7(3):330–44.
- Rotchanakitumnuai, Siriluck. 2013b. "The Governance Evidence of E-Government Procurement." *Transforming Government: People, Process and Policy* 7(3):309–21.
- Rotich, Geoffrey Kipngeno and Barrack Okello. 2015. "Analysis of Use of E-Procurement on Performance of the Procurement Functions of County Governments



in Kenya.” *International Journal of Economics, Commerce and Management* III(6):1381–98.

Ryan, RM and EL Deci. 2017. *Self-Determination Theory: Basic Psychological Needs in Motivation, Development, and Wellness*.

Sahu, G. P. 2016. “E-Procurement Implementation: Critical Analysis of Success Factors’ Impact on Project Outcome.” *Papers.Ssrn.Com*.

Salazar-Ordóñez, Melania, Macario Rodríguez-Entrena, Elena R. Cabrera, and Jörg Henseler. 2018. “Survey Data on Consumer Behaviour in Olive Oil Markets: The Role of Product Knowledge and Brand Credence.” *Data in Brief*.

Sarpong, P. B., Du, J., Antwi, H. A., Udimal, T. B., Musah, A.-A. I., & Khan, H. S. (2017). E-Procurement Adoption Barriers in Retrospect: a Structural Equation Analysis of Ghanaian Hospitals. *Canadian Journal of Applied Science and Technology*, 5(2), 201–209.
<http://onlinejournal.org.uk/index.php/cajast/article/view/119>

Saunders, Daniel G. and Kathleen C. Faller. 2016. “The Need to Carefully Screen for Family Violence When Parental Alienation Is Claimed.” *Michigan Law Journal*.

Saunders, M. 2019. *Research Methods for Business Students*. Eighth edition.

Saunders, MNK and P. Lewis. 2012. *Doing Research in Business & Management: An Essential Guide to Planning Your Project*.

Saunders, MNK and PC Tosey. 2013. “The Layers of Research Design.” *Rapport*.



- Saunders, Robert N., James G. Boyd, Darren J. Hartl, Jonathan K. Brown, Frederick T. Calkins, and Dimitris C. Lagoudas. 2016. "A Validated Model for Induction Heating of Shape Memory Alloy Actuators." *Smart Materials and Structures* 25(4).
- Schwarz, Colleen, Andrew Schwarz, and William C. Black. 2014. "Examining the Impact of Multicollinearity in Discovering Higher-Order Factor Models." *Communications of the Association for Information Systems*.
- Siebert, S., G. Martin, B. Bozic-Human Resource Management, and undefined 2016. 2016. "Research into Employee Trust: Epistemological Foundations and Paradigmatic Boundaries." *Wiley Online Library* 26(3):269–84.
- Smith, Alan D. and Frank R. Flanegin. 2014. "E-Procurement and Automatic Identification: Enhancing Supply Chain Management in the Healthcare Industry." *International Journal of Electronic Healthcare* 1(2):176–98.
- Tashakkori, Abbas, Charles Teddlie, and Kathleen M. T. Collins. 2015. "Advanced Sampling Designs in Mixed Research: Current Practices and Emerging Trends in the Social and Behavioral Sciences." Pp. 353–78 in *SAGE Handbook of Mixed Methods in Social & Behavioral Research*.
- Thiele, Kai-Oliver, Marko Sarstedt, and Cristian M. Ringle. 2015. "A Comparative Evaluation of New and Established Methods for Structural Equation Modeling." in *Academy of Marketing Science Annual Conference (AMS 2015)*.
- Tokar, Travis and Morgan Swink. 2019. "Public Policy and Supply Chain Management: Using Shared Foundational Principles to Improve Formulation, Implementation, and



Evaluation.” *Journal of Supply Chain Management* 55(2):68–79.

Vaidyanathan, Ganesh and Sarv Devaraj. 2008. “The Role of Quality in E-Procurement Performance: An Empirical Analysis.” *Journal of Operations Management* 26(3):407–25.

Vinzi, Vincenzo Esposito, Wynne W. Chin, Jörg Henseler, and Huiwen Wang. 2010. “Editorial: Perspectives on Partial Least Squares.” Pp. 1–20 in *Handbook of Partial Least Squares*. Springer Berlin Heidelberg.

Voorhees, Clay M., Michael K. Brady, Roger Calantone, and Edward Ramirez. 2016. “Discriminant Validity Testing in Marketing: An Analysis, Causes for Concern, and Proposed Remedies.” *Journal of the Academy of Marketing Science* 44(1):119–34.

Walker, Helen and Christine Harland. 2008. “E-Procurement in the United Nations: Influences, Issues and Impact.” *International Journal of Operations and Production Management* 28(9):831–57.

Winit-Watjana, Win. 2016. “Research Philosophy in Pharmacy Practice: Necessity and Relevance.” *International Journal of Pharmacy Practice* 24(6):428–36.

Yilmaz, Kaya. 2013. “Comparison of Quantitative and Qualitative Research Traditions: Epistemological, Theoretical, and Methodological Differences.” *European Journal of Education*.

Yin, Juelin and Ali Quazi. 2018. “Business Ethics in the Greater China Region: Past, Present, and Future Research.” *Journal of Business Ethics* 150(3):815–35.



- Zangirolami-Raimundo, Juliana, Jorge De Oliveira Echeimberg, and Claudio Leone. 2018. "Research Methodology Topics: Cross-Sectional Studies Journal of Human Growth and Development." *Journal of Human Growth and Development* 28(3):356–60.
- Zsidisin, George A. 2002. "E-Procurement: From Strategy to Implementation." *Journal of Supply Chain Management* 38(3):58.
- Žukauskas, Pranas, Jolita Vveinhardt, and Regina Andriukaitienė. 2018. "Philosophy and Paradigm of Scientific Research." in *Management Culture and Corporate Social Responsibility*.



APPENDIX

SAMPLE QUESTIONNAIRE

UNIVERSITY FOR DEVELOPMENT STUDIES

WA

Dear Respondent,

This questionnaire is to solicit information on the topic: the potential effects of electronic procurement adoption on supply chain management, Does the Regulatory Environment Matter? in public hospitals towards the award of MCOM Procurement and Supply Chain Management degree, and you have been selected to participate in this study. I appreciate your willingness to participate in this study. Please include answers that represent the realities of the topics being examined in this study based on your own experience and understanding of your organization's e-procurement activities. Your responses will be treated with the utmost confidentiality. Thank you.

SECTION A:

Question 1

Kindly indicate the extent to which you agree or disagree to each of the following statements regarding your Knowledge on the use of E-procurement in your organization using a scale of 1 – 5 [where 1=strongly disagree; 2=disagree; 3=neither agree nor disagree; 4=agree and 5=strongly agree.





	Knowledge	1	2	3	4	5	
E- procurement(EP)	Advertising tenders online						
	Online submission of proposals						
	Shortlisting of suppliers online						
	Company staff make requisitions online						
	Call for proposals done through company website						
	E-Informing/E-notification						
	E-Invoicing						
	E-Sourcing						
	E-Tendering						
	E-Reverse auctioning						
	E-Awarding						
	E-Ordering						
	Benefits of E-procurement						
	Enhanced quality						
	Harmonization						
	Reliability of spending information						
	Product standardization						
	Reduced administrative cost						
	Value for Money (VfM)		1	2	3	4	5
	The duration of contract execution, order or service delivery influences pricing						
	Final cost of project is always higher than planned/budgeted						
	End users' requirements are largely missed at all times						
	End users always complaint that the procured products/projects/services do not fit the purpose of their acquisition						
	Monitoring and evaluation rarely influence procurement cost and quality						
	The user rate of procured products/projects/services is satisfactory						
	Most of our procurement activities are carried in a competitive manner						
	Greater supplier/contractor/service provider participation in our bidding process						
An equal playing field is offered to all potential vendors, in all stages of the procurement process							
Ethical issues are always considered at all stages in the procurement function							

	We make sure that only qualified and experienced officers are engaged in our procurement activities.					
	Potential Factors affecting e-procurement adoption	1	2	3	4	5
	Issues of procurement transparency and accountability					
	Issues of professionalism in the use of e- procurement systems					
	Lack of trust of system by suppliers					
	Unreliable energy supply					
	Government interference					
	Unreliable internet services/internet jam					
	Unreliable information available on website					
	Constraining legal and regulatory control					
Regulatory Environment(RE)	There is a government agencies that regulate procurement activities in the organization					
	E-procurement initiatives has been started by regulatory agencies					
	Legal and regulatory bodies have interest in the implementation of e-procurement					
	The regulatory environment positively impact on e-procurement adoption					
	Our procurement activities are regulated by PPA					
Supply Chain Management(SCM)	Our organization have a well-built warehouse					
	Inventory management (monitory) is done online.					
	Tracking of goods and service is carried out online					
	End-users make requisition online					
	Forecasting of procurement needs is easy with e-procurement					

THANK YOU

